off an intensive state safety campaign in Oregon

Carelessness Is the Villain

Carelessness and ignorance cause nearly all insecticide mishaps, some of which are incredible. A California sprayman, splashed with a parathion formulation, refused to wash it off when so directed. He further proved his manhood by drinking from the irrigation ditch where the spray tank was being filled. Another "accident" in the record. Cases nearly as extreme as this are not infrequent. In a negative sense they are perhaps encouraging, in that they seem a prime target for education compared with more nearly accidental cases like broken pipes and inadvertent spillage.

Labels offer a more concrete point of attack. The good ones go about as far as a label can go. Many exceed the legal minimum, but this, unfortunately, is no guarantee of effectiveness. Labels are read widely, but this again does not guarantee effectiveness. Some feel, for instance, that home gardeners are not likely to obey labels that direct them to to wear masks or protective clothing. Others may feel differently, but this is the sort of thing that must be weighed carefully when deciding whether or not the label will be adequate to the job.

Oregon officials screening label registration bids note a trend toward omitting emergency treatment data, particularly with less hazardous insecticides. They feel such data should be included and that they should cover the vehicle as well as the active ingredients. Kerosine poisoning, they point out, for example, is not uncommon and can be serious.

Complete or partial illiteracy is a label problem as is unfamiliarity with English. (Monsanto attacks the latter by printing appropriate safety posters in Spanish and Portuguese as well as in English.) Some have suggested that colored labels might cure these ills, but most authorities feel color in itself does not give adequate warning. A major reason is that one man in 12 is color blind to some extent and one in 50 is in effect completely color blind.

Analysis Shows Weak Points

Analysis of organic phosphate mishaps reveals several points that may deserve particularly strong educational effort. One is the apparently common idea that a poison is harmless unless swallowed. This is not universally true, of course, since some organic phosphates enter the body through the skin as easily as through the mouth and are equally hazardous by either route. It might also be useful to stress that one insecticide's being "safer" than another does not mean it is completely harmless. Malathion, for example, is one of the least hazardous organic phosphates; yet a Mississippi farmer is reported to have lost several calves after spraying them with a malathion formulation.

Medical facilities are a current educational target, and rightly so. Doctors must handle a terrific variety of problems; unless alerted, they cannot always be expected to diagnose and treat a parathion case, for example, correctly and with the necessary speed. The antidote for organic phosphates is atropine (dangerous itself if not used properly). One doctor, confronted with a parathion case, gave atabrine upon the patient's assuring him it was the correct antidote. Others, faced with organic phosphate-induced convulsions, have given sedatives, exactly the wrong thing to do.

The easy way out of this safety maze is to use less hazardous insecticides, and there is in fact a trend in this direction. Many agencies now tend to recommend malathion, where it will do an adequate job, in preference to the most dangerous organic phosphates. Less hazardous products would certainly be welcomed, but for many jobs the insecticides now used are the only ones that perform efficiently and economically. In the status quo, then, education and yet more education seems in order if public opinion is not to legislate slowly away the many benefits of insecticidal "economic poisons."

DAP Fits Trends

CF&I's diammonium phosphate jibes with high analysis move, but what about other coke ovens and fertilizers?

COLORADO FUEL & IRON's January shift from coke oven ammonium sulfate to diammonium phosphate fits nicely into two trends, one well established, the other barely under way. First is the very evident move toward higher fertilizer analyses; CF&I's DAP qualifies easily at 21-53-0. Second is the coke oven operators' budding concern about ammonium sulfate's future (AG AND FOOD page 283, April). Besides CF&I and Bennett Chemical Co. only U. S. Steel has moved and then only part way. Currently preparing to make ammonia from by-product hydrogen at its Geneva, Utah, works, USS will presumably continue to make ammonium sulfate. Kaiser Steel at Fontana, Calif., began test runs on coke oven diammonium phosphate in late March but has not committed itself.

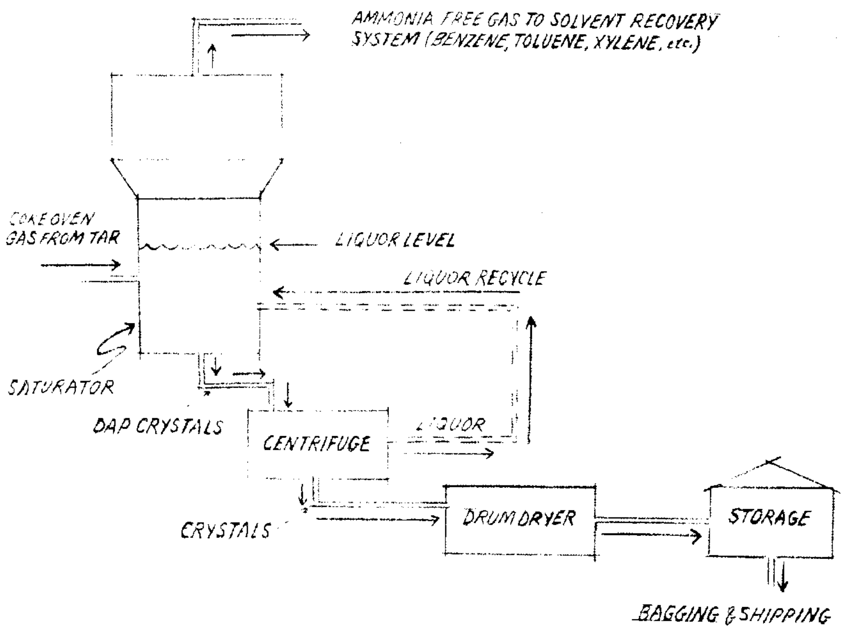
CF&I, with assists from Monsanto and Koppers, has apparently made a smooth transition. Basically, electric furnace phosphoric acid (from Monsanto) replaced sulfuric acid in the standard ammonium sulfate saturator units. Process control in the saturator is more critical for DAP than for ammonium sulfate, but on the other hand gives less trouble during washing and drying. Materials of construction must be considered too. Stainless steel, now used in most sulfate units, will take the change, but one firm is said to have decided against conversion because its monel equipment would not handle phosphoric acid

Industry Will Watch Closely

CF&I's 10,000 to 15,000 ton per year DAP output should not profoundly affect any but a local fertilizer market. The same is true of the 5000 tons (maximum) that TVA will apparently make and distribute commercially this year. DAP has the earmarks of a quality product, however, and the industry will doubtless keep a sharp eye on its progress. DAP's 53 phosphate units are reported to be completely water-soluble, a property to which high importance is attached today. The 21 nitrogen units, all in the ammonia form, should be as available as anhydrous or aqua ammonia nitrogen although TVA, at least, has not reported a definitive study of this aspect.

DAP's physical properties are said to be good. Commercial users, however, might want thorough proof chiefly because of the reputation of the unruly German product, Nitrophoska, which although different from DAP did contain diammonium phosphate, and some quantity of which entered the U. S. before World War II. TVA says its diammonium phosphate (from furnace acid) shows about the same caking tendency as monoammonium phosphate and ammonium sulfate, and less caking tendency than ammonium nitrate. Several commercial mixers reported 1946 pilot plant batches of TVA's product to be satisfactory in storage, handling, and mixing; TVA finds it compatible with all commonly used fertilizer constituents.

While relative selling prices do not give the complete picture of a fertilizer's value, they do give some basis for comparison. CF&I recommends a DAP retail price of $162 per ton in the Denver area; 10-20-0 costs $74.50 per ton in the same area. A system of common value units, based on the prices of ammonium nitrate and triple superphosphate in the area, shows a $2.08 tag per common



The flowsheet for DAP manufacture is very similar to that for ammonium sulfate

value unit of 10-20-0. At $162 per ton, DAP's common value unit cost is $1.88.

Related Products May Help

DAP is new and will doubtless need some educational backing, but older, related products may have at least prepared the way. Consolidated Mining & Smelting began making monoammonium phosphate (11-48-0) and ammonium phosphate sulfate (16-20-0) at Trail, B. C., in 1936. CM&S markets both products widely in the western and north-midwestern U. S. Stauffer at Tacoma, Wash., and Mathieson at Pasadena, Tex., has made ammonium phosphate sulfate for some years; Stauffer also makes monoammonium phosphate at Tacoma and at Garfield, Utah. Missouri Farmers Association at Joplin, Mo., got under way last year with both 11-48-0 and 16-20-0.

One noteworthy trend is toward a nitrogen-phosphate ratio of 1:1 or higher. Phosphate sulfate was a move in this direction. Stauffer came out last year with an 8-12-0 and is toying with a 12-8-0; CM&S is introducing a 27-14-0 this season. Should this continue, DAP might look better for high analysis mixes than as a simple.

Until recently, wet process phosphoric acid's impurities have made it an impractical raw material for diammonium phosphate. TVA, however, recently announced a wet process acid method (not suitable for coke oven conversion) and reports brisk interest; at least six firms have requested process economics data. Monsanto, meanwhile, reports two imminent prospects for the furnace acid process. And yet a third route to higher analyses is nitric acidulation of phosphate rock, used by Allied at South Point, Ohio, and Associated Cooperatives at Sheffield, Ala. (Nitric acidulation becomes more economical when sulfuric acid is in short supply.) Perhaps all that can be said for certain is that the technical advance goes on.

Indirect Insect Control

There may be a future for compounds that slow growth—they may even solve resistance problem

THE INDIRECT APPROACH to insect control is being explored by a research group at the USDA's research Center in Beltsville, Md. A group of insect physiologists has been investigating nontoxic chemicals that affect the development of insects. Traditionally, screening of chemical compounds for insect control has been directed to finding materials which would kill bugs at low concentrations. The physiologists, however, are interested in the effects of low levels of chemicals which don't kill the insects but do affect their development.

The project has evolved from one aimed at investigating the normal growth rate of insects. These normal development studies have now been expanded to include screening of compounds which affect development, especially in insect larvae. A wide variety of compounds has been found to affect development; colchicine and aminopterin prevent normal cell division and growth; sulfanilamide and coumarin seem to slow down the metabolism.

The insecticide synergist, piperonyl butoxide, is usually considered nontoxic to insects. It is added to insecticide formulations to increase the effectiveness of active insecticides. When added to the medium on which housefly larvae are grown, piperonyl butoxide has been found to slow down the development of the larvae, in some cases preventing them from becoming adults.

Added at a level of about 0.1% by weight to the larval-rearing medium, it allowed only about a quarter of the flies to develop into normal adults, and their development took two days longer than that of normal flies. Increasing piperonyl butoxide levels to about 0.25% prevented adult development of nearly all larvae. One interesting note turned up by the studies: piperonyl butoxide seemed to affect DDT-resistant flies more than normal flies.

The studies of DDT-resistant flies are considered to be particularly important, for in many areas the effectiveness of DDT as a control of houseflies has decreased to the point where it is nearly worthless. The physiologists are investigating the metabolic background for this DDT resistance with the aim of finding spots in the metabolism of the DDT resistant flies which might be susceptible to chemical attack. The attack from the physiologists' point of view would not necessarily have to kill the flies immediately but a long term poison of the antimetabolite type might be the right thing.

As yet the researchers see no immediate practical application of the work on growth or development inhibitors; in the long run they may be opening up a new approach to insect control.

Forest Insects

Insects now epidemic in most western forests, and losses exceed 5 billion feet/year; chemicals halt some but improvement vital

ASK WESTERN forest industry men about forest insects and their estimates can only be classified as "bunyonesque" in true forest industry tradition: Millions of infested acres require millions of dollars for control efforts. The goal: saving all or most of well over 5 billion