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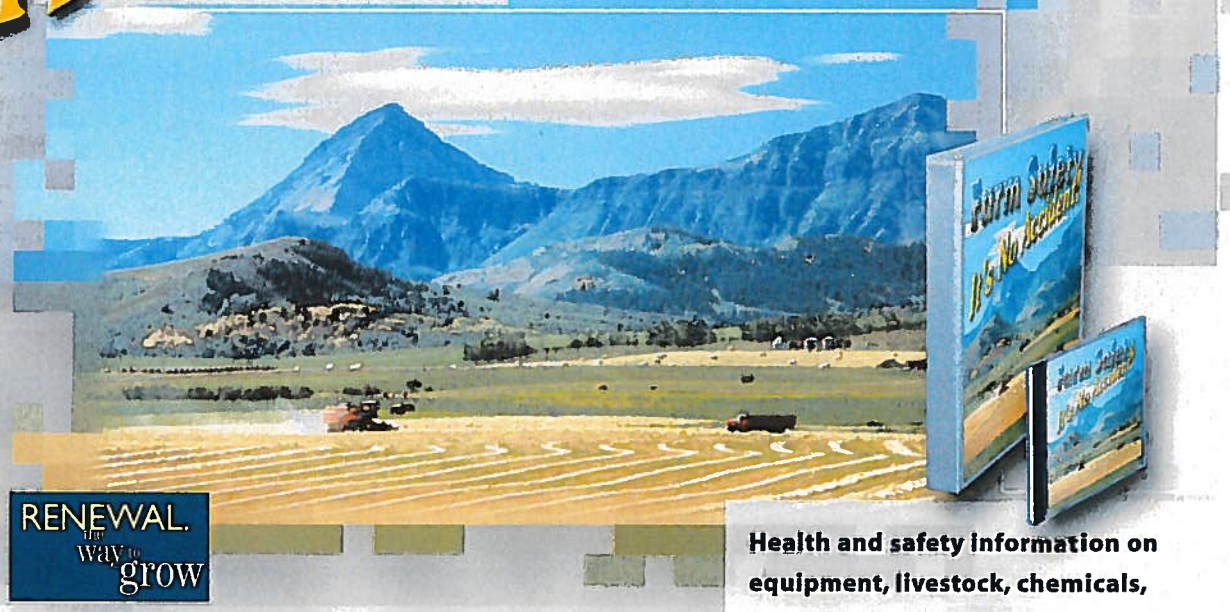

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SECTION 4: PESTICIDES & HAZARDOUS ATMOSPHERES

4.1 Pesticides and Hazardous Atmospheres—Introduction (Video)

FROM THE VIDEO:

Farmers are a tough bunch.

But with all the health hazards on a farm, tough isn't always enough. You've got to know the hazards and use the right gear as well.

The truth is, farmers don't always protect themselves as well as they could.

A lot of farm hazards won't get you right away; they'll catch up with you later in the form of chronic illness—unless you take precautions.

Dr. Tee Guidotti:

"I think that the general rule has to be to treat all agricultural chemicals with respect, to consider every chemical a potential toxic, something that just as a matter of course you want to protect yourself from in much the same way as you would want to protect yourself from an accident using farm equipment, or from hot water. You simply accept it as a hazard and treat it accordingly with respect and that means protective clothing, it means handling it carefully and following the manufacturer's instructions. And we know that if you do that, it works and you'll protect yourself."

A commitment to a "zero casualty" farm means eliminating and managing hazards before they cause harm.

You are responsible for your own health. There's no one forcing you to look after it, and nobody else to blame.

At the end of the day, you and your family are the ones who live with the consequences.

4.2 Toxicity of Pesticides

DVD:

When handling farm pesticides, knowledge is power!

- Pesticides are toxic chemicals, designed to kill undesirable insects and plants.
- Pesticides include insecticides, fungicides and herbicides.
- Some pesticides have low toxicity for humans. Others are extremely toxic.
- Toxicity is a measure of a chemical's ability to cause injury.
- Pesticide exposure can occur during container transport, filling and mixing, rinsing, spraying, maintenance and container storage.
- The greater the dose of pesticide absorbed, the greater the risk of injury.
- Some symptoms of poisoning develop within minutes or days. Others take years.

What are Pesticides?

- Pesticides are toxic substances, designed to kill undesirable insect and plant species. Insecticides, fungicides and herbicides are all types of pesticides.

What is Toxicity?

- Toxicity is a measure of the inherent ability of a chemical to produce injury. Some pesticides have low toxicity for humans, while others are extremely toxic.
- The most toxic pesticides are equivalent in their toxicity to some of the most potent known poisons.
- Symptoms resulting from pesticide poisoning can develop within a few minutes, or can take days, months or even years to show.
- The greater the dose of pesticide absorbed, the greater the risk of injury. Dose is dependent upon the absolute amount of the pesticide absorbed relative to a person's body weight.
- The most common route for pesticide absorption is through the skin. Pesticides can also enter the body in other ways, such as through the eyes, lungs and mouth.
- The longer a person is exposed to pesticides, the higher the level in the body.
- Exposure can occur during any of the activities involved in pesticide application: transporting, filling the tank, mixing, rinsing the container, spraying, sprayer maintenance and storage.

4.2.1 "Toxicity of Pesticides"—Dr. Tee Guidotti (Video)

FROM THE VIDEO:

Interview with Dr. Tee Guidotti on "Toxicity of Pesticides:"

"Pesticides vary tremendously in their level of toxicity. Some pesticides are extremely toxic and poisoning is a serious problem with them. Other pesticides are much less toxic so it's difficult to generalize. There are different groups of pesticides and the different groups tend to produce different types of symptoms of different severity. So it's very hard to generalize about pesticides as a group but I can say that the most toxic pesticides are equivalent in their toxicity to some of the most potent known poisons, and the least toxic approach the toxicity of common food ingredients so there is a very wide span."

"The first symptoms of pesticide toxicity usually look like the flu, or look like a bad cold. Frequently a person will have a headache, they'll be a little nauseous, runny nose, cough, a little pain in the chest that doesn't feel like it amounts to much and with increasing exposure these symptoms get worse. There may be changes in vision and with extremely high levels there can be . . . especially with the organo phosphate insecticide, a person can go into a coma, can have a severe seizure, can stop breathing, a number of very serious symptoms and in fact, acute pesticide poisoning can lead to death straightaway. But, that's for the very high levels of exposure and particularly for the more toxic types of pesticides such as the organo phosphates."

"You have to be exposed to a lot of herbicide in the short term to get an acute toxic effect. Insecticides are a different story - they're much more toxic."

"I think it's very important for farmers to use good common sense to protect themselves by using protective clothing and avoiding coming into direct contact with the pesticide. They should be very careful, for example, to open their mixing to be sure that none gets onto them particularly of the concentrate. They should be careful to stay away from the spraying cloud when the pesticide is being applied and to stay out of the drift. They should avoid going back into the field until enough elapsed time has gone by according to the manufacturer's specification. It's extremely important to change your clothes regularly so that the pesticide that's on the clothes doesn't come in direct contact with the skin. And it's very important to wash those clothes separately because if you wash clothes that are contaminated with pesticides with other clothes all you do is redistribute the pesticide onto the other clothes, so it's very important to keep pesticide contaminated clothes separate."

4.3 Pesticide Handling and Storage (Video)

FROM THE VIDEO:

Pesticides are important in maintaining high agricultural production and food quality.

However, all pesticides are toxic by design, and they can affect you.

Take the time to use them correctly. Understand what the hazards are, and take action to protect yourself and others.

This is not the place to cut corners.

4.3.1 Pesticide Handling and Storage Checklist

DVD:

Check your pesticide smarts. Can you say "yes!" to all ten items?

Do you...

- Lock up farm chemicals?
- Read the product label?
- Do what the label says?
- Wear all protective equipment?
- Prevent concentrate spills and splashes (check for leaks, pour smoothly)?
- Mix in well-ventilated areas?
- Only spray when wind is less than 15 km/h?
- Drive at right angles to wind (prevent drift onto operator)?
- Wash clothing, tractor and spray equipment each day?
- Keep people and animals out for correct period?

☑ **Rate your handling and storage of pesticides with this checklist.**

☐ I keep chemicals in a locked, ventilated storage area to keep bystanders and children out. This storage facility is identified by a sign.

☐ I always read and make sure I understand the information contained in the product label before I begin working with any agricultural chemical product. (The instructions on the label are like a prescription: they tell you how much pesticide to mix, where and how to apply it, and the precautions to be observed.)

☐ I wear protective clothing appropriate to the chemical as specified on the label. (These can include: chemical-resistant gloves of unlined nitrile or neoprene, coveralls, boots, hat and apron, approved respirator with cartridges for pesticides, and chemical protection goggles and face shield.)

☐ I follow all label directions for mixing, handling and disposing of chemicals.

☐ I mix pesticides outdoors or in well-ventilated areas only.

- ☐ I avoid accidental exposure to pesticides by inspecting the container for leaks and spills before handling.
- ☐ I am careful when pouring chemicals. (Pour smoothly to prevent gulping and glugging, which can cause spills and splashes.)
- ☐ I never spray when people are working in the field. I follow label restrictions regarding re-entry into sprayed areas.
- ☐ I spray when windspeed is less than 15 km/h to reduce drift. I drive at right angles to the wind to avoid spray drifting onto the operator.
- ☐ At the end of each work day, I inspect and wash down the tractor and spray equipment. I stay at least 50 metres (160 ft.) away from a water source.

4.3.2 Loading and Mixing

DVD:

Most exposure to pesticides occurs during loading and mixing!

- Exposure to concentrated products = very high risk of injury.
- Always read and follow instructions on label.
- Wear protective equipment: chemical gloves, chemical apron, goggles, face shield, cartridge respirator, neoprene overboots or high rubber boots.
- Keep children, pets and livestock away.
- Load and mix in a well-ventilated area. Have a good supply of clean water.
- Pour smoothly to prevent spills and splashes.

Most exposure to chemicals occurs during loading and mixing. Since you're working with highly concentrated products, the potential for injury is very high. Splashes, spills and even vapours can contaminate (and harm) an unprotected handler.

- Always read and follow the label instructions before loading and mixing.
- Use chemical resistant gloves to protect your hands, a chemical apron to protect your abdomen and upper legs, goggles to protect your eyes, a face shield to protect your face and eyes, a respirator to protect against pesticide vapours, and neoprene overboots or high rubber boots.
- Keep children, pets and livestock away from loading and mixing areas.
- Carry out loading and mixing in a well-ventilated area and have a good supply of clean water available.
- Stand upwind during all opening, pouring and mixing operations.

4.3.3 Use Proper Storage Checklist

DVD:

Proper storage facilities protect farmers, children and livestock from accidental contact!

- Store pesticides in original containers, tightly closed, with original label.
- Do not use improvised containers. These can leak and rupture, chemical can "sweat" through and hazard labels are missing.
- Lock and ventilate storage area.
- Keep visitors, children and animals away.
- Install correct fire extinguishers. Keep flammable materials away (dry grass).
- Have spill control material (sawdust, sand, soil).
- Keep an inventory.

Pesticides are dangerous enough to keep under lock and key. The whole point of a proper storage facility is to prevent accidental contact. Without it, children and livestock can all come into contact with containers that are lying around. They have no protective gear and no supervision; and they'll do things you wouldn't do, because they don't understand the hazards. Tragedies can occur in the absence of reasonable precautions.

☑ **Is your chemical storage area properly set up? Use this checklist to find out.**

- ☐ Chemicals are only stored in properly labelled, closed original containers. Partially used products are stored in their original, closed containers. (Improvised containers don't do the job—they can leak and rupture, the chemical can "sweat" through, and there are no hazard labels.)
- ☐ The storage area is locked and ventilated.
- ☐ Utensils and containers used for mixing are also locked up.
- ☐ Visitors, children and animals are kept away from this storage area.
- ☐ The storage facility is identified with a sign.
- ☐ The appropriate fire extinguishers are available outside this storage area.
- ☐ There is no flammable material, such as dry grass, around the perimeter of the site.
- ☐ Absorbent material (sawdust, sand, soil, etc.) is available in case of a spill.
- ☐ There is an inventory of all chemicals in storage.

For more information, refer to Alberta Environment's "Pesticide Storage: Regulatory Requirements and Guidelines", available on the Internet.

4.3.4 Transportation

DVD:

When transporting pesticides, protect the general public and protect yourself.

- Check label for handling precautions.
- Inspect container for leaks and spills.
- Transport pesticides only in properly labelled, closed original containers.
- Prevent damage in transit. Ensure containers cannot move.
- Never transport chemicals in passenger side of vehicle.
- Have absorbent material available in case of a spill during transit.

When you transport pesticides, you have a responsibility to protect the general public as well as yourself.

- Read and understand the label to identify special handling precautions.
- Before handling the container, inspect for leaks and spills.
- Transport pesticides only in properly labelled, closed original containers.
- Prevent damage in transit. Securely fasten containers or tie them to a pallet to prevent shifting during transportation.
- Never transport chemicals in the passenger side of any vehicle.
- Have absorbent material available in case of a spill during transit. Decontaminate the vehicle before departing from the spill site.

4.3.5 Rinsing and Disposal (Video)

Don't be fooled. Empty pesticide containers can be as hazardous as full ones. Even a tiny amount of concentrate can be poisonous. Often, the chemical soaks right into the plastic—there's no way to clean it out completely. Empty pesticide containers can be a hazard to you, to children and to livestock.

Rinse and Puncture

- Add rinse water to the container, shake and drain into sprayer or mix tank. Do this three times. Make the empty container unsuitable for further use by puncturing several times on the top and bottom.
- Triple-rinse or pressure-rinse and puncture all pesticide containers before you take them to a collection site. (This is a requirement.)

Disposal

- Take all empty and rinsed pesticide containers to an approved collection site near you. See the list of collection sites in the province at http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/inf10646.
- Take empty granular bags, cardboard containers or plastic liners to a Class II landfill for proper disposal.

4.4 Using Pesticides Safely (Video)

FROM THE VIDEO:

If you're using pesticides, this label is your best friend. It's a one-stop shop for everything you need to know about what's in that jug—and how to protect yourself while using it.

Now, there's no question that protective gear is a bit inconvenient, and it's an added expense.

But we're talking about substances that will do damage to your health. The damage may not be visible for a long time, but it's there, and it will surface.

Wear the gear. Protective clothing acts as a barrier to prevent skin absorption. Proper safety equipment protects everything else—your hands and feet, your eyes and ears, your nose, mouth and lungs—against pesticide vapour, dust, splashes and spray.

Don't forget to decontaminate after. Properly wash your protective clothing to get pesticide residues out. And wash yourself too—the longer pesticide residue is on your skin, the more you'll absorb.

In short: find out what you're dealing with, protect yourself and get on with the job.

4.4.1 Read the Label and Know the Symbols

DVD (1 of 4):

Read the label on a pesticide/herbicide container!

- This information tells you how to protect yourself.
- Warning symbols and signal words tell you the chemical's toxicity.

Warning symbols are a combination of:

- *Primary hazard symbols* and signal words (Poison, Corrosive, Flammable, Explosive)
- *Precautionary symbols* (Danger, Warning, Caution)

What's on a pesticide label?

- Before using any pesticide, carefully read the information printed on the pesticide container label. All the information you need is included on the label—the hazard level, safety precautions, symptoms of exposure and first aid.
- The warning symbols and signal words on every pesticide label tell you the chemical's toxicity. This is important—know what the symbols mean.

The warning symbols on a pesticide label are made up of two parts: the primary hazard symbols and the precautionary symbols.

Bulk Shipments:

Bulk shipments of pesticides might not have the usual manufacturer's product label attached. Instead, there may be a WHMIS (Workplace Hazardous Materials Information System) supplier label.

- Normally, your bulk supplier will provide you with a printout of the official product label. The product label is important, since it gives information on proper mixing and application rates.
- You may also be supplied with an MSDS (Material Safety Data Sheet). An MSDS is an industry-standard printout that lists the properties and hazards of a chemical, as well as safe handling measures. MSDSs are widely used as an information source under WHMIS.
- Product labels and MSDSs can be obtained from any company that sells the pesticide, or from the manufacturer's Internet web site.

DVD (2 of 4):

Primary Hazard Symbols

- The four primary hazard symbols indicate the type of hazard for a chemical.
- Symbols always appear with a signal word: Poison, Corrosive, Flammable or Explosive.
- Poison: chemical is poisonous if taken into the body (absorbed, swallowed).
- Corrosive: chemical is either acid or alkali (caustic) and can burn the skin and eyes.
- Flammable: chemical is flammable or easily ignited. Keep the product away from heat, sparks or open flame.
- Explosive: chemical can explode (pressurized cans, certain herbicides in galvanized steel tank).

Primary Hazard Symbols

The four primary hazard symbols indicate the type of hazard for a chemical.

Symbols always appear with a signal word: Poison, Corrosive, Flammable or Explosive.

The POISON symbol warns that the chemical is poisonous if taken into the body. Keep the product out of reach of children. Use the appropriate safety measures when dealing with poisonous products.

The CORROSIVE symbol warns that the chemical is corrosive to the skin and eyes. The chemical is either acid or alkali (caustic) and can burn the skin. Protect your skin and eyes when using this product.

The FLAMMABLE symbol warns that the chemical is flammable or easily ignited. Keep the product away from heat, sparks or open flame. Do not smoke while mixing or applying this product.

The EXPLOSIVE symbol warns that the chemical can explode. For example, this would apply to a pesticide in pressurized cans. Explosive conditions can also be created by using Roundup or Rustler in a galvanized steel spray tank.

DVD (3 of 4):

Precautionary Symbols = three border "shapes" and signal words.

- Symbols indicate the severity of the hazard posed by the chemical.
- Danger = High hazard. Octagon "stop sign" shape.
- Warning = Moderate Hazard. Diamond shape.
- Caution = Slight Hazard. Triangle shape.

Precautionary Symbols

The precautionary symbols are the three border "shapes" along with their corresponding signal words. These indicate the degree of the hazard posed by the chemical.

DANGER

- octagon "stop sign" shape
- high hazard

WARNING

- diamond shape
- moderate hazard

CAUTION

- triangle shape
- slight hazard

DVD (4 of 4):

On pesticide labels, one glance at the combination of primary hazard and precautionary symbols tells the type and severity of the hazard.

For example:

- Danger + Poison = very toxic, dangerous pesticide
- Warning + Poison = moderately toxic pesticide
- Caution + Poison = slightly toxic pesticide
- Warning + Corrosive = moderately corrosive
- Caution + Explosive = material with a mild explosion hazard

When handling, be sure to wear appropriate protective gear.

Primary Hazard + Precautionary Symbols

On labels, the primary hazard and precautionary symbols are combined. This tells the user both the type and severity of the hazard—at a glance.

For example:

Danger + Poison = a very toxic and dangerous pesticide.

Warning + Poison = a moderately toxic pesticide.

Caution + Poison = a slightly toxic pesticide.

Warning + Corrosive = a moderately corrosive material.

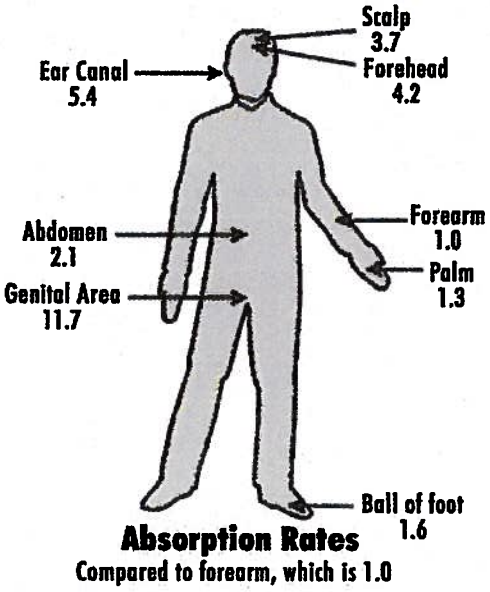
Caution + Explosive = a material with a mild explosion hazard.

4.4.2 Pesticide Absorption

DVD (1 of 2):

Pesticide can enter the body through skin, eyes, lungs and mouth. Skin absorption is most common.

- Different parts of the body absorb pesticide at different rates (head and groin are highest)
- Scalp: absorbs 3.7 times more than forearm; ear canal: 5.4 times more; groin area: nearly 12 times more
- Goal: reduce absorption to level where "no known harm" occurs



It is impossible for farmers to avoid exposure to all of the chemicals which they are applying. However, protective gear and good handling practices can reduce absorption into the body, to levels that are not known to cause harm.

To reduce the danger of exposure, wear recommended protective clothing and proper safety equipment, limit clothing worn for pesticide use to that use only, and wash clothing and equipment daily after use.

Different parts of the body absorb pesticides at different rates. For example, assuming that the forearm is given an absorption rate of 1.0, the relative absorption rate of pesticides in the ear canal is 5.4, on the scalp 3.7, on the forehead 4.2 and the genital area 11.7 (almost 12 times greater than the forearm!). The groin area and the head are the areas where absorption is the greatest.

Exposure can occur during any of the activities involved in the spraying operation: transporting, filling the tank, mixing, rinsing the container, spraying, sprayer maintenance and storage.

Pesticide can enter the body in three ways: through the skin and eyes, through the lungs and through the mouth.

DVD (2 of 2):

Skin:

- Absorption by direct contact with pesticide or contaminated clothing
- Contact with concentrate is very high risk

Eyes:

- High sensitivity to pesticides
- Absorption by vapour and fumes, dust or spray drift, spills and splashes

Lungs:

- Inhalation of fumes, dusts and spray mists
- Extremely fine particles can be completely absorbed

Mouth:

- Pesticide entry: eating or smoking with contaminated hands, or licking lips

Skin and Eyes

- Pesticide absorption through the skin is the most common. It can result from direct contact with the pesticide or from wearing contaminated clothing. Skin is exposed to pesticides by direct handling of pesticides: from spills and splashes during mixing and handling of the concentrated pesticide, during equipment adjustment and from spray drift during application.
- Eyes are very sensitive to pesticides. They can be exposed to vapour and fumes, dust or spray drift. As well, accidental spills and splashes can occur when containers are being opened or when pesticide is being poured into the sprayer tank.

Lungs

- Pesticides can enter the body if you breathe in fumes, dusts or spray mists. Fumes and extremely fine particles of dust or spray can be completely absorbed by the lungs.

Mouth

- Pesticides can enter the body through the mouth when users eat or smoke with contaminated hands or lick their lips.

4.4.3 Preventing Personal Contamination Checklist

DVD:

Avoid personal contamination when handling pesticides! Remove residue before it can be absorbed!

- Keep pesticides away from lungs, eyes, mouth and skin.
- Know toxicity and handling procedures.
- Wear recommended protective clothing and equipment.
- Provide water for frequent handwashing and cleanup.
- Do not smoke, eat or drink while handling.
- Wash hands before eating, drinking, smoking or using the toilet.
- Shower thoroughly at end of day.
- Do not wear contact lenses.
- Launder clothing daily. Change sooner if contamination occurs.

This isn't about looking nice. It's about removing the pesticide residue on your body before it can be absorbed. How diligent are you at preventing personal contamination?

☑ **Use this checklist to rate your safety in preventing personal contamination.**

- ☐ I keep pesticides away from my lungs, eyes, mouth and skin.
- ☐ I know the toxicity of the pesticide and the procedures for safe handling.
- ☐ I wear the proper protective clothing and safety equipment recommended on the label.
- ☐ I keep plenty of water available for frequent handwashing while applying pesticide and for cleaning up accidental spills and splashes.
- ☐ I do not smoke, eat or drink while handling, mixing, loading and applying pesticides.
- ☐ After handling, I always wash my hands before I eat, drink, smoke or use the toilet.
- ☐ I do not use my mouth to blow out plugged nozzle tips.
- ☐ At end of the spraying day, I shower thoroughly, washing my body, my hair and under my fingernails. (The longer a pesticide resides on your skin, the greater the probability it will be absorbed into your body.)
- ☐ I do not wear contact lenses while handling pesticides. (Contact lenses are very hard to wash if they are contaminated by splashes or mist droplets.)
- ☐ I launder coveralls daily, and change more often if contamination occurs. (If coveralls are not washed daily, they become a source of pesticide for you to absorb.)

4.4.4 How to Wash Pesticide-Soiled Clothing

DVD:

Skin can absorb chemicals from improperly laundered garments (secondary exposure)!

- Store in plastic bags. Wear rubber gloves. Avoid spreading contamination.
- Discard clothing if soaked with pesticide concentrate.
- Wash separately from family laundry.
- Use laundry pre-treatment (helps remove oil-based pesticides).
- Use hot water, full water level and a heavy-duty detergent.
- Wash clothes two or three times to remove as much pesticide as possible.
- Line-dry clothes (prevent dryer contamination).
- Remove pesticide residues in washing machine (full cycle, hot water, detergent).

Good laundry practices can remove most pesticides from clothing. This is important—the skin can absorb chemicals from improperly laundered garments. This is called "secondary exposure."

Handle and wash contaminated clothes and equipment with care, in order to avoid contaminating yourself or others. To avoid secondary exposure to chemicals, take these precautions:

- Handle all soiled clothing with rubber gloves.
- Remove pesticide granules from cuffs and pockets outdoors.
- Discard any clothing that is saturated with full-strength chemical concentrate.
- Use disposable garbage bags for temporary storage of pesticide-soiled clothes before washing.

These laundry practices have been developed to remove a higher percentage of pesticide from contaminated clothing:

- Wash pesticide-soiled clothing separately from your regular family laundry, to avoid contaminating the rest of the family's clothing.
- Spray pesticide-soiled clothing with a laundry pre-treatment product. This helps to remove oil-based pesticides.
- Use the hot water setting, full water level for normal cycle.
- Use heavy-duty detergent.
- Wash clothes two or three times to remove as much pesticide as possible.
- Line-dry clothes to prevent possible contamination of the dryer and to increase the chemical breakdown of pesticide residues.
- When you finish using your washing machine, rinse it of any pesticide residues by running the machine through the full cycle using hot water and detergent.

4.4.5 Personal Protection Checklist

DVD:

Prevent harmful side effects from pesticides/herbicides. Protect yourself when pouring, mixing and spraying.

- Read the label! The container lists the protective equipment and clothing needed.
- Prevent skin contact (cover up, head to toe). Avoid clothing, hats, boots and gloves that absorb chemicals (cloth, leather).
- Protect eyes and ears.
- Use correct respirator and cartridge to prevent inhalation.

Exposure to pesticides during pouring, mixing or spraying can affect your health. You can prevent harmful side effects by taking proper precautions.

To protect yourself against pesticide exposure, use protective clothing and suitable safety equipment. Always read the label for the specific protective clothing and equipment you need.

☑ **Use this checklist to assess your personal protective measures when handling pesticides.**

☐ I wear protective clothing when handling any pesticide, to reduce contact with my skin. (Clothing acts as a barrier to prevent skin absorption of pesticides). Several articles of clothing, which leave little skin exposed to the chemical, are recommended to be worn when handling pesticides:

- long-sleeve shirt
- long pants
- coveralls
- neoprene or unlined rubber gloves
- neoprene over-boots or long rubber boots
- wide-brimmed hard hat

☐ When mixing pesticide concentrates, I wear a waterproof apron for added protection.

☐ I avoid cloth or leather gloves, leather shoes or sneakers, baseball caps and wrist watches with leather bands. (These materials absorb chemicals and prolong exposure.)

☐ I use goggles or a face shield to protect my eyes and face from pesticide vapours, dust and splashes.

☐ I wear a respirator to protect against inhalation of dust, powders and sprays. (A respirator for pesticides contains a charcoal cartridge and a pad to filter out dust and spray particles. Adjust properly for airtight fit over the nose and mouth. Be aware that beards and mustaches can prevent an airtight seal.)

- ☐ I replace the charcoal cartridge or the entire disposable respirator at the first sign of chemical odour.
- ☐ Before buying disposable protective items, I read the label and make sure they are recommended for the pesticide I intend to use. (Disposable coveralls with a protective coating give added protection when worn over regular work clothing. Do not launder disposable coveralls. Replace them if severe pilling, rips or holes occur. Dispose in a plastic bag and take to an approved collection site; do not burn.)
- ☐ I wear chemical gloves when handling all pesticides. (Roll up the glove to form a cuff, and wear under sleeve of coverall to prevent pesticides from running off the gloves and onto the arms. Use unlined nitrile and neoprene gloves. Avoid contaminating the inside, and wash gloves inside and out after daily use. Replace when cracks, pin holes or discolouration appear.)
- ☐ I use a hard hat to protect my hair and scalp from spray, dust and powders. I avoid leather inner bands.
- ☐ I wear neoprene over-boots or high rubber boots to protect my feet. I wear pants over boots to prevent accidental spills from draining into the boot. (Knee-length boots are also available with safety toes for extra protection.)
- ☐ I use disposable ear plugs to protect my ears when dust, sprays and spills are likely to contaminate me.
- ☐ I have equipped tractor cabs with charcoal filters to remove chemical from the air while spraying in the field. (Ordinary dust filters will not protect you.)

4.4.6 Pesticide Exposure Response

DVD:

Know how to deal with pesticide exposure!

Preparation

- Emergency numbers beside telephone
- Know first aid and CPR
- Rescuer knows how to help without being exposed
- Have emergency cleanup kit in field and storage area

Emergency response

- Decontaminate immediately. Do not delay. Seek immediate medical attention.
- If symptoms of pesticide poisoning occur, seek immediate medical attention.
- Take labelled container along.

Given the danger of many pesticides, it's worth having a response plan for when things go wrong. In case of accidental exposure:

- Decontaminate immediately. Seek medical attention right away.
- If symptoms of pesticide poisoning occur, seek medical attention right away.

Preparation

- Have emergency numbers listed by the phone in case of an emergency: family doctor, ambulance, pesticide supplier, Alberta Environment, Poison Control Centre, etc.
- Have all adults in your family trained in first aid and CPR.
- In the case of a highly toxic pesticide, the responder needs to know how to keep from contaminating him/herself also. Two casualties are not better than one. Teach everyone how to help without becoming a second casualty.
- Have emergency equipment in the field and storage area. This emergency kit should contain: clean water supply, soap, clean clothes, dry towels and absorbent paper, first aid kit, and plastic bag for contaminated clothing.

Emergency Response

- In case the pesticide completely soaks the skin and/or clothing, remove the contaminated clothing at once and thoroughly wash the exposed areas of the body with water and detergent. Scrub thoroughly under fingernails and toenails. Repeat the process with detergent and clean water and rinse with water. See a doctor if the area of contact is large or if irritation persists.
- If pesticide gets in your eyes, wash them with water at once. Hold the eyelids open and flush eyes for at least 15 minutes with fresh water. Do not use any eye medication unless prescribed by a doctor. Seek medical attention and take the labelled container with you.

- If pesticide has been swallowed, get to the nearest hospital at once. Do not induce vomiting even though label instructions may say so. Health and Welfare Canada states that inducing vomiting by a non-trained person can be more hazardous to the victim than the chemical itself. (Take the container along. If you're not positive what was swallowed—for example, if a child has swallowed chemical—take along your inventory of pesticides also.)
- Symptoms of pesticide poisoning vary with each pesticide and are described on the container label. If you are severely exposed to a pesticide and you are alone, do not panic. The symptoms do not show up immediately. You will have some time to decontaminate yourself.

The Chronic Effects of Pesticide Poisoning (Video)

Interview with Dr. Tee Guidotti on "Chronic Effects of Pesticide Poisoning:"

"...it varies on the type of pesticides one is talking about. The herbicides, and in particular, 2,4-D, have been associated in a number of studies now, a number of very good studies, with the potential risk of cancer over a number of years. This is an uncommon cancer and certainly cancer is an uncommon problem after using these herbicides. A person can go their entire life and not develop this problem, but there is an increased risk of developing these types of cancer after exposure to 2,4-D. I think I'm quite confident in saying."

"There are also some nervous system disorders that have been demonstrated after exposure to the class of pesticides called the organic phosphates. These can occur, for example, 10 or 20 years after an intense exposure to these pesticides, that's pretty rare too. In general, the problems that we have with pesticides tend to be short term rather than long term. The chronic health effects are generally less of a problem for the herbicides, less of a problem for most of our insecticides and it's the short term toxicity of the insecticides that is the principal public health problem."

Information medical personnel need in case of pesticide poisoning:

Dr. Tee Guidotti:

"Well, one of the key pieces of information that the physician would need to know, for example, in order to treat a pesticide poisoning case, is what pesticide was being used and what the exposure was. If it's an organo-phosphate insecticide, then the physician has very specific treatment including a specific antidote for that class of compounds."

4.5 Hazardous Atmospheres (Video)

FROM THE VIDEO:

On farms, hazardous gases are created by bacteria as they decompose plant material and manure. These gases are often heavier than air, and collect in low places and confined spaces. Hazardous atmospheres are created where toxic gases and a lack of oxygen create potential death traps for the unwary.

If you are overcome by fumes in a manure pit or silo, the odds are very low that you will be rescued before you die. Too often, untrained and unaware rescuers are also overcome when they try to retrieve an unconscious person, leading to multiple deaths.

Entering these areas is a very serious business. Know the hazards. Keep untrained people out. And, take every precaution before you enter. This is no place to take a chance.

4.5.1 Manure Gases Checklist

DVD:

Manure gas often claims multiple lives! Untrained rescuers die trying to help an unconscious person.

- Manure pits (lagoons) are confined spaces. Harmful gases can accumulate. Rescue of an unconscious person is difficult.
- Atmosphere can be oxygen deficient, toxic or explosive (hydrogen sulphide, carbon dioxide, ammonia, methane).
- Keep untrained people out. Place warning signs. Cover openings with metal grates.
- If entering pit (empty or full), use confined space entry procedures: gas test, ventilate, self-contained breathing apparatus, harness and lifeline, trained watch person.

Manure pits (lagoons) are confined spaces because harmful gases can accumulate and rescue of an unconscious person is difficult.

The atmosphere in a manure pit can be oxygen-deficient, toxic and explosive. Manure gas often claims multiple lives.

Hazards

These four gases in manure pits are of major concern:

- Hydrogen sulfide, heavier than air, is a highly toxic gas that can cause dizziness, unconsciousness and death. Don't rely on smell to detect this gas. At low concentrations, it smells like rotten eggs. At higher concentrations, it dulls the sense of smell so that no odour can be detected.
- Carbon dioxide, heavier than air, is an odourless and tasteless gas that can cause unconsciousness and death. (Carbon dioxide can also build to lethal levels in grain bins.)

- Ammonia, lighter than air, is a gas that has a sharp, fetid smell and can irritate the eyes and respiratory tract.
- Methane, lighter than air, is a gas that can create an explosive atmosphere.

Preventive Measures

☑ **Assess your safety around manure pits by completing this checklist.**

- ☐ I have placed manure gas warning signs near the manure pit and manure storage areas to warn of the gas hazards.
- ☐ I have covered openings to manure pits with metal grill covers to prevent accidental or unauthorized entry, and to provide natural ventilation.
- ☐ I never enter a manure pit alone. I use the "buddy" system and wear a lifeline.
- ☐ I test the atmosphere for oxygen and for levels of toxic and explosive gases present in the manure storage area. (Gas detection equipment can be rented at safety supply stores.)
- ☐ I always wear a self-contained breathing apparatus before entering a liquid manure pit, even if the pit is empty.
- ☐ I keep family members, visitors and untrained workers away from manure pits.

4.5.2 Confined Spaces Checklist

DVD:

Dangerous gases can collect in a confined space. Restricted entry/exit makes rescue of an unconscious person difficult.

- Examples: silos, grain bins, trenches, open-air manure pits (toxic gases, low oxygen).
- Keep untrained persons out. Post warning signs. Block access points.

If entering:

- Never enter alone.
- Test for toxic gases and oxygen levels.
- Ventilate area and wear self-contained breathing apparatus (not cartridge respirator).
- Wear harness and lifeline.
- Train watch person! Never enter if person has collapsed. Call for rescue.

A "confined space" is any enclosed or semi-enclosed area where:

- entry or exit is restricted
- rescue of an injured or unconscious person is difficult, and potentially dangerous to the rescuer

A confined space can also be an open-air depression where heavier-than-air gases can accumulate in dangerous concentrations, creating a toxic or oxygen-deficient atmosphere. Confined spaces can be deadly. If a hazardous atmosphere exists, you could be overcome by fumes and pass out or die because of toxic gases or lack of oxygen. Confined spaces on farms include: silos, grain bins, manure pits, controlled atmosphere storage buildings, deep trenches and well shafts.

☑ **Use this checklist to evaluate your confined space entry practices.**

- ☐ Before entering a confined space, I test the atmosphere for oxygen and for levels of toxic and explosive gases. I repeat this test if I decide to re-enter this area.
- ☐ If a hazardous atmosphere is detected, I wear self-contained breathing gear and ventilate the confined area as much as possible. (Cartridge respirators will not protect you.)
- ☐ I never enter a confined space area alone. I use the "buddy" system and wear a lifeline.
- ☐ I make sure everyone understands the rescue plan should something go wrong.
- ☐ Family members, visitors and untrained workers are kept away from confined spaces.
- ☐ Warning signs are posted on or near all confined spaces. Family members, visitors and untrained workers obey all these warning signs.
- ☐ I have covered or blocked all openings and access points to confined spaces.

4.5.3 Silo Gas Checklist

DVD:

Silo gas is deadly. Exposure = sudden death or permanent lung damage!

- Silo gas (nitrogen dioxide) forms immediately after silage enters silo.
- Highest concentration in 48-72 hours. May persist for 3 weeks.
- Keep out! Place warning signs. Lock access points.

If entry is essential:

- Provide high-volume ventilation (silo blower) for at least 30 minutes.
- Keep blower running.
- Never enter alone.
- Train watch person! Never enter if person has collapsed. Both will die. Call for rescue.

Silo gas (nitrogen dioxide, NO_2) is a deadly gas formed immediately after chopped silage is loaded into the silo. Exposure to this hazardous gas can result in sudden death or extensive and permanent lung damage. Even limited exposure to NO_2 can result in severe lung disorders.

☑ **Use this checklist to assess your safety when dealing with silo gases.**

☐ I have placed silo gas warning signs near the silo. I have locked up access points to keep family members, visitors and untrained workers out.

☐ I have ventilated the feed room to remove any silo gas that may have leaked down the chute, in order to prevent contamination from affecting livestock.

☐ I know how to recognize the presence of silo gas:

- bleach-like odour
- brown haze with a yellowish top at the silage surface or near the feed room floor
- abnormal breathing or coughing by livestock or people
- dead flies, rodents or cats on the feed room floor

☐ If it is necessary to go into a silo at the completion of filling, I do so as soon as the last load is sent up. (Silo gas concentration may be the highest 48-72 hours after filling. Lethal concentrations may exist for up to three weeks in poorly ventilated silos.)

☐ I always power ventilate the silo for at least 30 minutes before entering. (High-volume power ventilation, such as the silage blower, is required to remove this heavier-than-air gas. If the silage has settled, air must be directed downward.)

☐ I determine the level of NO_2, CO_2 or O_2 present before entering a silo. If dangerous levels exist, I do not enter. (Gas detection equipment can be rented at safety supply stores.)

- ☐ I never enter a silo alone. I use the "buddy" system and wear a safety harness with lifeline. I make sure that high-volume power ventilation continues while anyone is in the silo. I have people available outside the silo to help in an emergency. (Most safety experts insist that a self-contained breathing apparatus must be worn when entering a silo. Small amounts of silo gas can cause severe lung damage. These apparatus may be rented from safety supply stores.)
- ☐ I have discussed the rescue plan with my outside safety person (who stays outside the silo while I enter). The safety person knows who to call for help, what the land location is and how to use the telephone. The safety person clearly understands that entering the silo to assist an unconscious person, without proper self-contained breathing gear, will not help, but will make the situation worse.

4.5.4 Safe Handling of Anhydrous Ammonia Checklist

DVD:

Anhydrous ammonia can cause devastating injuries!

- Contact = severe burns to eyes, skin, throat and lungs.
- Ensure equipment is in good condition (hoses, fittings).
- Wear personal protective equipment and clothing (goggles, rubber gloves, face shield or respirator, long sleeve clothing).
- Water reduces injury! Carry two emergency water supplies (shirt pocket, tractor/truck).
- Use locking hitch pins. Bleed hose couplings before disconnecting.
- If exposure occurs, use emergency water for 15 minutes. Seek emergency medical attention.

Improper handling of anhydrous ammonia can have devastating results on farm workers. Common injuries are severe burns to eyes, skin and the respiratory tract.

☑ **How do you rate in your handling of anhydrous ammonia? Fill in the following checklist.**

- ☐ I wear personal protective equipment and clothing when handling anhydrous ammonia: goggles, rubber gloves with thermal lining, face shield or an approved respirator. I wear a lightweight rubber suit or a long-sleeve shirt and coveralls.
- ☐ I have an emergency water supply in two locations: a squirt bottle in my pocket for instant use and a large supply in the tractor or truck.
- ☐ I check that hoses are in good condition, and fittings are clean and free from rust.
- ☐ I check that the tank is secured with a locking hitch pin.
- ☐ I make sure tanks are not filled beyond their approved capacity.
- ☐ I always bleed hose couplings before disconnecting.

- ☐ In case of exposure to anhydrous ammonia, I use the emergency water supply for at least 15 minutes and then seek emergency medical attention.

4.5.5 Carbon Monoxide

DVD:

Carbon monoxide (CO) gas overcomes victims with little or no warning!

- CO is invisible, has no smell and does not irritate nose or throat.
- Cause: incomplete fuel combustion (engines, space heaters, faulty appliances).
- Prevention: Ensure adequate fresh air flow. Appliances must be properly vented.

Symptoms do not provide reliable warnings!

- Nausea and headache may occur.
- Loss of consciousness and death follow.

If exposed:

- Move into fresh air immediately. Keep warm and walk if possible. Seek medical attention.

Approximately four Albertans die each year as a result of exposure to carbon monoxide due to faulty or improper use of heating devices.

Carbon monoxide is invisible, has no smell and does not irritate the nose or throat when inhaled. Carbon monoxide can overcome victims very quickly, with little or no warning.

Engines and other combustion sources may continue to operate in an atmosphere with dangerous carbon monoxide levels.

Symptoms

Symptoms of exposure include nausea and headaches. Continued exposure may lead to loss of consciousness and death.

Treatment

Move into fresh air immediately. Keep warm and if possible walk. Obtain medical attention.

Causes

Carbon monoxide is created by incomplete combustion. Appliances that are not regularly serviced or maintained, have improper venting or are incorrectly installed may be sources of carbon monoxide.

Precautions and Prevention

- Have furnaces and other heating devices inspected regularly.
- Keep chimneys and vents clear of debris such as snow, leaves and nests.
- Ensure that fireplaces and wood stoves have a source of fresh air for combustion.
- Never use unvented gas appliances (propane torches, camp stoves, barbecues) as space heaters.

Avoid situations where propane torches or equipment and tools powered by gasoline engines are used inside buildings or other partially enclosed spaces. If there is no alternative, ensure a HIGH VOLUME of fresh air supply is available—fully open all barn/shop doors and windows, and ensure a strong draft can be felt in the work area.