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OCCUPATIONAL HAZARDS TO PEST CONTROL OPERATORS WITH SPECIAL REFERENCE TO PESTICIDES

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With the help of one of your expert operators I have selected eight pesticides which I understand are widely used in vertebrate pest control, and with one exception, pose substantial safety problems for operators. These pesticides are the anticoagulants, zinc phosphide, 1080, strychnine, thallium sulfate, anhydrous ammonia, carbon disulfide, and methyl bromide. Except for the anticoagulants, it would be hard to assemble a more lethal group of chemicals. I wonder if the talents of chemical research should not be brought into this picture more actively, so that less hazardous materials could be developed for vertebrate pest control. Perhaps the economic incentives do not stimulate in this direction.

Nevertheless the vertebrate pest control operators have a reasonably good record as far as acute occupational poisoning is concerned. Either you are careful, lucky, or whatever health problems which may be occurring are not being recognized. One fortunate circumstance is that a good portion of the chemicals you use are not easily absorbed through the intact skin, a property which reduces the hazard to operators considerably.

On the attached table is presented a summary of the properties and hazards of the eight chemicals together with information about the protection of the operator using them. Also attached is a list of safety rules for workers handling pesticides (to be discussed in the oral presentation.)

Also I'd like to present some actual cases of poisoning or other harmful effects experienced by California workers to illustrate how operators may experience difficulties. Although none of these cases occurred to operators dealing with vertebrate pests they do concern the pesticides on our list.

Case 1. The manager of a fertilizer plant was standing 12. feet from a tank of ammonia which was in the process of transfer to an applicator. The hose broke and the ammonia stream hit him squarely in the right eye causing a severe burn. He was hospitalized for some time.

Case 2. A tractor driver was injecting ammonia in the vineyards. The hose came off and blew ammonia into his right eye causing chemical burns.

Case 3. A tractor driver was filling a tank with ammonia. The hose broke, splashing his eye. He has since undergone surgery to help repair permanent damage to his eyesight.

Case 4. A serviceman was adjusting a tractor and ammonia tanks. He took the hose off the tank without checking to see if it was empty. It wasn't. Ammonia burns in both eyes resulted.

Case 5. A warehouseman for a fertilizer company on a warm July day in the San Joaquin Valley hooked a hose to a truck tank of ammonia. Pressure in the tank had apparently built up because of the heat and the hose blew off,

spraying his face and eyes.

Case 6. A tractor driver was hospitalized with critical burns of both eyes when ammonia under pressure escaped from a leaky valve on a fertilizer applicator.

None of the injured was wearing eye, face or respiratory protection!

There have been no occupational deaths in the last six years reported to us where ammonia was applied as a fertilizer. However, there were three occupational deaths attributed to ammonia, one in a truck driver, one in a ginner, and the third in a utility man in a chemical plant.

The first resulted from a freeway accident where ammonia was discharged from a broken loading valve on a truck. The driver lost control of the truck and struck an overpass center column. The escaping ammonia caused considerable panic in the surrounding area and 100 nearby residents were evacuated and schools were closed for the day. Seven persons, including the highway patrolman and fireman who pulled the trucker from the wreck, were hospitalized after inhaling the ammonia.

The second death occurred during the transfer of anhydrous ammonia into a delivery tank truck from a railroad tank car in a fertilizer supply operation. The victim, a ginner who usually worked in another part of the plant, disconnected the hose before closing a valve and was sprayed with ammonia.

The third death occurred because a tank of ammonia exploded in a chemical plant, and a utility man inhaled enough to cause his death.

The following are among the six California occupational deaths from methyl bromide occurring over the past decade. A young Mexican laborer was employed by a company which processes edible nuts. When insects got into the nuts, it was customary to fumigate under tarps with methyl bromide. This employee had been assisting with these fumigating operations. He became ill rather suddenly at home and died within a few hours after being admitted to the hospital. The cause of death was not known until the coroner's office sent specimens to the State Health Department Laboratory to see if any unusual chemicals might be involved. Large concentrations of bromide were found in one of the specimens and subsequent investigations revealed the work history of repeated exposure to methyl bromide. Another death occurred to a worker in an ice room next to a date storage room being fumigated. The gas leaked into his work area and he became ill and died the next day. A warehouseman died following repeated exposures to methyl bromide from fumigated grain.

An exterminator was working with methyl bromide in a box car. A hose broke and he inhaled some of the gas. He recovered after complaining of nausea, vomiting, and chest pain for several hours. Methyl bromide is one of the most hazardous materials used by pest control operators. Repeated exposures are additive and damage to the lungs, nervous system, and kidneys may easily result. Contact with the eyes and skin may cause severe burns and skin rashes.

I found no records of deaths among adult workers involving the other pesticides on our list. However there are two deaths among California children during the past decade, one involving strychnine and the other thallium. In

both instances former occupants of the rural homes in which these children lived had left the pesticides. One boy climbed up to the top shelf in a shed to get the strychnine and another crawled under the house to reach thallium poisoned grain. It is important to note that young children are at the greatest risk of death from pesticides than any other group and that it is too often a commercial operation which is responsible for leaving the lethal material where children have access.

The Bureau of Occupational Health, of which I am a member, has on occasions examined poison bait mixing operations for Agricultural Commissioners. From these records a composite of the recommendations made for safe mixing of poisons is as follows:

1) The poison bait mixing machine should be properly enclosed and mechanically exhaust ventilated.

2) The stove and weighing tables should also be properly enclosed and mechanically exhaust ventilated.

3) Eliminate the operation of carrying the pot of poison concentrate and provide gravity feed system.

4) Provide adequate locked storage cabinets for concentrated poison stocks on hand.

5) Employees should be thoroughly informed concerning the risks of working with these poisons and the importance of meticulous personal cleanliness and good housekeeping in all of their operations.

6) Food, tobacco, and drinks should not be stored or used in the working area. Tobacco or lunches should not be stored in work clothing.

7) Adequate convenient washing facilities should be available so that employees can wash up after any accidental spill, before eating, drinking, and smoking, and before leaving work.

8) Arrangements should be made with a physician and an alternate physician who are willing to take emergency calls. Their advice should be sought in regard to posting of first-aid instructions, and any employee in whom there is any question of illness being related to materials used in the work place should be seen by either of these physicians.

In closing, I would like to leave you with the idea that working safely with chemicals requires a carefully worked-out plan known to everyone involved in the operations. The elements of the plan are keeping chemicals out of and off people, and providing emergency care for workers who accidentally contact a chemical or become ill.

SAFETY [illegible] USED IN VERTEBRATE PEST CONTROL

Name and Description	Hazard	Routes of Absorption	Effects	First Aid	Protection of Operator	Protection of Public and Wildlife	Miscellaneous
Anticoagulants (white salty crystalline solid)	Mild - repeated ingestion only	Ingestion only	Bleeding, interferes with clotting of blood	Call physician**	Avoid ingestion through contamination of food, beverage, tobacco and hands, TLV*-0.1 mg/M3	Store under lock away from foodstuffs.	
Zinc Phosphide (gray powder, garlic taste)	[illegible]	Ingestion, inhalation [illegible]	[illegible] vomiting, [illegible]	Call physician** [illegible]	Avoid ingestion and inhalation of dusts. [illegible] protective clothing. [illegible] work clothing home for laundry.	[illegible] wildlife [illegible] away from food. [illegible]	Do not heat or mix with oxidizing agents; keep dry; flammable with acids.
1080 - Sodium fluoroacetate (white salty powder)	[illegible] very dangerous to adult human	Ingestion, inhalation, contact with damaged skin	Effects delayed, vomiting, [illegible], convulsions - damage to heart	Call physician** There is no specific antidote	Same as zinc phosphide, TLV*-0.05 mg/M3	Same as zinc phosphide.	Use and possession restricted.
Strychnine (white crystals or powder)	[illegible] dangerous to adult human	Ingestion	[illegible] convulsions	Call physician**	Same as zinc phosphide, TLV*-0.15 mg/M3	Same as zinc phosphide.	
Thallium sulfate ([illegible] powder)	Extremely toxic [illegible] to adult human	Ingestion, inhalation of dust	[illegible] convulsions, loss of hair, effects similar to arsenic	Call physician** no specific antidote	Same as zinc phosphide, TLV*-0.1 mg/M3	Same as zinc phosphide.	Use and possession restricted.
[illegible] (magnet gun)	Extremely poisonous	Directly absorbed through all surfaces	[illegible]	Immediately [illegible] call physician** [illegible]	[illegible] protective equipment [illegible]	[illegible]	[illegible] has caused a number of severe [illegible] injuries and some deaths. [illegible] flammability.

*TLV = Maximum acceptable concentration in air for workers to breathe during 8 hour workday.

**Operators working with these materials should arrange in advance with a physician for emergencies and carry his name and phone number.

...ALTH INFORMATION SHEET FOR FUMIGANTS USED IN STRUCTURAL PEST CONTROL

Name and Description	Hazard	Routes of Absorption	Effects	First Aid	Protection of Operator	Protection of Public and Wildlife	Miscellaneous
Carbon Disulfide (or bisulfide) (gas with "rotten" odor)	Highly toxic 1 to 2 cc. liquid fatal to adult, less than 0.3% in air fatal in 1/2 hr. Repeated exposures to low concentrations are very hazardous	principally by inhalation, some by ingestion or skin contact.	Headache, nervous, dizziness, mania, weakness, irritant to skin and eyes	Remove to fresh air, artificial respiration, Call physician, give oxygen, wash contaminated skin and remove clothing.	Avoid all inhalation and skin and eye contact. If odor can be detected, concentration too high, use the protective equipment recommended for particular operation. TLV=20 ppm	Same as ammonia.	Explosive and flammable, toxic to plants and seeds.
Methyl bromide (gas with chloroform like odor)	Very toxic as gas or as liquid under pressure, repeated exposure to low concentrations are dangerous	principally by inhalation, readily some by skin contact.	may be delayed, skin eye, and lung irritation, alveolar pneumonia, kidney and central nervous system damage, repeated exposures dangerous .	If inhaled move to fresh air, artificial respiration, remove contaminated clothing, wash skin. Call physician"	Avoid all inhalation and skin and eye contact. If worker can smell it, he is inhaling for too much. Successful inhalation requires sanitation, use use of respiratory protection and protective clothing. TLV-20 ppm	Same as ammonia.	Teratogenic, Six (6) fetuses worker have died from methyl bromide poisoning during the past 12 years.

TLV: maximum acceptable concentration in air for workers to breathe during 8 hour workday.

"Operators working with these materials should arrange in advance with a physician for examination and carry his name and phone number.

SAFETY RULES FOR WORKING WITH PESTICIDES

1. Before working with pesticides operators should be informed of the risks to themselves and others and should receive instructions for safe handling. READ THE LABEL!

2. There should be on-the-job safety supervision. New employees and those not trained in handling chemicals need constant supervision. No one should work alone with a hazardous chemical.

3. Plans for handling emergencies must be made in advance with the doctor. Medical supervision should be provided for all work with hazardous materials.

4. Pest control equipment should be of proper design, well maintained and regularly cleaned so as to minimize spills or other pesticide exposure to operators or maintenance personnel.

5. Whenever there is a choice, the less hazardous chemical should be used and no more than is necessary.

6. Washing facilities should be readily available and any spills or splashes of chemicals should be immediately washed from the skin and the clothing changed. Hands should be washed before smoking or eating. Lunches and tobacco should be kept away from the chemicals. A shower followed by a change of clothing after each day's work is mandatory. Work clothes should be cleaned separately and not taken home for laundering.

7. The employer should provide, maintain and clean whatever protective clothing or equipment is needed for safe work with chemicals. Different pesticides may require different kinds of protective equipment.

8. Special care is necessary in handling concentrated pesticides. It is at this point that the greatest hazards lie, particularly if the chemical is readily absorbed through the skin. In the transferring of concentrates from drums, either threaded taps or drum pumps should be used. Measuring and pour ing from jars and cans is asking for trouble.

9. Pesticide containers should be properly labeled and stored under lock and key. No pesticide chemicals or their containers, empty or otherwise, should be left around where children or pets have access. Emptied containers should be burned, buried or decontaminated right away.