

Health Consultation

PESTICIDE CONTAMINATION IN A HOME
TENNESSEE DEPARTMENT OF AGRICULTURE
LOUDON, LOUDON COUNTY, TENNESSEE

APRIL 19, 2007

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

PESTICIDE CONTAMINATION IN A HOME

TENNESSEE DEPARTMENT OF AGRICULTURE

LOUDON, LOUDON COUNTY, TENNESSEE

Prepared By:

Tennessee Department of Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

Table of Contents

Health Consultation	1
Pesticide Contamination in a Home.....	1
Tennessee Department of Agriculture	1
Loudon, Loudon County, Tennessee	1
Table of Contents	i
Foreword.....	ii
Summary and Statement of Issues	3
Background.....	3
Site Description and History.....	3
Discussion.....	4
Child Health Considerations.....	6
Conclusion	6
Recommendations.....	6
Public Health Action Plan.....	6
Authors, Technical Advisors	6
References.....	7
Figure 1. View of the basement from the patio at the back of the house.....	8
Figure 2. View of the drywall removal from the bottom 12 inches of the walls.	8
Figure 3: Basement bathroom before remediation.....	9
Figure 4. Basement bathroom after remediation.....	10
Certification	11

Foreword

This document summarizes an environmental public health investigation performed by Environmental Epidemiology of the State of Tennessee Department of Health. Our work is conducted under a Cooperative Agreement with the federal Agency for Toxic Substances and Disease Registry. In order for the Health Department to answer an environmental public health question, several actions are performed:

Evaluate Exposure: Tennessee health assessors begin by reviewing available information about environmental conditions at a site. We interpret environmental data, review site reports, and talk with environmental officials. Usually, we do not collect our own environmental sampling data. We rely on information provided by the Tennessee Department of Environment and Conservation, U.S. Environmental Protection Agency, and other government agencies, businesses, or the general public. We work to understand how much contamination may be present, where it is located on a site, and how people might be exposed to it. We look for evidence that people may have been exposed to, are being exposed to, or in the future could be exposed to harmful substances.

Evaluate Health Effects: If people could be exposed to contamination, then health assessors take steps to determine if it could be harmful to human health. We base our health conclusions on exposure pathways, risk assessment, toxicology, cleanup actions, and the scientific literature.

Make Recommendations: Based on our conclusions, we will recommend that any potential health hazard posed by a site be reduced or eliminated. These actions will prevent possible harmful health effects. The role of Environmental Epidemiology in dealing with hazardous waste sites is to be an advisor. Often, our recommendations will be actions items for other agencies. However, if there is an urgent public health hazard, the Tennessee Department of Health can issue a public health advisory warning people of the danger, and will work with other agencies to resolve the problem.

If you have questions or comments about this report, we encourage you to contact us.

Please write to: Environmental Epidemiology
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Or call us at: (615) 741-7247 or toll-free during business hours: 1-800-404-300

Summary and Statement of Issues

On November 17, 2006, the Environmental Epidemiology Program (EEP), Communicable and Environmental Disease Services (CEDS), Tennessee Department of Health (TDH), received a telephone call from Kathy Booker, Pesticide Administrator with the Tennessee Department of Agriculture, asking for assistance. A couple in Loudon County had bought a home in September, 2006. After the purchase, they noticed a strong pesticide-like smell in the partially finished basement. The man noted that his chest felt tight and his lips tingled when he spent time in the basement; the woman experienced fatigue. They opened all windows and doors in the house and basement to let it air out. Ventilation did not solve the problem. He called various local agencies seeking assistance. The Tennessee Department of Agriculture (TDA) came to his home and took swab samples for pesticides at three locations in the basement. The samples arrived at the TDA laboratory on November 1, 2006, and analytical results were reported to the TDA central office on November 15, 2006.

Background

Site Description and History

The house in Loudon County, zip code 37774, was bought from the previous owner through a real estate agent. The home is estimated to be less than 10 years old. It is located on a lot that slopes from front to back, providing a basement that is above ground on the back. The backyard adjoins a golf course fairway. The back wall has several windows, an exterior door, and a garage-style door. The basement is not used as a garage; rather it is more like a half-functional living space. The garage is on the front of the house. The garage-style door is used for a golf cart. See Figure 1 for a view of the basement from the patio.

The basement had a basic bathroom with a fiberglass shower. Walls in the entire basement are covered with drywall. The floor is made of concrete. A stairway is located next to the bathroom and enters the main floor of the home in an entryway off the garage, near the kitchen. The couple planned to make the basement into a playroom and bedroom for the grandchildren when they come to visit. They were concerned about their own health, and they were worried that their grandchildren would be harmed if they came to visit.

Discussion

Results from the initial swab sampling requested by TDA are summarized in Table 1 (Booker, 2006).

Table 1. Swab sample results ($\mu\text{g}/100 \text{ cm}^2$), basement of home in Loudon County, reported November 15, 2006.

<i>Chemical</i>	<i>Area 1</i>	<i>Area 2</i>	<i>Area 3</i>
Chlorpyrifos	None detected	Not available	6 – 12
Diazinon	None detected	85 – 147	143 – 249
Malathion	None detected	29	8 – 13
Bifenthrin	None detected	33 – 50	25 - 37

Chlorpyrifos, diazinon, and malathion are organophosphorous pesticides that inhibit acetylcholinesterase (AChE), which results in the accumulation of acetylcholine at acetylcholine receptors leading to cholinergic responses in the peripheral and central nervous system and neuromuscular junctions. Some mild symptoms of exposure are headache, dizziness, weakness, feelings of anxiety, constriction of the pupils of the eye, and not being able to see clearly. These symptoms are reversible. There is no evidence that long-term exposure to low levels of diazinon causes any harmful health effects in people. Diazinon has not been shown to cause birth defects or to prevent conception in humans. Diazinon has not been shown to cause cancer in people or animals (ATSDR 2006). Diazinon is not approved for use inside homes. Bifenthrin is a pyrethroid pesticide that enhances the insecticidal properties of other pesticides. Completed routes of exposure in this situation are likely to be dermal contact or inhalation.

The Agency for Toxic Substances and Disease Registry (ATSDR) has derived health guidance values (minimal risk levels (MRLs) and environmental media evaluation guides (EMEGs)) for chlorpyrifos, diazinon, and malathion. These values are summarized in Table 2.

Table 2. ATSDR health guidance values derived for chlorpyrifos, diazinon, and malathion

Health Guidance Values	Chlorpyrifos	Diazinon	Malathion
Chronic MRL, oral (mg/kg·day)	0.001	Not available	0.02
Intermediate MRL, oral (mg/kg·day)	0.003	0.002	0.02
Acute MRL, oral (mg/kg·day)	0.003	Not available	Not available
Intermediate EMEG, inhalation ($\mu\text{g}/\text{m}^3$)	Not available	9	20
Acute EMEG, inhalation ($\mu\text{g}/\text{m}^3$)	Not available	Not available	200

These health guidance values expressed in mg/kg·day or $\mu\text{g}/\text{m}^3$ do not correlate with the swab sample results expressed in $\mu\text{g}/100\text{ cm}^2$, thus direct comparisons cannot be made. It seemed, qualitatively, that the loadings of the organophosphorous pesticides were high. EEP staff called the ATSDR emergency response program for assistance. Staff of EEP, along with staff from TDA, called the Environmental Protection Agency (EPA) emergency response center and the national response center to request assistance for the family.

TDH called the family to explain that someone from EPA would call them. We suggested that they see their physician, explaining that they had been exposed to pesticides that are cholinesterase inhibitors. We, also, suggested that they spend the night elsewhere, not sleeping in their residence until it had been remediated.

The EPA on-scene coordinator and an EPA contractor arrived at the home the next day, November 18, to begin their assessment of the situation. They sampled the entire house for the presence of organics in air. On November 19, the upstairs living area showed no traces of pesticide residue while the basement area showed elevated levels of pesticides; the highest concentration measured in the basement was 0.39 ppm diazinon or $4,849\ \mu\text{g}/\text{m}^3$ (personal communication from Bob Safay, November 20, 2006), with smaller amounts of malathion. This level of diazinon is much higher than the intermediate EMEG of $10\ \mu\text{g}/\text{m}^3$. The linoleum tile and shoe molding in the bathroom as well as the bottom twelve inches of drywall in the basement were removed (see Figure 2). The entire area was then coated with a sealant in order to encapsulate the pesticide. The basement was ventilated overnight, then closed and heated to 70 degrees (Byrd a,b, 2006).

EPA emergency response returned on November 21 to collect confirmatory air samples. Unfortunately, pesticides were still present in the air of the basement at a concentration of 0.03 ppm or $379\ \mu\text{g}/\text{m}^3$. At that time, the fiberglass shower and all bathroom fixtures were removed, as well as all the drywall in the bathroom. Remaining concrete block walls and studs were coated with a sealant in order to encapsulate any remaining pesticide. See Figures 3 and 4 for before and after pictures.

Staff of EEP and ATSDR visited the home on December 12, 2006, to see the results of the remediation efforts and to reassure the couple that the problem was being fixed and that they would be able to finish the basement for their grandchildren's use.

Results of air sampling on December 7, 2006, after the removal of the shower and bathroom dry wall, showed concentrations of diazinon in the basement of 0.38 ppb ($4.7 \mu\text{g}/\text{m}^3$) and 0.54 ppb ($6.7 \mu\text{g}/\text{m}^3$), compared to the intermediate EMEG of $9 \mu\text{g}/\text{m}^3$. Two days later, on December 9, 2006, no diazinon was detected in the air. After this result, the basement was determined to be clear of pesticides and safe for use. EEP sent a letter to the couple explaining this (Bashor 2007).

Child Health Considerations

Because the grandchildren of the couple would be likely playing and sleeping in the basement of the home when they visit, special consideration was given to making sure that no pesticide contamination remained in the basement air or could in any way be contacted by the children.

Conclusion

- At the time of the initial telephone call, a public health hazard existed.
- Following EPA emergency response cleanup, no public health hazard exists.

Recommendations

As the basement was cleaned and returned to safe use, there are no additional recommendations at this time.

Public Health Action Plan

After the remediation of the basement, no public health concerns require any action. EEP is available for additional consultation if needed.

Authors, Technical Advisors

Author

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References

ATSDR (2006). Agency for Toxic Substances and Disease Registry. September 2006. Draft Toxicological profile for diazinon. Atlanta: US Department of Health and Human Services.

Booker, Kathy. Tennessee Department of Agriculture. Environmental Monitoring, Final Report. November 15, 2006.

Byrd, Terrence. US Environmental Protection Agency, Region IV, Pollution Report, POLREP No 2. November 19, 2006.

Byrd, Terrence. US Environmental Protection Agency, Region IV, Pollution Report, POLREP No 3. November 21, 2006.

Bashor, Bonnie. Letter to the couple. December 20, 2006.

Figure 1. View of the basement from the patio at the back of the house.



Figure 2. View of the drywall removal from the bottom 12 inches of the walls.



Figure 3: Basement bathroom before remediation



**OFFICIAL PHOTOGRAPH No. 15
U.S. ENVIRONMENTAL PROTECTION AGENCY**

Location: Loudon, Loudon County, Tennessee

Photographer: Russ Nelson

Date: November 18, 2006

Subject: View facing east of bathroom in basement.

Source: TN & Associates – Superfund Technical Assessment and Response Team:
----- Pesticide Response

Figure 4. Basement bathroom after remediation



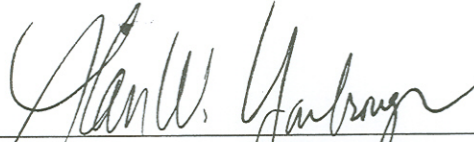
Certification

This Public Health Consultation: *Pesticide Contamination in a Home*, was prepared by the Tennessee Department of Health Environmental Epidemiology under a Cooperative Agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It was prepared in accordance with the approved methodology and procedures that existed at the time the health consultation was begun. Editorial review was completed by the Cooperative Agreement Partner.



Technical Project Officer, CAT, CAPEB, DHAC, ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health assessment and concurs with the findings.



Team Leader, CAT, CAPEB, DHAC, ATSDR