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REMARKS OF

EDWIN M. WHEELER

PRESIDENT

THE FERTILIZER INSTITUTE

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I suppose it is traditional that every speaker coming to Hawaii always makes the comment that Hawaii is a long way off but that anything occuring in the United States has an impact on these lovely islands. While it is a cliche, it is nevertheless true. Therefore the task assigned me today is to bring you closer to what is occurring within the United States and I want to talk on two events that are going to be felt here before you know it.

Event I

Clearly American farmers are disturbed by events that are confronting them for they were unanticipated. Continuing newspaper stories and editorials about the world starving to death while at the same time they see a rapid build-up in our rice reserves, a rapid decline in sugar prices and probably a bumper sugar crop, and last but not least, we have just completed a record wheat and corn crop in the U.S. with the result that prices are slowly declining. In addition, the soybean market has broken very sharply in the U.S. so that we can already tell the impact via the increased corn acreage route for 1976. It is true that there has been a good deal said about the wheat output declining due to a drougth and it will be down but not enough to make any appreciable difference. Our wheat exports are not holding to the level that everyone had hoped for and so the carry-over of the 1975 crop plus a now indicated good wheat prospect in the non-drought areas should alleviate any cause for alarm. All this adds up to causing farmers uncertainty

particularly in the face of their rapidly increased costs and rapidly declining prices. It is a miracle that our principal grain markets have not collapsed in view of the tremendous production last year but the farmers have had prior periods of relatively good income and have not been compelled to sell their crops at harvest time. In fact, they have surprised everyone by the slow orderly bringing to market of these big crops hence the relative stability. Yet even with the so-called stability we see a steady inching downward on the prices farmers receive.

Embargoes in the fall of 1973 and '75 are being blamed even unto this day by our farmers for the disruption of prices. This may have had a short term effect on price, but in all honesty the farmers need to take another look at what is happening to their offshore markets. Offshore markets are being disturbed by rapidly growing exports out of new sources, for example, Brazil where soybeans are concerned, but of greater importance and impact is the fact that everyone greatly overestimated world buying power. This is not to say that the need around the world for grain is not great but it is the lack of buying power that is causing the demand for U.S. grains to slow down.

There isn't any doubt, however, that embargoes and lack of faith in the politician's word probably have our farmers more concerned than any single event. They have been through

two distinct periods when embargoes had been preceded by a plea for maximum production. There will be a greatly stepped-up effort by the politicians to woo the farmer's votes because even in the early primaries we have seen tight elections won by the swing in the farm vote. Specifically, President Ford, Secretary Butz, and the assistant secretaries went through Illinois on a half dozen different occasions to try to placate the farmers and to assure them that the current administration's policy would be one to avoid embargoes if at all possible. I will say for President Ford that he used great candor in telling them he would not flatly rule embargoes out and I think the farmers began to get the message. That message is the U.S. consumer comes first.

I would like to conclude my first comments about what is going on in agriculture in the mainland by saying that we have a very, very nervous group of farmers. This nervousness reflects into some of their purchases, some of their planting intentions and in their general overall outlook.

Event II

Fertilizer and the farmer are tied together by money. If the farmer believes that he is going to do well with his crops he will really pour on the fertilizer. If he thinks that the crops are going to be sold at very low prices or that fertilizer material is beyond what he thinks it ought to be, it affects the sales of our material. In 1975 we had the first decline in consumption in the U.S. ever recorded.

Overall U.S. use of fertilizer was down about 10%. In order to have the record complete I have brought with me the figures for the State of Hawaii.

Hawaii Fertilizer Consumption

(Tons)

	N	P_2O_5	K_2O	Total	Tons of Goods
1970	28,802	19,082	23,955	71,839	189,262
1971	32,113	16,751	26,286	75,151	199,858
1972	29,507	22,114	23,646	75,267	202,725
1973	27,995	19,411	24,014	71,421	171,199
1974	26,312	19,935	22,845	69,092	165,720
1975	25,401	16,383	25,117	66,901	180,704

You will note from these figures that in 1975 Hawaii's consumption rate rose, but overall U.S. consumption was down appreciably. Around the world this same phenomena occurred

and as we will see in just a few minutes this is having a profound effect on the industry within the United States. There is an elastic demand for our products and for those of us in the industry to forget this No. 1 rule, we do so at great peril.

We are off and running, however, for spring 1976. Beginning in the early part of the year we saw Southeastern farmers beginning to return to normal rates of application. At the time of preparing this speech when the good weather had finally come to the Midwest, nitrogen was moving at a pace almost alarming in proportion. We should, therefore, come back to regular rates of application in the U.S. and should pretty well clean out very high producer's stocks of nitrogen. It is hard to believe that we have even had allocation and shortfall of both ammonium nitrate and urea simply because the material was not moving from producer to retailer distribution points fast enough. I have no doubt that nitrogen will be the best performer in 1976 and that come June 30th, the end of the fertilizer year, that material will be down to bin and tank floors.

I am not so optimistic, however, on P_2O_5 in any form. The inventories are simply tremendous and when I review the products a little bit later on in these remarks you will see the reason for my pessimism. Potash inventories are high and sales are reasonably good but I can't believe that we would cut the inventories for they are simply of record smashing proportions.

There is a great mood of pessimism beginning to sweep into the industry in the United States at the producer level. Speeches have been made and papers have been written indicating that we could get back into difficulty but all the papers, including some of my own, have concluded that we would not see the disasterous days of 1968, '69, and '70. We may have been too optimistic on this score. I hope that you will bear in mind that as we'll discuss the future of the U.S. producers we have to treat each of the main nutrients on a separate basis.

Turning to nitrogen first, current U.S. ammonia capacity is 19 million tons. In 1977, 3,340,000 tons of new production will come onstream. The rise in production both around the world and in our domestic operations will cause the nitrogen producers great difficulty. This could put the nitrogen producers between a rock and a hard place, that is, of shutting down older facilities or continuing to run them and be beaten to death financially. Two things can change this picture and do so drastically. First, for the last several years the U.S. has had unbelievably mild winters and this has not affected our production. Come a severe winter and production overall might drop so much that the new capacity would not be achieved. The other thing that could change this picture would be major crop failure in principal populated areas of the world raising the prices of our corn, wheat and so on to the point that the farmers would greatly increase

their use of the material. There are, therefore, two events ahead which might change this picture but my current feeling is that we are going to go into a rather sharp increase of nitrogen supply-surplus and that the market will be very shaky in 1977 particularly the latter part of the year. We still are contemplating an additional 900,000 tons of anhydrous ammonia coming onstream in 1978 which certainly does not brighten the picture.

There is no reason to kid anyone, nor try to fool anyone that the phosphate picture is rather gloomy. We are beginning to see total shutdown or severely curtailed output from many of the phosphate plants. Several years ago we tried to forwarn the industry that a 50% expansion simply could not be absorbed by the U.S. or the export market. The collision between booming production and a sharp substantial drop in domestic demand has stunned this segment of the industry. It may be that some relief is on the way later this year when we anticipate that exports of U.S. phosphates will pick up. I do not see the phosphate industry making any kind of a turn around over the next 24 to 36 months -- probably the latter. It is going to take the industry some considerable period of time to work its way out of this great over-production.

I think it should be borne in mind that there is a ray of sunshine as to the great over-expansion in the nitrogen

and the phosphate production facilities. Several years from now the newly built facilities could not be duplicated for anywhere near the price of these new investments if we continue to have inflation as most economists believe we will for the foreseeable future. For example, an ammonia plant that cost $75 million in 1977 will cost well over $100 million in the early or mid-eighties, so that it may turn out in the long haul not to be quite as bad a situation as would first appear. Nevertheless both nitrogen and phosphate have some tough sledding ahead of them.

We turn now to potash and I'll not rehash the various lawsuits and arguments going on in Canada except to begin with the current situation of the proposal by the Saskatchewan government to buy up to 50% of the potash mines. One must clearly understand that the Provincial government is honestly socialist in a textbook sense and they believe that they should control a very large part or all of the output. There's no doubt in my mind that they greatly overestimate their knowledge of the business. When the current premier took office, we were allocating potash and running the mines at capacity. Somehow or other the current Saskatchewan government got the idea that the fertilizer business, and more particularly the potash industry, was a bottomless pit of customers trying to literally tear the door from its

hinges. One cannot help but wonder that if they really studied the current world markets for potash and know what they are getting into that their ardor would remain high.

The reaction to the proposed seizure brought a rather sharp U.S. Senate Resolution passed unanimously which has not deterred the Provincial government nor has it stirred any action by the Federal government but certainly seems to have slowed down the once pell-mell pace. It would serve the Provincial government well if they would study the U.S. market for an example. If one goes back over a period of five years, U.S. consumption of potash has risen relatively little. Yet in that same period of time the U.S. has gone from curtailed restricted farming to unrestricted farming. Full acreage and full planting has not increased U.S. potash demand to any measurable degree.

The Canadians have failed to appreciate that most companies that are basic in the industry want to continue to own their own source of supply. This is particularly true of the cooperatives in the U.S. who, after all, have nearly 40% of the retail sales in the U.S. Their reaction, as well as others, has prompted a heavy drilling program exploring for potash underlying an area from Montana generally east towards Michigan. It is no secret that the current drilling in core testing ventures are sited in the Dakotas, Wyoming and Montana and the preliminary results look rather promising.

At the same time two other U.S. companies have begun a similar strong drilling program in far Eastern Canada.

Foreign suppliers such as East Germany and Poland have begun to step up their marketing efforts to indicate that there is more than one big guy on the block. Now we learn that the Soviet Union is becoming anxious to sell rather substantial quantities of potash to the U.S. One would make a great mistake looking to 1980 and beyond if he did not consider that a trade of U.S. grain for Soviet potash would be a very distinct possibility. Government policy would enter into this sort of an arrangement but, I believe strongly that whoever is the then Secretary of Agriculture would encourage Russian grain purchases and at the same time give them an opportunity to pay for it by exporting roughly two million tons of potash into the U.S. market.

So the Canadians may well get into the potash business -- but they may well wish they hadn't! All of us who have been in this business any period of time know that it is a high risk business. The Canadians are going to find out that even though it is a government owned operation it is not immune from those risks. It is not immune from market swings. It is not free from having all the problems that private venture capital has visited upon it.

The remarks that I have made would indicate that I am extremely gloomy about our future. I am not. The short term 36 month prospects do have some very onerous signs to them. We would be foolish not to recognize that producers are going to have a period of less than satisfactory profits based on their tremendous investment. The industry over the last several years has poured hundreds of millions of dollars into the business at a time when the cost of borrowing money was at an all time high. I do not try to say to them, "Well, it's just a little short term thing. You will outlive it." It is serious. Once we begin to see the fading away of obsolescent facilities and to see additional time pass we will once again work our way out of the dilemma.

I feel strongly that this will occur even though it is months away. First, because the world's economic picture is beginning to brighten and this means additional demands for better diet and more U.S. feed and food grains. Second, one must never forget that in a period of 36 months the world will have a net addition to its population of 200 to 220 million people. Even though these people are born in the poorer parts of the world they are going to demand to be fed and some way will be found to do so because the political repercussions are simply too great to permit anything else to happen. All in all then we have got some rough sledding ahead of us insofar as agriculture and its input industry is concerned, but I feel in the long term that this is the business to be in.

APPLICATION OF SUSPENSION FERTILIZERS

By Frank P. Achorn and Homer L. Kimbrough

A survey by the Tennessee Valley Authority and the Association of State Control officials indicates that about 2 million tons of suspension fertilizers were sold in the United States this past year. A suspension is a saturated fertilizer solution with small crystals of plant nutrients suspended in the solution. The main advantages of suspensions are:

1. They can be uniformly applied.
2. They can be placed beneath the soil at the exact location for efficient use by the crops.
3. The plant nutrient concentration of suspensions is usually twice that of solutions and comparable to granular bulk blends.
4. They are convenient carriers of pesticides or herbicides.
5. They can be transported and handled easier than granular fertilizer; they readily fill the needs of a highly mechanized agriculture system.

Transporting Suspensions

One of the drawbacks of liquid fertilizer is low analysis. With the new high-speed applicators which apply fluid fertilizer at a rate of more than one acre per minute, it is very difficult to keep the applicator charged and moving. Part of this problem can be solved by using high analysis suspensions so that more plant nutrients per load can be delivered to the applicator. However, there are some problems in transporting suspensions that do not exist with solutions.

The main difficulty is that road vibrations within the transport tank cause the gel of the suspension to weaken and allow crystals to settle. Figure 1 shows a sketch of a conventional stainless steel transport equipped with an agitation sparger particularly well adapted to transporting suspensions. This transport is equipped with a recirculating pump driven by a hydraulic motor. The pump is a centrifugal type and usually has a discharge diameter of 3 inches. Piping to the pump and sparger is of 3-inch, Schedule 40, stainless steel or plastic pipe. The sparger has 1/4-inch holes drilled in it on 4-inch centers. The liquid recirculating through the sparger sweeps the bottom of the tank and causes the fluid to be agitated.

A photograph of a standard cylindrical type transport truck used to transport suspension fertilizers is shown in figure 2. Some companies prefer cone-bottom trucks with an air unloading system as shown in figure 3. Air is injected at the base of each hopper and filters up through a diffuser pad to agitate the suspension and make it flow. When the appropriate pressure is built up in the tank (up to 25 psi), the discharge valve is opened so that the air blown into the suspension forces it through the discharge line. Pressure remains constant and the flow rate is controlled by a butterfly discharge valve.

Some companies transport fluids in spherical tanks on flat-bed trucks. The spheres shown in figure 4 are made of polyolefin plastic and are excellent for storing and transporting suspensions. Materials that settle to the bottom are circulated to the top of the spheres. No difficulties have been reported with deterioration of the plastic over a period of 10 years.

Surveys by TVA show other causes for delay in keeping materials supplied to the large applicators are:

1. The size and number of transports used to haul suspenions to the applicator.
2. Time required to pump the suspension from the transport to the applicator.

One equipment company has developed a tilting type transport that can be emptied quickly into the applicators. A photograph of this transport is shown in figure 5. These tanks are self-supporting and hinged on one side. They have a hydraulic system which raises and quickly unloads the tank as it is dumped into the applicator. Other companies have installed large transfer pumps with capacities up to 300 gallons per minute.

Broadcast Application

Most of the latest application equipment is of the high flotation type. Figure 6 shows a photograph of a popular tricycle-type high-flotation applicator. All piping is 3 inch. A centrifugal pump recirculates the liquid to an agitation sparger similar to those in the transports. It is usually located near the bottom of the side wall of the tank. Holes of the sparger are directed so that the fluid sweeps the bottom of the tank and provides continuous agitation. This applicator is equipped with a 60-foot boom and usually applies fertilizer at a speed of 15 miles per hour (depending on the terrain).

At this speed and with this swath, it is possible to apply fertilizer at an average rate of 1-3/4 acres per minute. The rate is controlled by:

1. Pressure of the suspension at the nozzles.
2. Number of nozzles.