



# Pesticide Applicator Report



a Publication of the Vermont Agency of Agriculture, Food & Markets  
for Vermont's Pesticide Applicators

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## ► News from the Agency of Agriculture, Food & Markets

### ***Pesticide Issues in the Works: Pesticide Volatilization***

EPA considers all pathways of exposure to ensure that all exposures are below levels of concern. Pesticides can move from the sites where they are applied into the surrounding environment through a number of different ways, including spray drift and volatilization.

Spray drift, can occur when pesticides move off the application site in the air as particles or aerosols during application or when the pesticides move that are attached to dust.

Volatilization occurs when pesticide surface residues change from a solid or liquid to a gas or vapor after an application of a pesticide has occurred. Once airborne, volatile pesticides can move long distances off site. Fumigant pesticides (used to treat soil before planting and to treat structures such as homes or storage bins) are especially volatile. But, not all pesticides are volatile.

### **Past practices for evaluating volatile pesticides**

Historically, EPA has assessed inhalation exposures through volatilization for pesticides that have high vapor pressures (a characteristic that allows them to move easily into a gaseous state). Certain indoor-use pesticides and fumigants meet this high vapor pressure criterion. EPA has assessed exposures and risks related to volatilization for these pesticides in its re-evaluation program for pesticides on the market, as well as, during its registration program before allowing use. As a result, measures have been taken or are proposed to reduce exposures and risks below levels of concern.

Continued →

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## **New data lead to possible new evaluation methods**

In addition to this re-evaluation work, EPA has reviewed data on volatilization that have recently become available from the Pesticide Action Network of North America (PANNA) as well as many studies from the California Air Resources Board (CARB). EPA has been joined in this effort by the States of California, Florida, Minnesota, and Washington and by Canada. These data show that detectable exposures occur for semi-volatile pesticides. However, the data available to date show that the exposures are low and generally below levels of concern.

### **What EPA is doing?**

As a result of this analysis, EPA is in the process of reconsidering the criteria it uses to trigger an assessment of exposure from inhalation of pesticides that volatilize. Vapor pressure appears to have a major effect on pesticide volatilization. Other physical and chemical pesticide properties, agricultural practices, meteorological conditions, persistence of a pesticide on plant surfaces, and soil properties also appear to affect volatilization to some degree. This work will help the Agency to predict which pesticides have the potential to volatilize and under what conditions.

EPA also continues to work to determine the best way to estimate the levels of exposure resulting from volatilization, including the use of monitoring data from PANNA and CARB, single field modeling, and air-shed modeling. The Agency continues to work with states and other federal agencies, as well as seeking input from stakeholders to determine the most appropriate way to evaluate the significance of these exposures.

Due to the many science issues related to pesticide volatilization, including estimating the magnitude of exposures and determining the best method for assessing potential risks, the Agency will seek the expert advice and input from its Federal Insecticide, Fungicide, and Rodenticide Act Scientific Advisory Panel in December 2009.

### **For more information**

If you are interested in more detail on how EPA evaluates pesticides to protect your health and environment, see:

<http://www.epa.gov/pesticides/factsheets/riskassess.htm>  
<http://www.epa.gov/oppsrrd1/reevaluation/index.htm>

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## ***Jim Leland Becomes Director of ARMES Division as Phil Benedict Retires***

Jim Leland, who has been with the agency since 1991, has taken over as director of the ARMES division (Agricultural Resource Management & Environmental Stewardship), the section of the Agency of Agriculture that regulates pesticide sales, use and registration in the state of Vermont, among other tasks.

Jim started off by running the Certification & Training program for pesticide applicators, and did this for a couple of years before moving into a newly created position of Turf Specialist. There Jim developed the fledgling Golf Course Permitting program, and later took on the responsibility of supervising the field staff, which included pesticide law enforcement activities. In 2005 Jim became the Assistant Director of the division, where continued overseeing the Golf Course Permitting program as well as all aspects of the pesticide enforcement, certification, licensing, registration and permitting programs.

Here in ARMES we are all looking forward to Jim's leadership as we tackle the challenges these programs will surely face in the future. Jim's wealth of experience and steady hand will be an asset to us all.

Phil Benedict has retired as of December 31, 2008. He came to the agency in 1971 after graduating from Johnson State College with a degree in Biology and then receiving his Masters degree from the University of New Hampshire in Entomology. His first assignment with the agency was as an entomologist. Most recently his time was focused on improving Vermont's water quality.

Phil has been described as having more dedication and commitment to protecting agriculture and the environment than almost anyone. It has been noted that his foresight has allowed him to develop an agricultural water quality program for Vermont that is the envy of many other states. He has been known to push Vermont's regulatory and assistance

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programs to meet environmental standards while assisting farmers in meeting goals that society demands for our environment.

Phil says his plans include spending more time with Susan, his wife of over 30 years, their son Dan, daughter-in-law Tracy and his grandson Alex as well as pursuing interests such as fishing, hunting, skiing and golfing. We wish him well in his retirement.

\* \* \*

## ***Pesticide Enforcement Update***

Routine inspections of certified applicators ensure that: individuals are properly certified for the work they are performing; **their certification is current**; they keep the required records of pesticides used; and, pesticides used are registered with both the EPA and the State of Vermont. In FY08 (Fiscal Year 2008), ARMES (the Agricultural Resource Management & Environmental Stewardship Division) conducted 87 certified applicator records checks. One investigation, involving an extensive review of a company's invoices, revealed that some misleading statements regarding the identity of areas treated were included on all invoices. Following a number of meetings and communications between the investigating agent and company officials, the misleading statement was removed from the invoices. The investigation also led to the company re-emphasizing to their applicators the need to carefully check label language regarding when and where applications of certain products may be made.

Routine use inspections are conducted to ensure that the applicator is properly certified, using the pesticide(s) in a safe and effective manner and according to label directions, maintaining the appropriate records, and using pesticides that are registered with both EPA and the State of Vermont. In the case of agricultural use inspections, ARMES paid special attention to determining compliance with the Worker Protection Standard requirements.

ARMES conducted 24 agricultural use inspections in FY08. One violation was observed during these routine inspections resulting in the issuance of a letter of warning for applying a pesticide within the labeled harvest interval. A total of 16 inspections

were conducted with specific Worker Protection Standard components (14 Tier I and 2 Tier II). These inspections focus on determining if workers are properly trained, if the central posting requirements are met, and if appropriate PPE and decontamination supplies are available and adequate. All operations inspected were found to be in compliance with WPS. There have not been any reported injuries as a result of occupational exposure to pesticides. No complaints were recorded from agricultural workers this past year.

ARMES also conducted 24 non-agricultural use inspections in FY 08. A major focus of these inspections was herbicide use on right-of-ways (ROW) conducted under Agency-issued right-of-way permits. As a result, inspections were made of applications to highway, utility and railroad ROW's. Other entities inspected included Pest Control Operators (PCOs), golf courses and lawncare applicators. Two administrative penalties were issued; one for the violation of specific ROW (railroad) permit conditions (requiring follow-up visits to determine the resulting brown-out patterns); the other for violations of state pesticide regulations and the pesticide product label while conducting applications to a ROW (highway). In the latter case, a pre-hearing conference was convened and an assurance of discontinuance (AOD) entered into between the violating party and ARMES. An additional administrative penalty was issued in October 2008 as a result of an investigation initiated during the FY08 grant period. The case involved violations of specific ROW (utility) permit conditions.

Referral, or "for-cause" investigations are conducted by ARMES in response to complaints received from the public regarding a pesticide application that has allegedly violated state or Federal pesticide regulations, pesticide product labeling, or Agency-issued use permits. 11 agricultural use referral investigations were conducted in FY08. No violations were identified in the course of these inspections. Additionally, 6 non-agricultural use referrals were conducted in FY08. In one case an administrative penalty was issued for an illegal application of herbicides to school grounds. A pre-hearing conference was held and an assurance of discontinuance was entered into by the violating parties and the Agency.

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## Crossword Puzzle Answers and Explanation

In this article I provide the answers to the crossword puzzle that was "Home Study Quiz 2" in the last issue of The Pesticide Applicator Report of June 2008.

Now that you have the answers, don't bother completing the crossword puzzle and sending it in for credit! Too late! You know what they say – you snooze, you lose! But at least now you can read through the answers and explanations and learn a little something. You probably already know all of this stuff anyway; it's all review...right?

### ACROSS

2. restricted-use pesticide classification in VT  
Answer: CLASS A – whether restricted by the US Environmental Protection Agency or the State of Vermont, all restricted use and "by permit only" pesticides are class A. Others are Class B or C.

6. worn when cleaning or repairing spray equipment, mixing, or loading  
Answer: APRON – a chemical resistant apron is one of the basic pieces of Personal Protective Equipment (PPE) to be worn over long sleeved shirt and long pants.

7. all shirts should be, when applying  
Answer: LONGSLEEVED – as listed on the label under PPE.

10. the mother of all pesticide laws  
Answer: FIFRA – or Federal Insecticide, Fungicide and Rodenticide Act of June 25, 1947 "to regulate the marketing of economic poisons and devices, and for other purposes."

11. type of applicator on someone else's property  
Answer: COMMERCIAL – as stated in *The Vermont Regulations for Control of Pesticides*, anyone applying any pesticides (Class A, B, or C) on someone else's property is a commercial applicator, and must be certified to do so.

12. nickname for equipment that personally protects you  
Answer: PPE – Personal Protective Equipment. You know, gloves, apron, respirator, face shield, etc.

13. the most common route of pesticide exposure for applicators  
Answer: DERMAL – the most common exposure for applicators is when they get it on their skin,

usually the fore-arm area between the sleeves and the gloves, and this just happens to be a part of the body that is very prone to absorbing stuff through the skin!

14. the formulation indicated by a WP in the pesticide name  
Answer: WETTABLE POWDER – a formulation that is mixed with water to form a suspension, meaning it does not dissolve.

17. a word denoting the "form" of a pesticide  
Answer: FORMULATION – actually has the word "form" in it. You know, granular, wettable powder, emulsifiable concentrate. On exams when asked what the formulation is I usually get the % active ingredient for an answer, which is incorrect.

18. nickname of the pesticide certification coordinator at the Vermont Agency of Agriculture  
Answer: MATT – if you got this one wrong your certificate has been revoked indefinitely!

20. equipment worn to protect against inhalation exposure  
Answer: RESPIRATOR – the product label will specify if one must be worn and which type to wear.

21. type of pest management that takes a holistic approach  
Answer: INTEGRATED - as in Integrated Pest Management, or IPM, is the system of mechanical, cultural, biological controls for pests, and using the lowest toxicity pesticides as a last resort. Addresses the cause of pest problems.

### DOWN

1. type of exposure when pesticides enter through your mouth

Answer: ORAL – No, the answer is not EATS!

3. a bad choice of material for gloves or boots  
Answer: LEATHER – wearing leather can be exciting, but just not while you are applying pesticides, it doesn't protect you very well.

4. nickname for the standard that kicks-in when pesticides are used in an agricultural situation  
Answer: WPS – which stands for Worker Protection Standard. Sorry, I know a lot of you are not in "Ag.", but that is no reason to just start naming body parts that fit into a three-letter space!

5. gloves should be this, on the inside  
Answer: UNLINED - the cloth lining that makes gloves much easier to take on and off actually absorbs pesticides, making them harder to clean out and more hazardous to you.

8. the most chemical resistant material for gloves  
Answer: VITON – some of you tried to get vinyl to

fit here. This is not in the core manual chapter on PPE, but is covered in the insert that I put in the front of the manual, so I was just trying to see who is up on the more recent research.

9. type of applicator on own land producing an agricultural commodity

Answer: PRIVATE – also can be on land that one rents or leases for the production of an Ag commodity. Includes farms, greenhouses, nurseries, and forests.

15. when a pesticide moves off target due to wind, rain, runoff or evaporation

Answer: DRIFT – Glad to see everybody got this one. It is the applicator's responsibility to prevent this.

16. temperature setting for laundering contaminated clothing

Answer: HOT - 140°F or higher is the recommended temperature.

19. nickname of pesticide education and safety program coordinator at UVM

Answer: ANN – OK, it's not really a nickname, it's her whole name (as far as I know).

You know how crossword puzzles usually have a theme running through them? Well I was just trying to make the "nickname" theme work. I admit I had to stretch it a bit, but I think it worked pretty well.

I almost always get the quizzes back in pairs, both from the same newsletter together. This time I got many singles back, and it was the one that was not the crossword puzzle. So, from this, I assume some of you do not like the puzzles or simply sent it in a bit later after spending some time on it.

I hope you enjoyed it, but if you didn't, don't worry! I won't do it too often. I was just trying to mix things up a bit to make it more interesting. -Matt

<sup>1</sup> O												<sup>2</sup> C	<sup>3</sup> L	A	S	S	A
R				<sup>4</sup> W									E				
A		<sup>5</sup> U		P									<sup>6</sup> A	P	R	O	N
<sup>7</sup> L	O	N	G	S	L	E	E	<sup>8</sup> V	E	D			T				
		L						I					H			<sup>9</sup> P	
	<sup>10</sup> F	I	F	R	A			T					E		R		
		N						<sup>11</sup> C	O	M	M	E	R	C	I	A	L
<sup>12</sup> P	P	E						N							V		
		<sup>13</sup> D	E	R	M	A	L								A		
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		<sup>14</sup> W	E	T	T	A	B	L	E	P	O	W	<sup>15</sup> D	E	R		
														R			
		<sup>16</sup> H			<sup>17</sup> F	O	R	M	U	L	A	T	I	O	N		
		O												F			
<sup>18</sup> M	<sup>19</sup> A	T	T			<sup>20</sup> R	E	S	P	I	R	A	T	O	R		
	N																
<sup>21</sup> I	N	T	E	G	R	A	T	E	D								

## Respirators for Pesticide Applications

Frederick M. Fishel

*This guide provides an explanation for respirator use while working with pesticides.*

Respirators are the most specialized piece of personal protective equipment for working with pesticides and proper selection is complicated. Specific information on choosing the appropriate respirator will be supplied by pesticide labels. Use only respirators approved by the National Institute of Occupational Safety and Health (NIOSH) and the Mine Safety and Health Administration (MSHA). Approved respirators will carry a "TC" number prefix, which signifies they have been tested and certified for a specific level of protection. If you plan to purchase a new respirator, a particulate respirator that formerly carried a TC-21C NIOSH prefix may carry a TC-84A prefix. NIOSH has developed a new set of regulations in 42 CFR 84 (also referred to as "Part 84") for testing and certifying nonpowered, air-purifying, particulate-filter respirators. The new Part 84 respirators have passed a more demanding certification test than the old respirators (e.g., dust and mist [DM], dust, fume and mist [DFM], spray paint, pesticide, etc.) certified under 30 CFR 11 (also referred to as "Part 11").

Particulates are solid particles such as dusts, mists, and fumes. Newer pesticide labels that specify organic vapor-removing cartridge respirators, once designated only as TC-23C, will also list which filters or pre-filters can be used with the respirator. The filters are identified by codes such as an HE, N, R or P, which indicate the level of oil resistance offered by the filter. "N" filters are not resistant to oils, but are excellent for use with dusts and granular formulations. "R" and "P" filters are either oil-resistant (R) or oil-proof (P). HE filters refer to "high efficiency" filters for powered-air purifying units, which can be used with oils. Manufacturers will designate a number that follows the HE, N, R, or P on their products, and this number is an indication of the trapping efficiency. For example, a particulate respirator or filter with the N95 designation would be expected to have 95% efficiency in its trapping capacity. Pesticide label recommendations generally instruct the user to

have a P100 filter with the chemical cartridge respirator when handling and applying oil-based pesticides.

One of the two common types of respirators is the air-purifying respirator. Air-purifying respirators are available that cover the entire face; there are also less expensive half-masks that cover the nose and mouth. These respirators should be used only where there is sufficient oxygen. Air-purifying respirators remove airborne contaminants as air enters the respirator through chemical cartridges or mechanical filters. The chemical cartridges are filled with activated carbon, which has a very high absorption capacity for gases and vapors. Chemical cartridges are color-coded which indicates the uses for which they were designed. A description of these codes is listed in Table 1. Mechanical filters provide protection by trapping particulate matter in the porous filter material.

Table 1. Chemical cartridge color codes.

Color	Protects against
Black	Organic vapors (pesticides except fumigants unless allowed on label), paint spraying (except isocyanate-containing paints), fumigation
Green	Ammonia: anhydrous or from livestock confinement
Yellow	Acid gases, such as chlorine and other disinfectants
Olive*	Organic vapors, ammonia, and acid gases
Pink	Dusts and welding fumes

Most air-purifying respirators ([Figure 1](#)) operate under negative pressure; that is, they rely on the power of the wearer's lungs to pull air through the filter elements. These include half-mask dust/mist respirators, half-mask dual-cartridge respirators, full-face dual-cartridge respirators, and canister-type gas masks. Dust/mist respirators ([Figure 2](#)) and some half-mask dual-cartridge respirators are disposable. The only air-purifying respirator that operates under positive pressure is the powered air-purifying respirator (PAPR). It has a fan that pulls air through the filters and circulates it over the wearer's face. Air-purifying respirators vary widely in price.

Continued →



Figure 1. Air-purifying respirator.



Figure 2. Dust-mist respirator.

The second basic type of respirator is the atmosphere-supplying respirator. This kind of respirator supplies an independent source of breathable air and is used in conditions where oxygen is deficient or the applicator is exposed to high concentrations of very toxic pesticides in enclosed areas. Breathable air is supplied to the wearer from an independent source through an air line, or the wearer carries oxygen in a tank. These respirators are relatively expensive and should be serviced and inspected by qualified personnel.

An applicator should perform a fit test to determine correct size of a respirator facepiece because a respirator that does not provide a proper seal is of little value. OSHA mandates that a fit test be performed *every time* a person puts on a respirator. Instructions for conducting fit tests generally accompany half-mask and full-face respirators.

Chemical cartridges should be replaced according to the manufacturer's recommendations or the pesticide label or when odor or irritation is noticed.

Pre-filters will extend the life of chemical cartridges in dusty conditions. Mechanical filters should be replaced when breathing becomes difficult or the filter is damaged or as specified by the manufacturer or the pesticide label. If no instructions are provided, replace cartridges and filters when the workday is over.

### **Additional Information**

- Lehtola, C.J., C.M. Brown and W.J. Becker. 2001. Personal protective equipment: OSHA standards 1910.132-137. UF/IFAS EDIS Document AE271. <http://edis.ifas.ufl.edu/OA034>.
- Nesheim, O.N, F.M. Fishel and M.A. Mossler. 2005. Toxicity of pesticides. UF/IFAS EDIS Document PI-13. <http://edis.ifas.ufl.edu/PI008>.

### **Footnotes**

1. This document is PI-77, one of a series of the Pesticide Information Office, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date October 2005. Visit the EDIS Web Site at <http://edis.ifas.ufl.edu>.

2. Frederick M. Fishel, Associate Professor, Agronomy Department, and Director, Pesticide Information Office; Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL 32611.

*The use of trade names in this publication is solely for the purpose of providing specific information. UF/IFAS does not guarantee or warranty the products named, and references to them in this publication does not signify our approval to the exclusion of other products of suitable composition. Use pesticides safely. Read and follow directions on the manufacturer's label.*

### **Certificate Check!**

*There's no time like the present! Go ahead and pull out your certificate to check the expiration date. I'm not talking about applicator categories; I'm talking about the date your certificate expires!*

*It looks like this: Expires: mm/dd/yyyy*

*If this date has passed, call Matt at 802-828-3482!*

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# ► News from UVM Extension

## ***Toxicity of Pesticides***

Ann Hazelrigg, UVM Extension

The toxicity of a pesticide is its ability to cause injury or illness. All pesticides are toxic but they vary in their levels or degrees of toxicity. There are two types of toxicity of pesticides; **acute** and **chronic**.

**Acute Toxicity** measures how poisonous a pesticide is to an organism after a single, short-term exposure or dosage. The four routes of exposure are dermal (skin), inhalation (lungs), oral (mouth) and eyes. An example of an acute exposure would be a pesticide splashing in the face of an applicator during mixing and loading. The effects from acute pesticide exposure appear within 24 hours. The measurement of acute toxicity is used as basis for the warning statement or signal word on the pesticide label and provides a way to compare the toxicities of pesticides.

**Measuring Acute Toxicity** is done by measuring the amount of pesticide that has killed a population of test animals (usually rats or mice) by dermal or oral exposure. This amount is called the Lethal Dose 50 (LD 50) and is measured in number of milligrams per kilogram of the animal's body weight. The higher the LD 50 number the less toxic the pesticide is. Conversely, the lower the LD 50 number, the more toxic the pesticide is. For example, the pesticide with the active ingredient glyphosate and the trade name of Round-up or Touchdown has an LD 50 value of over 5,000 mg/kg whereas the herbicide with the active ingredient paraquat and trade name Gramoxone Max has an LD 50 of 150 mg/kg. Paraquat is much more toxic than glyphosate. Lethal concentration 50 (LC 50) can be used interchangeably with LD 50.

### **Signal words and LD 50**

Pesticides are categorized on the basis of their relative acute toxicity values (LD50, LC50). These values are represented by the Signal word on the pesticide label. Pesticides that are classified as highly toxic on the basis of either oral, dermal or

inhalation toxicity must have the signal word **DANGER** and **POISON** printed in red with skull and crossbones on the front panel of the package label. The acute toxicity (single dosage) oral LD50 for pesticides in this group varies from a trace of the pesticide to 50 mg/kg. This means a few drops of the pesticide swallowed by a hundred and fifty pound person would be fatal. Some pesticides can have the **DANGER** signal word without the skull and crossbones symbol if the eye and skin effects are more severe than suggested by the LD 50 or acute toxicity of the product.

Pesticides with the **WARNING** signal word on the label are considered moderately toxic and have LD 50 levels of 50mg/kg-500 mg/kg. A 150 pound individual would need to ingest a teaspoon to an ounce of the material to be fatal. The least toxic pesticides display the signal word **CAUTION** on the pesticide label. Acute oral LD 50 values for these products are greater than 500mg/kg. An ounce or more could prove fatal to a 150 pound person.

### **All Pesticides are toxic**

When choosing a pesticide for a job, always check the Signal word on the label and try to select the least toxic pesticide that will still control the pest. All pesticides can be hazardous to living things and the environment if label directions are not followed.

### **Chronic toxicity**

Chronic toxicity measures how toxic a pesticide is over time or repeated exposure. The chronic toxicity of a pesticide is determined by subjecting test animals to long term exposures of the active ingredient in the pesticide. Chronic toxicity is what we would experience after repeated exposure to pesticides in food, water and air. This type of toxicity is more difficult and costly to measure than acute toxicities. Some of the suspected chronic effects from certain pesticides include tumor production, blood, nerve and lung disorders, cancers and birth defects.

### **Minimize your exposure**

Minimize your exposure to all pesticides whether labeled Caution or Danger by fully reading label directions and by using the right personal protective equipment (gloves, goggles, hat, long sleeved shirts and long pants, boots, etc) for the job.

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## ***Home Study Quiz 1 – Respirators for Pesticide Applications***

The following questions refer to the article on pages 6 and 7. Fill out the information on the back of this completed quiz and mail it to the Vermont Agency of Agriculture to receive **(1) one pesticide recertification credit.**

1. Where can specific information about choosing the appropriate respirator be found?
  
2. What does NIOSH stand for?
  
3. What does the respirator number prefix "TC" stand for?
  
4. Indicate the level of oil resistance indicated by the filter identification codes below:  

N -

R -

P -
  
5. What does the number that follows the code above represent?
  
6. What type of filter is recommended for use with the chemical cartridge respirator when handling or applying an oil-based pesticide?
  
7. What type of filter is filled with activated carbon and has a high absorption capacity for gasses and vapors?
  
8. What does it mean when a respirator operates under "negative pressure?"
  
9. How often does OSHA mandate that a "fit test" be performed?
  
10. Please complete this sentence:  
Chemical cartridges should be replaced...

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Fill out the following information and mail the completed quiz to the Vermont Agency of Agriculture to receive one (1) pesticide recertification credit.

<b>Name:</b>		
<b>Certificate #:</b>		Please check: <input type="checkbox"/> Commercial <input type="checkbox"/> Non-Commercial <input type="checkbox"/> Government <input type="checkbox"/> Private
<b>Street Address:</b>		
<b>City/State/Zip</b>		
<b>Company/Farm:</b>		
<b>Signature:</b>		<b>Date:</b>

Mail to:

**Vermont Agency of Agriculture  
Attn: Matthew Wood  
116 State Street  
Montpelier, VT 05620-2901**

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## **Home Study Quiz 2 – Toxicity of Pesticides**

The following set of questions refers to the article on page 8. Fill out the information on the back of the completed quiz and mail it to the Vermont Agency of Agriculture to receive **(1) one pesticide recertification credit**.

1. What is meant by LD 50?
2. What is the difference between acute and chronic toxicity?
3. Which is more toxic; a pesticide with an LD 50 of 500mg/kg or a pesticide with an LD 50 of 5,000mg/kg?
4. What is meant by the signal word?
5. What are the three main signal words?
6. What are some suspected chronic effects that can occur after repeated pesticide exposure?
7. If a pesticide is labeled CAUTION, how much of the pesticide would a 150 pound person have to ingest to be fatal?
8. How is acute toxicity measured?
9. When do acute toxicity effects appear?
10. Give 3 examples of an acute toxicity occurrence.

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December 2008

Vermont Agency of Agriculture, Food & Markets  
Agriculture Resource Management & Environmental Stewardship  
116 State Street  
Montpelier, VT 05620-2901

<p>NONPROFIT U.S. POSTAGE PAID MONTPELIER, VT 05620- 2901 PERMIT No. 74</p>
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Fill out the following information and mail the completed puzzle to the Vermont Agency of Agriculture to receive one (1) pesticide recertification credit.

<b>Name:</b>		
<b>Certificate #:</b>		Please check: <input type="checkbox"/> Commercial <input type="checkbox"/> Non-Commercial <input type="checkbox"/> Government <input type="checkbox"/> Private
<b>Street Address:</b>		
<b>City/State/Zip</b>		
<b>Company/Farm:</b>		
<b>Signature:</b>	<b>Date:</b>	