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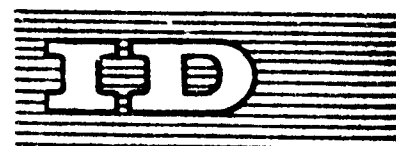
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Agenda item IV/5

SUMMARY

TRENDS IN POTASH SUPPLY^{1/}

by

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This paper deals with past and future trends in potash production and sales and gives information on the origin and structure of supply. The main points are summarized as follows:

1. Potash sales -- expressed in million MT K_2O -- increased from 4.7 in 1950 over 9.2 in 1960 to 17.2 in 1970, i.e. almost four times in 20 years.
2. In the same period production increased from 4.8 over 9.1 to 17.6 in 1970. Naturally there were annual fluctuations, however, in general production exceeded consumption by 100 - 200,000 tons K_2O in the first decade and by about 400,000 tons in the later part of the sixties. At the end of 1970 potash stocks were estimated world-wide to be 2.2 million MT K_2O .
3. These stocks and the increased difference between production and sales reflect the higher stock requirement of the increased world market.
4. Main sources of potash supply are Europe and North America, where deposits are estimated to be around 68 billion MT K_2O . The larger part of these reserves are

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in Canada and Russia, however, even those in Western Europe would allow to continue present production for several hundred years.

5. Based on potash sales of 1970 the producer countries rank as follows (million MT K_2O): USSR (4.2), Canada (3.2), USA (2.5), GDR (2.4), FRG (2.3), France (1.8), Israel (0.5), Spain (0.5), Italy (0.1), Congo Brazz. (0.1).

Potash production outside of Europe and North America -- i.e. Israel and Congo -- amounted to 0.6 million MT K_2O or about 4 per cent of the world total.

6. Agricultural potash consumption 1969/70 (excluding potash for industrial use) is given by FAO with 15.8 million MT K_2O . Out of this 9.6 million MT K_2O (or 61 per cent) were used in the 10 countries where potash is produced. Europe and North America absorbed 13.2 million MT K_2O or 83 per cent of the world consumption. In spite of their major share in population and agricultural area developing countries used in 1970 only 1.6 million MT K_2O , which is 10 per cent of the world consumption (1950: 1.5 per cent, 1960: 3.7 per cent).

7. Potash prices could be maintained nearly stable over the two decades under review. They decreased recently, due to premature announcements of excess capacities rather than due to an imbalance between supply and demand. High capital investment and increasing operating costs in potash mining indicate -- in spite of continuous rationalisation -- that maintenance of this depressed price level cannot be expected for longer periods.

8. It is estimated (also by TVA and others) that potash consumption will be in 1975 about 20 million MT K_2O . Potash producing countries will absorb 64 per cent of it and the continents Europe and North America 83 per cent. Until 1980 the respective shares are estimated to decrease to 61 and 81 per cent from a total consumption of 24.1 million MT K_2O . Correspondingly shares of developing countries will increase in this decade from at present 10 per cent to 12 per cent in 1975 and 15 per cent in 1980. (In million MT K_2O from 1.6, over 2.5 to 3.7).

9. Compared to 10-year consumption forecasts, those for production are at least as difficult and burdened with uncertainties. Not only will a multitude of individual management decisions influence annual production figures in existing plants but also in those under consideration. Some of the more than 15 recently discovered deposits may overcome their difficulties (as regards depth and K_2O content of deposits, water bearing strata, long distance land transport, brine disposal, etc.) and come into production.

10. Under these reservations and assuming that the above mentioned 10 countries and U.K. will be potash producing countries in 1975 and 1980 it is estimated that potash demand will be covered by a production of 21.5 million MT K_2O in 1975 and 25.0 million MT K_2O in 1980.



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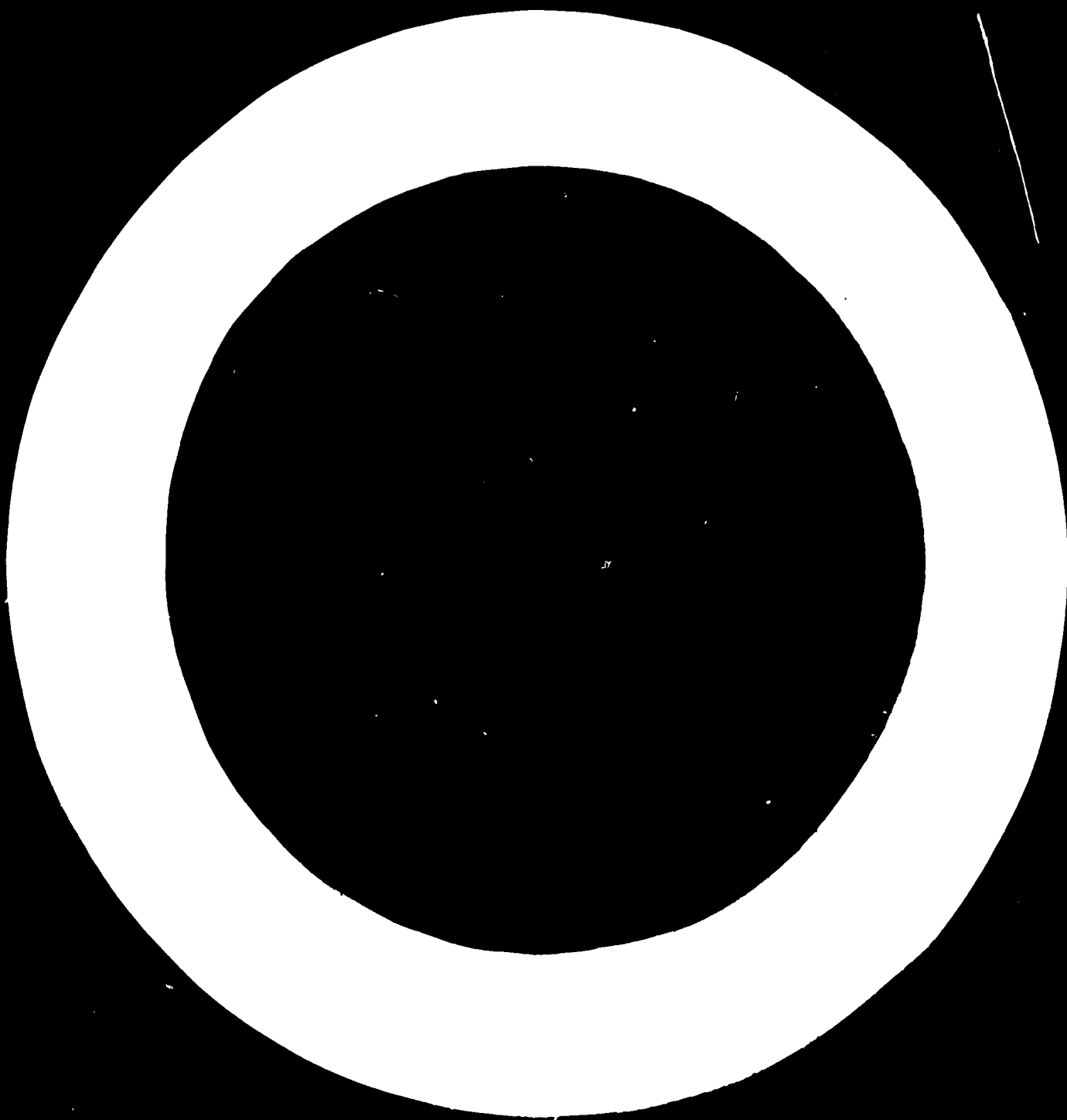
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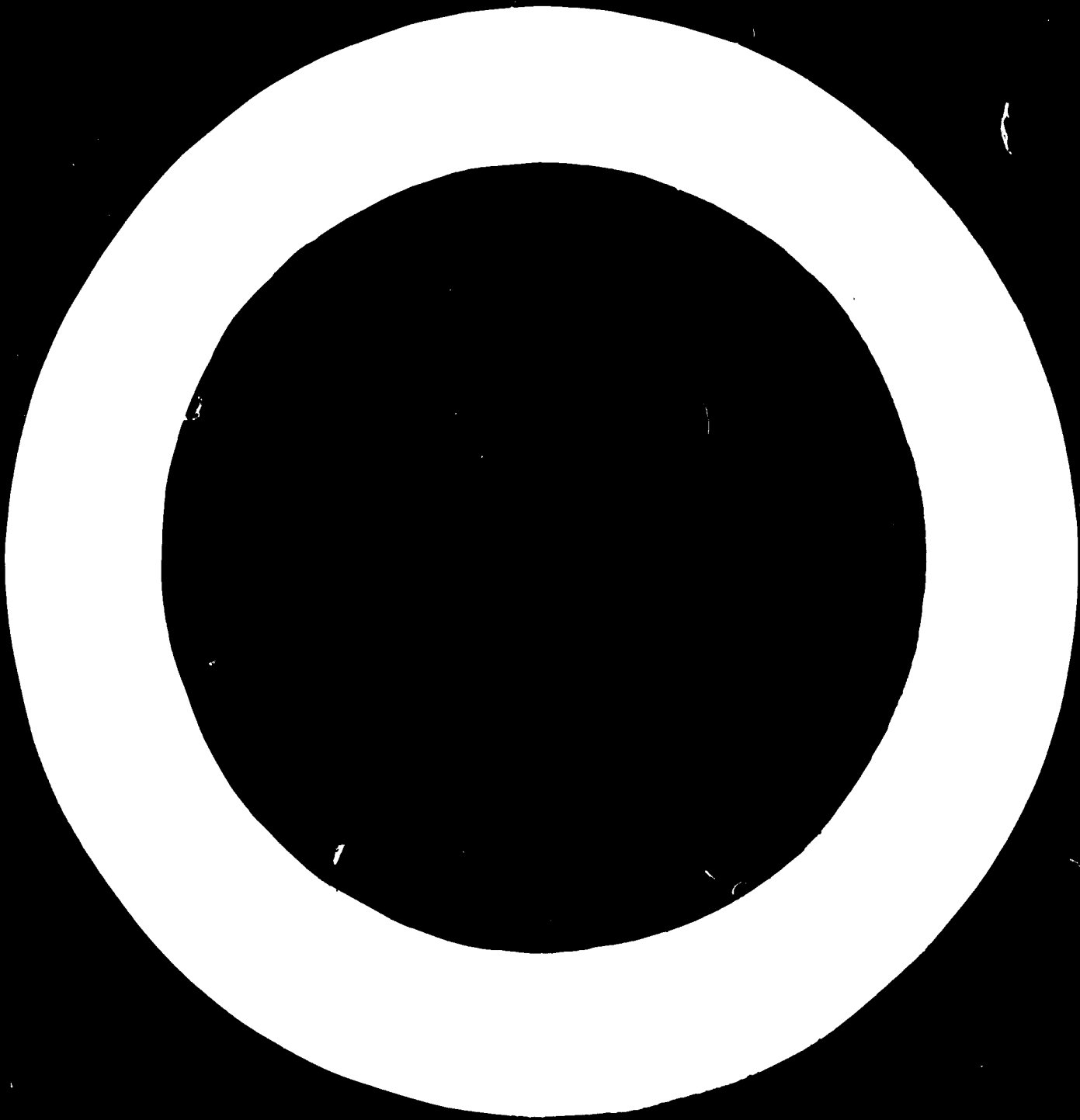
TRENDS IN POTASH SUPPLY^{1/}

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It's slightly more than a century that potash has been found to be required for plant growth and mines were constructed to supply potash for use in agriculture.

The continuous increase of agricultural production led to a strong increase of potash requirements so that 4.7 Mio tons K_2O were sold world wide in 1950. In the following table the development of sales is given annually based on calendar years.

Table 1: Potash sales 1950 - 1970 (in Mio tons K_2O)*

<u>1950</u>	<u>4.7</u>	57	7.4	64	11.5
51	5.0	58	7.9	65	13.0
52	5.4	59	8.2	66	13.8
53	6.0	<u>60</u>	<u>9.3</u>	67	14.7
54	6.3	61	9.6	68	15.6
55	6.8	62	9.9	69	16.7
56	7.2	63	10.5	<u>70</u>	17.2

Sales increased within 2 decades by 12.5 Mio tons K_2O and were 1970 with 17.2 Mio tons K_2O 360 % of those in 1950. It is interesting to note, more as a historical sidelight, that in the past (disregarding the period 1940-1950) potash sales within 2 decades increased to a very similar extent in percentage.

1900 - 1920	0.3 - 0.9 Mio tons K_2O	= 300 % (+ 0.6 Mio)
1920 - 1940	0.9 - 3.0 Mio tons K_2O	= 330 % (+ 2.1 Mio)
1950 - 1970	4.7 - 17.2 Mio tons K_2O	= 360 % (+ 12.5 Mio)

The following table gives the development of annual production figures based - as table 1 - on data from the Potash Industry.

* Sales figures are based on actual deliveries.

Table 2: Potash production 1950 - 1970 (in Mio tons K_2O)

<u>1950</u>	<u>4.8</u>	<u>1960</u>	<u>9.1</u>	<u>1970</u>	<u>17.6</u>
51	5.2	61	9.5		
52	5.6	62	9.6		
53	6.0	63	10.6		
54	6.7	64	11.8		
55	7.3	65	13.6		
56	7.7	66	14.4		
57	8.0	67	15.1		
58	8.1	68	15.5		
59	8.5	69	16.7		

In comparing these 2 tables we note that production followed closely sales as the demand developed. There were wide variations in annual-growth rates, ranging from 3 to 12 % in sales and from 1 to 15 % in annual production increases. The average increase, however, was around 6 % per annum and it is interesting to note that the average growth rate increased from 5 % in the first, to 7 % in the second decade.

Production exceeded sales between 1950 and 1960 by ca. 100 - 200'000 tons and by about 400'000 tons in the later part of the sixtieth. As the total volume of the world potash market increased the quantities produced had to exceed more those sold in order to assure sufficient stocks for a smooth supply of seasonal and regional demands for the coming year on a higher level.

By the end of 1970 total potash stocks were estimated to be 2.2 Mio tons. This figure must be regarded as an approximation since East European stocks could only be estimated, while those for Western Europe and North-America are given with 1.5 Mio tons K_2O .

The e.m. quantities would correspond to 13 % of the demand for 1971, which is expected to reach ca 17.5 Mio tons K_2O (including 650'000 tons K_2O for industrial use) and would therefore assure 1 1/2 months supply.

The origin of supply has undergone during the last decades considerable changes. Up to World War I potash was only mined in Germany. Later sizeable deposits have been found and exploited in other countries of Western Europe and also in USSR, USA and recently in Canada. So the number of supplier countries increased to 8 by 1940 and to 10 at present.

In the following table these 10 potash producing countries are listed according to the size of production in 1970 and with the respective quantities produced.

Table 3: Potash producing countries according to production 1970
(in Mio tons K_2O)

USSR	4.2	German Dem Rep.	2.4	Israel	0.5
Canada	3.2	Fed. Rep. of Germany	2.3	Spain	0.5
USA	2.5	France	1.8	Italy	0.1
				Congo- Braz.	0.1

Out of the total potash production of 17.6 Mio tons K_2O in 1970, 11.3 Mio or 64 % have been produced in Europe, 5.7 Mio or 32 % in North America and 0.64 Mio or 4 % outside of these continents.

This situation is easily explained by the fact that world demand patterns are dominated by regions with high fertilizer usage and potash deposits.

To illustrate this interdependence we refer to figures on potash consumption in 69/70, as given by FAO with 15.8 Mio tons K_2O . In the following table the potash producing countries are listed in the order of potash quantities used in 1969/70.

Table 4: Potash consumption 69/70 in potash producing countries
(in Mio tons K_2O)

USA	3.6	Fed. Rep. of Germany	1.1	Italy	0.2
USSR	2.3	German Dem. Rep.	0.6	Canada	0.2
France	1.3	Spain	0.2	Israel	0.01
				Congo	0.003

9.6 Mio tons K_2O have been used in 1969/70 by the home markets of the potash producers, which amounts to 61 % of the world consumption. Out of this 5.8 Mio tons K_2O were used in potash producing countries in Europe and 3.8 in USA and Canada.

Comparison of table 3 and 4 indicates the great impact of the home market size on export availability of product. While the 3 countries using the greatest potash quantities mentioned in the first column of table 4 (USA, USSR, France) export only around 30 % of their production those with small local markets listed in the third column (as Canada, Israel, Congo) export between 80 and 96 % of their potash production.

If not merely the producing countries but the surrounding markets on the continents where potash is produced are taken into consideration the share is considerably increased.

Potash consumption amounted 69/70 in Europe to 9.4 Mio tons K_2O = 60 % and in North America to 3.8 Mio tons = 24 % of the world consumption. Therefore 13.2 Mio tons K_2O or 84 % of the world's potash demand is located in these 2 continents, where a high level of agricultural production with large and still increasing potash requirements offer a sound basis for large scale production.

The remaining 2.6 Mio tons K_2O or 16 % of total consumption has been used in the rest of the world with the following break down:

Asia	1'530'000 tons K_2O
Central + Latin America	615'200 tons K_2O
Africa	240'000 tons K_2O
Oceania	194'000 tons K_2O

Deducting from these 2.6 Mio tons Japan (663'000) and Oceania (194'000) leads to a potash consumption of 1'722'000 in developing countries. In spite of their major share in population and agricultural area these countries represent at present 11 % of the world potash market.

The quantities supplied to developing countries and their share of total potash consumption has increased, however, considerably in the past and is expected to do so also in the future.

The following table gives the actual development resp. estimates of future trends, from 1950 to 1980.

Table 5: Potash consumption world wide and share of developing countries 1950 - 1980

(in Mio tons K_2O)

	World consumption	Developing countries	share (% of total)
1950	4.5	0.1	2
1960	8.5	0.5	6
1970	15.8	1.7	11
1975	20.3	2.4	12
1980	24.1	3.5	15

The a.m. figures are based on FAO statistics until 1970 and on industry estimates for 1975 and 1980.

Figures indicate a very rapid increase of potash consumption in developing countries from 0.1 in 1950 to 1.7 Mio tons K_2O in 1970 with a growing share of the potash world market.

This increased share of developing countries is due to the strong regional differences in potash use linked with different regional growth rates, as is shown in the following statistical compilation of FAO figures.

Table 6: Average Rate of Growth in % according to Regions
1963/64 - 68/69

Europe	5
USSR	21.4
North & Central America	8.6
South America	17.7
Asia	11.0
Africa	13.4
Oceania	7.0
<u>World Total</u>	<u>8.0</u>

With the exception of USSR (where, due to unlikely annual fluctuating rates between 1 and 58 %, figures might need revision) developing areas showed on the lower basis of consumption higher growth rates as the regions with high developed agriculture.

Accordingly it is assumed that regional differences will continue to persist also in the future. Annual growth rates in Europe, North-America, Oceania and Japan are estimated with 4 - 9 % while countries in Central and Latin America, Africa and Asia are expected to have annual growth rates in potash consumption of 11 - 15 %.

Thereby the share of developing countries will continue to increase to 12 % in 1975 and 15 % in 1980 - following, with a certain time lag, the trend in Nitrogen and Phosphate markets. (TVA gives the following shares of developing countries in 1969, 1975 and 1980: for N-: 26, 32 and 35 %, for P_2O_5 : 15, 24 and 31 %.)

In regard to the future situation in potash supply we have to evaluate first the availability, since potash production is - in contrary to other fertilizer types - dependant on deposits.

Estimates of world potash reserves differ widely. The most conservative estimate indicates 15 another 68 and the highest 122 billion tons K_2O . The consumption figures 69/70 of 15.8 Mio tons would suggest that at the present level potash production could continue for at least thousand years or taking the most likely medium estimate with 68 billion tons K_2O more then 2000 years even if potash consumption is doubled.

Therefore it can be concluded that potash reserves are very large and well sufficient to cope with the increasing demand in the future.

There are however considerable regional differences which are listed in the following table.

Table 7: Estimated size of actually worked potash deposits
(in Mio tons K_2O)

USSR	18'400	Israel	1'200	Italy	22
Canada	17'500	Spain	450		
Fed. Rep. of Germany	17'000	USA	400	<u>Total</u>	<u>68'032</u>
German Dem. Rep.	12'700	France	360		

This table gives, as stated above, only deposits actually worked in potash producing countries and naturally they are best known. In regard to future supply, however, we should also review those which have newly be found and are not yet exploited.

Those newly discovered deposits are reported from 3 already producing countries and from 16 countries where up to now no potash production exists.

The evaluation of these announced deposits in regard to the probability of exploitation is rather difficult since they are in very different stages.

The larger part has reported deposits but they are either not confirmed in reliable detail or exploitation faces a variety of obstacles which can not yet or never be overcome. Some of these are:

Deposits may be too deep, with too thin potash layers, too low in or with strongly changing K_2O contents; high impurities may complicate separation from accompanying minerals or difficulties exist in waste disposal, or water bearing stratae between potash layers endanger production. Combined with an unfavourable strategic position of deposits (with long distance land transport, lack of local demand and of access to other markets) one or a combination of the a.m. factors may burden potash prices to such an extent that the resulting poor cost: benefit ratio is prohibitive for any government or private investor.

Due to these technical and financial implications the exploitation of deposits is only impending in 1 country namely England, where potash production is definitely expected. This refers not to the former Whitby and Yorkshire projects but to Cleveland Potash, which will start production by 73/74 to reach the capacity of 600'000 tons K_2O in 1975.

In turning to future production estimates it is repeated that the above evaluation can only be an assumption since information is not sufficient to allow an accurate prediction. It is however almost certain - also because any potential new comer could just not make it until 1975 - that potash demand in 1975 will be covered by the a.m. 10 producer countries + England.

Compared to an estimated consumption of 20.3 Mio tons K_2O production is expected to reach in 1975 21.5 Mio tons K_2O (with 14.0 from Europe, 6.7 from North-America and 0.8 from outside these continents).

For 1980 it is assumed that estimated consumption of 24.1 Mio tons K_2O will be met by a production of 25.0 Mio tons K_2O . Since announcements of overall goals and projects in early planning stages could not be included this production is supposed to come from the a.m. 11 countries (with 15.7 Mio tons K_2O from Europe, 8.3 North-America and 1.0 Mio tons from outside these continents).

It goes without saying that this production estimates may be influenced by a great number of individual management decisions in existing plants and especially in the longer range also in regard to projects. As in the past the individual outlook on prospects of the world market or of regional markets may differ considerably not only within but also outside the potash industry.

To this the great variety of fertilizer estimates produced by international agencies and Governments as well as by the fertilizer industry will continue to contribute. Variations in estimates for a decade as they are existing now are in the range of 20 - 25 % or more than 5 Mio tons K_2O - a quantity corresponding to the double of potash consumption 69/70 outside of Europe and North-America! Needless to say that a closing of this gap in demand estimates by more detailed analyses of trends and more coordination by those interested would also facilitate the long term planning and forecast for production of fertilizers.

Notwithstanding the above mentioned uncertainties this evaluation of Trends in Potash Supply should clearly bring out that deposits are ample and plant operations will be able and flexible enough to follow potash demand in all imaginable orders of magnitude. As a TVA report states:

"Many factors will affect the world's ability to feed itself but fertilizers will not be a limitation".

Such limitations will not exist for potash supply. But they will continue to exist for potash demand unless more efforts remove the limitations in education on potash use, in marketing and credit systems and in long term planning of agricultural and fertilizer use development.





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