

# REDUCING CHEMICAL TOXICITY TO PESTICIDE APPLICATORS<sup>1</sup>

by Elliott Schaffer

Pesticide safety is an all encompassing term that deals with all facets of pesticides, their use, and disposal. It is not my intention to discuss pesticide safety in general, but specifically the aspects of pesticide safety that lead to a reduction in chemical toxicity to pesticide applicators. At ChemLawn Corporation, the safe use of pesticides in the environment is our business, and we have always had a long-standing tradition of pesticide safety with strong company policies toward the use of pesticides as they concern our employees, our customers, and our customers' property.

From the very beginning we have felt that it is imperative that all pesticide applicators have a thorough working knowledge of the pesticides and equipment that they use. To that end, it is a policy of ChemLawn that all employees using pesticides be licensed, certified pesticide applicators in the state in which they are employed. As a licensed applicator, one has sufficient knowledge to handle pesticides, know when and where to use them, and whom to contact in the event of a pesticide emergency.

When dealing with chemicals on a large-scale basis, it has been found that an employee health program protects both the employee and the employer. The CHEMLAWN EMPLOYEE HEALTH PROGRAM was initiated in 1976 with the assistance of Dr. Bianchine of the Ohio State University (OSU) Department of Pharmacology and Dr. Yeary, leading toxicologist for the OSU Department of Veterinary Medicine. The program consisted of monitoring employee exposure to cholinesterase inhibiting pesticides, primarily organophosphates and carbamates.

## Cholinesterase Testing

Cholinesterase testing is an integral part of our

employee health program and goes a long way in reducing the risk of chronic pesticide toxicity to our applicators. Chronic pesticide toxicity is the key. Acute pesticide toxicity is something that we are well aware of; it is something that pesticide safety constantly addresses. It's the chronic affects of pesticide toxicity that we want to monitor to make sure that our employees are kept safe at all times.

Acetylcholinesterase is an enzyme the body manufactures on a continual basis to hydrolyze acetylcholine. Electrical impulses move from the brain through the nerves and over nerve synapses or "switches." Acetylcholine is a chemical that keeps the "switches" open, and cholinesterase is the enzyme that closes these switches. If the synapse or switch remains open, a continuous flow of impulses results, and the message becomes jumbled, causing twitching and convulsions.

Cholinesterase is found in many parts of the body, but is more easily monitored in the blood stream. It is found in both the blood plasma and red blood cells. Cholinesterase-inhibiting pesticides attack plasma cholinesterase first and then red blood cell cholinesterase.

Doctors tell us that once they have blocked all the plasma cholinesterase, these cholinesterase-inhibiting pesticides seek out red blood cell cholinesterase before affecting the brain. Consequently, by maintaining the red blood cell cholinesterase at a safe level, the nervous system cholinesterase is automatically safe. This, therefore, is the foundation of a blood testing program: to ensure that the red blood cell cholinesterase stays at a safe level, thereby protecting the nervous system cholinesterase.

The ChemLawn cholinesterase monitoring system starts with a pre-placement physical for all

1. Presented at the annual ISA conference in Indianapolis, Indiana in August of 1983.

new employees to determine a "baseline" or normal level of blood cholinesterase. The lower the baseline, the less exposure to cholinesterase-inhibiting pesticides the body can tolerate. One purpose of the pre-employment physical is to identify those individuals who should be prohibited from daily contact with cholinesterase inhibiting pesticides. This is for the protection of the new employee and the company. Other tests involving liver and kidney functions are also run.

After that, and once the employee is on the job, the blood is tested every three weeks during the time the applicator has daily exposure to cholinesterase-inhibiting pesticides. This is more often than the National Institute of Occupational Safety and Health recommends, which is once a month. It is our company's policy to follow more stringent guidelines than the OSHA recommendations.

Any individual who drops below .5 pH/hour or who drops more than 40 percent from one sampling to the next, receives a "concern" notice from our lab indicating that a problem is developing. When an individual drops below 70 percent of their normal baseline for RBC cholinesterase, the branch manager is instructed to remove the individual applicator from daily contact with pesticides until the cholinesterase level is restored, usually within two weeks.

Immediately following this off-truck concern, a thorough investigation is undertaken. In the few instances where we have had to remove employees from trucks, almost always the problem has been traced back to improper filling techniques with concentrates or the employee's general, overall health. Very, very infrequently does it have any relation to the exposure to the dilute material sprayed on properties. Our studies also show that the cholinesterase of our more experienced applicators, who presumably are neater sprayers and safer handlers of pesticides, does not drop as much as does that of newer applicators. ChemLawn also does not allow the general use of any Category I pesticides to be used by any employee.

### Safety Procedures

There are only three ways that pesticides can enter the bloodstream: (1) skin absorption, (2) in-

halation, and (3) accidental ingestion. Because the most likely avenue of exposure is through skin absorption, we have moved, whenever possible, away from coming in contact with the concentrates to the use of elaborate fill systems and, ultimately to filling through the use of computer-controlled fill systems. Although computer fills are now being tested, they are not yet in all locations. One thing that is in all locations, is a recycle system (Figure 1). These recycle systems are used to catch all washwater in the facility. The water is then diluted and recirculated by pumps and returned in small quantities into the spray equipment on a daily basis. Where our tree and shrub service and lawn care service are operating out of the same facility, we do not allow our tree and shrub operators to utilize each others washwater. The recycle system ensures that no pesticides can contaminate local storm drains, sewers, or water supplies — something that is of concern to all communities today.

Let me now describe the fill equipment and procedures that may help your company reduce exposure to the chemicals. First of all, the fill area should be clearly identifiable and defined. Pesticide data, fill charts, and labels should be posted for the chemicals currently in use (Figure 2). Storage areas should be labeled, drums should be clearly marked each time they are changed, and a pan for collecting or absorbing spills should be placed underneath all drums. One of our facilities has employed the use of a mobile drum rack to allow for neat, orderly filling and cleaning. Pipe elbows allow unused portions to be

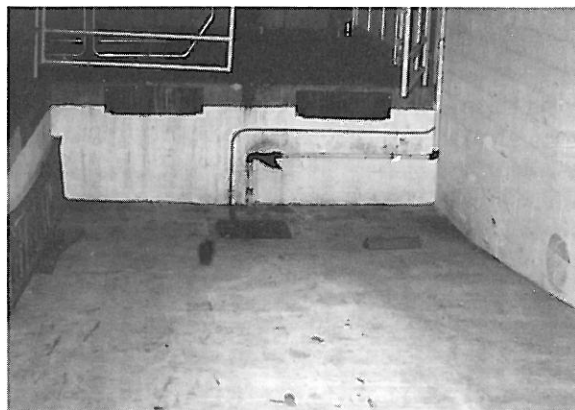


Figure 1. Recycling basin for pesticides.



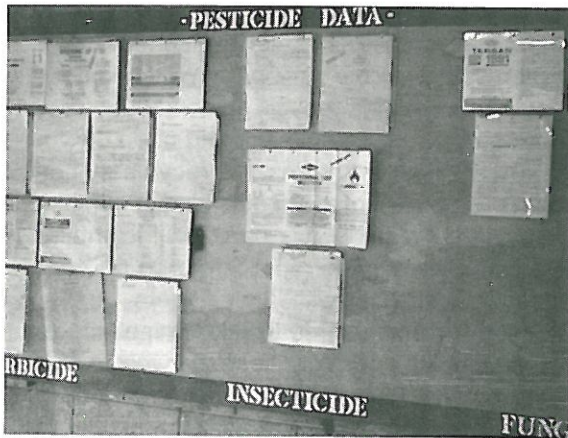


Figure 2. Bulletin board with pesticide information.

returned to the container rather than letting the concentrate sit around for the next fill.

Exits and fire extinguishers must be clearly marked and kept unobstructed. A yellow arrow high on the wall makes the area distinguishable even when the warehouse is full of trucks (Figure 3). The fill area should contain all the equipment for safe, accurate fills.

We employ several types of weighing equipment. Accuracy is a high priority. We also employ several types of weighing booths, which are convenient, easy to clean, contain the appropriate filling charts, and most are portable. Some locations even employ individualized fill buckets to avoid cross-contamination of materials and to expedite the filling process.

It's mandatory that all drips, puddles, and spills be cleaned up immediately with oil dry or some absorbent material and disposed of in the proper manner. Immediately following this procedure, the area needs to be washed with soap and water and squeegeed into our recycle system.

Corporate policies as well as label restrictions must be tightly adhered to when dealing with pesticides. When handling pesticides, you need to wear goggles or a face shield. You must have headgear that is waterproof and coveralls that are either disposable or washable. Boots and gloves are mandatory, as are dust masks when dealing with dust or a powdered material.

Don't forget that if situations warrant tank filling in the field, appropriate protective gear must be provided and worn. In some of our East Coast

locations where we handle large volumes of material to defend against the gypsy moth, we are forced to fill in locations away from our base station. Here we provide the pesticide as well as the fill gear in locked facilities on the vehicle. There should not be one set of standards for filling inside and another set for filling outside.

Fill gear, including gloves, boots, and the last several feet of spray hose, should be washed daily and decontaminated weekly with household bleach. It's imperative that a clean uniform be worn daily. Store and wash dirty uniforms separately from the family wash. It's recommended that once you take the uniforms out of the washer, you run an extra rinse cycle through the machine.

Check your gear for cleanliness, leaks, tears, and broken seams. Don't let anyone handle or spray pesticides who has severe dermatitis or large cuts or scratches.

Pesticide measuring containers should be triple rinsed and rinsate disposed of in a tanker. The fill

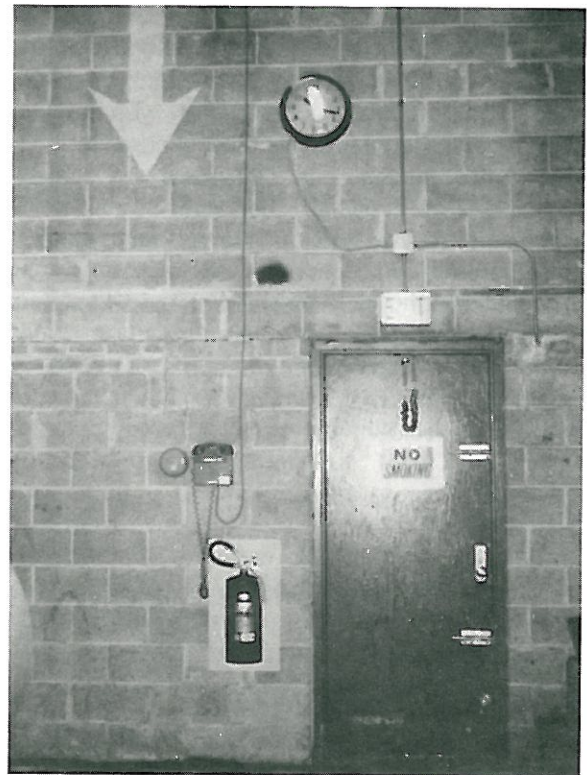


Figure 3. Exits and fire extinguishers clearly marked.

area should be washed and squeegeed daily. Tankers must be washed after filling to ensure that no pesticide is left on the equipment.

Below are some of the do's and don't's that must be constantly reinforced while handling pesticides. Common sense goes a long, long way to reducing chemical toxicity to pesticide applicators.

- Gloves aren't enough when filling with liquid pesticides; wear goggles, aprons, and boots.
- Don't let your applicator fill without neoprene boots. Leather will absorb the pesticide.
- Do remember to use the respirator and headgear when filling with powdered pesticide formulations.
- Those powders get everywhere, so be cautious of people walking around the fill area without a mask or respirator on. Once the dust settles — clean it up.
- Be careful not to contaminate the inside of gloves with pesticides. It does no good, of course, to have more pesticide on the inside of the glove than the outside. Studies that we conducted several years ago indicate that when working out on properties during cold seasons, gloves can be beneficial in protecting against pesticide exposure. During hot weather it seems that the heat of the gloves increase the pore size in the skin and allow for more pesticide absorption. Therefore, we don't recommend the use of gloves during hot weather.
- Remember to triple rinse buckets and funnels after filling.
- When taking your concentrates to the fill equipment, don't place all of them on the truck tank. This is an accident just waiting to happen. Set

them down on the bed first and then introduce them carefully into an agitating tank.

- When you clean the strainer on your pump, pull your truck over the recycle system, put on your apron, goggles, and gloves, and open up your strainer. If you do not have a recycle system, then provide a bucket or some kind of container to catch the material coming out of the strainer. Be cautious that your applicators do not try to clean the strainer with their fingers. Another common occurrence is to take something out of the tool box, possibly a screwdriver, to clean the material out of the strainer, wipe the screwdriver on your pants, throw it back, and away you go. Don't make that a practice.
- When recirculating, put on your goggles; your eyes are too precious to lose.
- When replacing empty drums, use clean tools, and don't forget to always wear gloves, apron, and goggles.
- Don't block the emergency shower and eye wash. Inspect this area continuously. Keep it open and unobstructed and make sure the equipment is in good working order.
- Instruct your people to wash before eating, drinking, smoking, or going to the bathroom. We insist that they wash with soap and water after filling with a pesticide, and we recommend that they wash out on the job as often as possible.

Remember — life is fragile, handle with care.

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