

DIELDRLIN AND CHLORDANE PRIVATE WELL PILOT STUDY

HEALTH CONSULTATION

PUBLIC HEALTH EVALUATION

OF

PRIVATE WELL SAMPLING DATA

IN

**WESTON, WESTPORT, CHESHIRE, REDDING, CANTON, AVON,
EAST GRANBY, AND GRANBY**

**HARTFORD, NEW HAVEN, AND, FAIRFIELD COUNTIES,
CONNECTICUT**

October 28, 2014

**Prepared by
The Connecticut Department of Public Health**

SUMMARY

INTRODUCTION

In 2012-2013, the Connecticut Department of Public Health (CT DPH) sampled and analyzed private well water from towns in four local health departments and health districts in Connecticut and evaluated the public health significance of the analysis results of this private well data in 2014. The health districts and departments included Farmington Valley, Chesprocott, and Westport/Weston Health Districts and the Redding Health Department. The participating towns were Avon, Canton, Cheshire, East Granby, Granby, Redding, Westport, and Weston. The main focus of this health consultation is to evaluate private well sampling data from select towns from these local health departments and health districts.

CONCLUSIONS

CT DPH evaluated current exposures to dieldrin and/or chlordane in well water. CT DPH reached the following conclusion in the health consultation:

Conclusion 1

CT DPH has concluded that based on the current wells water results, the well water in the eight towns sampled do not pose a public health hazard because dieldrin and chlordane are not present in the well water.

Basis for Conclusion

Exposure has not occurred because dieldrin and chlordane were not detected in the well water.

Next Steps

CT DPH recommends following that residents with private wells follow well testing guidance in the Private Well Testing Fact Sheet, Publication #24. (Appendix A).

The conclusions and recommendations in this health consultation are based on the data and information made available to the Connecticut Department of Public Health (CT DPH). CT DPH will review additional information when received. The review of additional data could change the conclusions and recommendations listed in this document. This report was supported by funds from a cooperative agreement with the Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services. This document has neither been reviewed nor cleared by ATSDR.

BACKGROUND AND STATEMENT OF ISSUE

After a well sampling study in 2012 in the city of Stamford found widespread dieldrin and chlordane contamination in private wells, the Connecticut Department of Public Health (CT DPH) and the Stamford Health Department recommended that everyone in Stamford test their wells for dieldrin and chlordane. CT DPH generally recommends that private owners test their wells for dieldrin and chlordane if their property was once located on former agricultural land and if it is known that their home was treated for termites before 1990. Because of the increasing concern from community members and local health officials in Stamford and throughout Connecticut that the dieldrin and chlordane contamination was more widespread throughout the state of Connecticut (and wasn't just a citywide Stamford issue), CT DPH developed a pesticide pilot study in 2012. This pilot study's goal was to determine whether dieldrin and chlordane contamination is more widespread than just the city of Stamford and whether the agency needs to expand its testing recommendations for these pesticides to include all private wells in Connecticut.

In 2012-2013, the CT DPH sampled and analyzed private well water from towns in four local health departments and districts in Connecticut and evaluated the public health significance of the analysis results of this well water data in 2014. The health districts and departments included Farmington Valley, Chesprocott, and Westport/Weston Health Districts and the Redding Health Department. The participating towns were Avon, Canton, Cheshire, East Granby, Granby, Redding, Westport, and Weston. The main focus of this health consultation is to evaluate private well sampling data from select towns from these local health departments and districts.

A total of 79 private well samples (approximately 20 samples from each local health district/department) from 4 local health district/departments were collected and analyzed in this pilot study. These well samples were sent to the CT DPH laboratory in Rocky Hill, CT and analyzed for the presence of dieldrin and chlordane. Local health districts/departments were recruited based on their ability to provide staff to coordinate and solicit volunteers and collect samples. In addition, because we wanted to cover different areas of the state, they were also chosen because of their location. Some local health district/departments recruited volunteers through a press release while others decided to target certain areas of certain towns within their health district (or town) and recruit volunteers in that area via phone calls/letters. If dieldrin and/or chlordane levels in samples exceeded action levels (ALs), residents would have been sent a copy of their well water analysis results along with treatment instructions. However, there were no wells that exceeded ALs. ALs are health-based levels developed to be protective of children and adults with frequent, long-term exposure to contaminants in private well water.

Environmental Contamination and Health Comparison Values

Private Well Sampling Data

From September 2012 to summer 2013, the Redding Health Department and the Chesprocott, Weston/Westport, and Farmington Valley Health Districts sampled 79 private wells in the towns of Avon, Canton, Cheshire, East Granby, Granby, Redding, Westport, and Weston. Only one sample per private well was taken. Because local health districts had control over what towns or areas in a particular town they wanted to investigate, there were varying sample sizes in participating towns. In addition, some health districts had some difficulty contacting residents in a neighborhood where they wanted to sample wells.

None of the 79 samples in all 8 towns had detectable levels of chlordane or dieldrin in the private wells. The detection limits (and ALs) are 0.3 parts per billion (ppb) (chlordane) and 0.03 ppb (dieldrin).

Figure 2. Sample Sizes for the Towns Participating in the Pesticides in Private Wells Pilot Study.

Town	Sample Size
Avon	3
Canton	10
Cheshire	20
East Granby	3
Granby	3
Redding	20
Westport	10
Weston	10

DISCUSSION

Exposure Pathway Analysis

To determine if community members are exposed to contaminants in private well water in Avon, Canton, Cheshire, East Granby, Granby, Redding, Westport, and Weston, CT, CT DPH evaluated the environmental data and considered how people might come into contact with contaminants in private well water. The possible pathways of exposure are dermal, inhalation, and ingestion. In other words, in order to be exposed to contaminants in private well water, one must come into contact with the water by touching it (during showering/bathing), breathing vaporized pesticides (during showering/bathing), drinking the water, or cooking with it. An exposure pathway consists of five elements (ATSDR 2005):

1. A source of contamination;
2. Transport through an environmental medium;
3. A point of exposure;
4. A route of human exposure; and
5. A receptor population.

ATSDR categorizes an exposure pathway as either completed, potential, or eliminated. In a completed pathway, all five elements exist and indicate that exposure to a contaminant has occurred in the past, is occurring, or will occur in the future. In a potential exposure pathway, at least one of the five elements has not been confirmed, but it may exist. Exposure to a contaminant may have occurred in the past, may be occurring, or may occur in the future. An exposure pathway can be eliminated if at least one of the five elements is missing and will never be present (ATSDR 2005).

None of the 79 wells tested had water that contained detectable levels of dieldrin or chlordane. Therefore, it is assumed that there are no current, future, or past exposures.

Public Health Implications for Adults and Children

When determining the public health implications of exposure to hazardous contaminants, CT DPH considers how people might come into contact with contaminants and compares contaminant concentrations with health protective comparison values. When contaminant levels are below health-based comparison values, health impacts from exposure to those levels are unlikely. Contaminant levels exceeding comparison values do not necessarily indicate that health impacts are likely but instead warrant further evaluation. In this health consultation, CT DPH used established Action Levels for private wells as health protective screening values. As stated previously, these values are health-based levels developed to be protective of children and adults with frequent, long-term exposure to contaminants in private well water. CT DPH only evaluated completed exposure pathways where private well contamination exceeded the established Connecticut Action Levels. However, since dieldrin and chlordane were not detected in any of the well water results (and therefore, there were no positive well water results to compare with an AL), there is no past, ongoing, or future exposure from contaminated well water and further evaluation is not warranted. General toxicology information on dieldrin and chlordane are provided in Appendix B.

Uncertainty

One must emphasize that there is a large degree of uncertainty in the public health evaluation of well water results because of data limitations on chlordane and/or dieldrin in private well water and the lack of information about exposure duration. A single measurement does not give sufficient data to base a decision about whether a resident has been exposed to dieldrin or chlordane in their well water in the past or whether they will be exposed in the future. In addition, in a small sample size such as 20 or less, there is a large degree of uncertainty of whether these samples accurately describe the dieldrin and/or chlordane contamination in these 8 towns and the rest of the state.

In addition, there is also some uncertainty due to the inability to test some key towns that are located adjacent to Stamford as well as any health districts in eastern Connecticut. The towns located adjacent to Stamford may also have dieldrin/chlordane levels in private wells as we do not expect the contamination to be contained within city limits.

CONCLUSIONS

None of the 79 wells sampled in Avon, Canton, Cheshire, East Granby, Granby, Redding, Westport, and Weston had detectable levels of dieldrin and/or chlordane. Because of this, the CT DPH has decided not to expand their testing recommendations for dieldrin and chlordane to a state wide recommendation. However, there is a great amount of uncertainty due to data limitations and the inability to analyze wells in towns located adjacent to Stamford and in eastern Connecticut.

CT DPH has concluded that based on the current well water results, the well water in these eight towns do not pose a public health hazard because dieldrin and chlordane are not present in the well water.

RECOMMENDATIONS

1. CT DPH recommends that all Connecticut residents follow private well testing guidance in the Private Well Fact Sheet, Publication #24 (Appendix A).

PUBLIC HEALTH PLAN

Actions Taken

1. In May 2013, CT DPH finalized the Private Well Testing Fact Sheet, Publication #24 which gives specific guidelines on testing for well water contamination and remediation advice.

Actions Planned

1. CT DPH will make this health consultation available to all Connecticut residents via a posting on the CT DPH website.
2. CT DPH will continue to assist the Connecticut Department of Energy and Environmental Protection (CT DEEP) and local health districts and departments in responding to health questions and concerns regarding private well contamination.
3. CT DPH will continue to educate and inform Connecticut residents regarding private well concerns.
4. CT DPH will review any additional private well data and update this health consultation, if necessary.
5. CT DPH will provide the results of these findings to local health departments and health districts.

REFERENCES

[ATSDR 2005]. Public Health Assessment Guidance Manual. 2005. Agency for Toxic Substance and Disease Registry, Available at <http://www.atsdr.cdc.gov/hac/PHAManual/ch2.html#2.5.4>. Accessed on July 22, 2014

REPORT PREPARATION

Author

Sharee Major Rusnak, MSPH, ScD

Epidemiologist

Environmental and Occupational Health Assessment Program

Connecticut Department of Public Health

Appendix A
Private Well Water Fact Sheet, Publication #24)

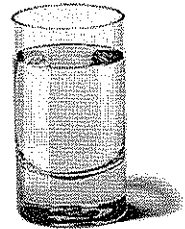
PRIVATE DRINKING WATER IN CONNECTICUT



Publication Date: May 2013

Publication No. 24: Private Well Testing

Testing your well water provides you with information on the quality of your drinking water. Testing is the best way to ensure that your drinking water supply is safe from harmful chemicals. In addition, water testing can determine whether nuisance impurities are present, such as iron and manganese. The purpose of this fact sheet is to assist private well owners in deciding how frequently to test their private well water and what to test for. It also provides homeowners with information about how to get their water tested, understanding their water test results and protecting their well from contamination.



Private Water Supplies

Homeowners with private wells are responsible for the quality of their own drinking water. They are generally not required to test their drinking water. However, testing is a good idea even if you do not suspect a problem because testing is the only way to be sure your water is safe to drink. A good time to test is when buying a home so that you can make any contamination findings part of your home purchase decision. The best time of the year to test is after a spring or summer heavy rainy period. Even if your current water supply proves to be clean and safe to drink, regular testing is important because it establishes a record of water quality that may help identify and solve future problems.

In accordance with Section 19-13-B101 of the Public Health Code, testing is required for new wells. However, the required tests do not cover all contaminants. Water tests done during home purchases are usually required by the bank providing the mortgage. Contrary to common belief, such tests are not required by law. Water tests done for a home purchase do not necessarily cover all contaminants.

This fact sheet provides general guidelines for private well water testing. However, these are just guidelines. Check with your Local Health Department to find out whether there are water quality problems specific to your area. It is also a good idea to ask your neighbors whether they have ever had water quality problems. The Connecticut Department of Public Health (DPH) Private Well Program is also a resource for questions about private well testing. DPH's Environmental and Occupational Health Assessment Program is a resource for questions about safe limits of chemicals in water and health concerns. Contact information is provided at the end of this fact sheet.



What To Test For? How Frequently to Test?

Even if you do not suspect any well water problems, it is important to test your water to ensure that it is safe to drink. Table 1 lists the tests we recommend for all private wells even if you do not notice any problems with your water. Table 3 lists water quality issues you might encounter and what tests you should do if you have a particular issue with your water. Whenever you notice a change in the taste, color, odor, or clarity of your water, contact your Local Health Department or DPH for assistance.



Produced by The State of Connecticut Department of Public Health
Environmental Health Section, Private Well Program
450 Capitol Avenue, MS#51REC, PO Box 340308, Hartford, CT 06134
Phone: 860-509-7296 Fax: 860-509-7295



Table 1. Recommended Tests for All Private Wells

Type of Test	When?	Why?
Basic Indicators (Potability) See Table 2 below	Every Year Also test after repair or replacement of your well, pump or water pipes. <i>If 5 years of results show no problems, test once every 5 years.</i>	Provides a general indication of water quality. Can provide clues that additional tests are needed. Required for all new wells.
Lead	At Least Once Also test when planning a pregnancy or if you have a child under 6 years old. <i>If your water is corrosive (pH less than 6.0), test every 3-5 years.</i>	Lead can leach from plumbing (pipes and faucets). Lead pipes may be in homes built before 1930. Lead-based solder may be in homes built before 1988. Brass is used in new plumbing and fixtures. All brass contains small amounts of lead. Corrosive water leaches more lead. Young children are more susceptible to harmful effects from lead exposure.
Arsenic, Uranium, Radon	At Least Once Ideally, repeat test every 5 years	Arsenic, uranium and radon are naturally occurring in some groundwater in CT. Private wells with high levels have been found sporadically around CT. Levels can fluctuate over time.
Volatile Organic Compounds (VOCs)	At Least Once	Gasoline, oil, solvents or industrial chemicals spilled or leaked on the ground could get into your well water.
Fluoride	Every 5 years when a child under 12 is present	Fluoride can occur naturally in wells throughout CT. A child's permanent teeth can become discolored from excess fluoride. Too little fluoride can increase risk of tooth decay. Your child's dentist will likely ask you about the fluoride level in your well water.

Some acceptable limits are based on aesthetics and some are based on health. If your water exceeds a Basic Indicator Parameter, contact your Local Health Department for advice about whether you should stop drinking the water.

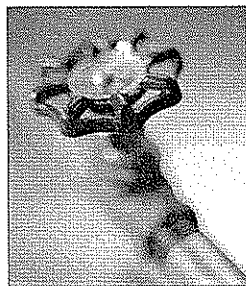


Table 2. Basic Indicators Test

Parameter	Acceptable Limit
Total Coliform Bacteria	None Present
Nitrate-Nitrogen	10 mg/L
Nitrite-Nitrogen	1 mg/L
pH	6.4 - 8.5 Standard Units
Odor	Less than 2
Chloride	250 mg/L (milligrams per liter)
Hardness	150 mg/L
Apparent Color	Less than 15 Standard Units
Sulfate	250 mg/L
Turbidity	Less than 5 Standard Units
Iron	0.3 mg/L
Manganese	0.05 mg/L (taste/odor concern) 0.5 mg/L (health concern)

Table 3. Private Well Water Quality Issues and Testing Recommendations

Water Quality Issue	Possible Cause(s)	Recommended Water Test(s)
Low pH (pH less than 6.0)	Naturally corrosive (low pH) water, low hardness, low alkalinity	Hardness, Alkalinity, Sulfate, Lead, Copper, Cadmium, Zinc
Buildup of limescale (off-white chalky solids) on hot water plumbing, fixtures, kettles. Reduced soap lathering.	Hard water (hardness level exceeding 150 mg/L)	Hardness
Blue or reddish stains on plumbing, fixtures or laundry. Plumbing leaks.	Corrosive (low pH) water.	Hardness, Alkalinity, Sulfate, Lead, Copper, Cadmium, Zinc
Rust-colored water, foul odor, rust stains on clothing and plumbing fixtures, rust coating in toilet tank	Elevated Iron or Manganese, Iron Bacteria	Iron, Manganese
Rotten egg odor, musty or swampy odor, tarnished copper and silverware, yellow or black stains on plumbing fixtures	Hydrogen sulfide gas, high sulfates, sulfur bacteria, iron/manganese bacteria, coliform bacteria	Odor, Hydrogen Sulfide, Sulfate, Coliform Bacteria, Iron, Manganese
Cloudy, Turbid, Muddy Water	Silt, Sediment, microorganisms	Turbidity and Coliform Bacteria, Check Well Construction with an expert
Chemical, fuel or fruity odor	Leaking underground fuel tank, gas station fuel spill, industrial chemical spill, road runoff	Volatile Organic Compounds (VOCs)
Nitrates exceed 10 mg/L Nitrites exceed 1 mg/L	Fertilizer runoff, malfunctioning septic system	Pesticides (contact your local health department about pesticide use in your area), Coliform Bacteria
Radon in Air exceeds 4 picocuries per liter	Naturally-occurring uranium in bedrock	Radon water test
Recurrent gastrointestinal illness	Human or animal waste contaminating well, cracked well casing, flooded well, malfunctioning septic system	Coliform Bacteria, Nitrates, Nitrites
Bitter, metallic taste	Corrosive (low pH) water	pH, Lead, Copper
Salty, brackish taste	Road salt runoff, nearby salt storage, well near salt water, improper setting on water softener	Chloride, Sodium, Total Dissolved Solids
Well within 1/4 mile of current or former orchard or farmland	Agricultural and/or arsenic-based pesticides get into well	Arsenic, Nitrates, Pesticides (ask for EPA Method 505)*
Well within 1/4 mile of commercial or industrial area	Gasoline, oil, solvents leaked or spilled on the ground get into well	Volatile Organic Compounds (VOCs)
Well flooding, ponding around well	Heavy rains, poor drainage around well	Basic Indicators
House foundation treated for termites before 1990	Termite pesticides leach into well	Pesticides dieldrin and chlordane
Noticeable change in taste, color, odor, or clarity of your water.	Unknown	Contact your local health department or DPH

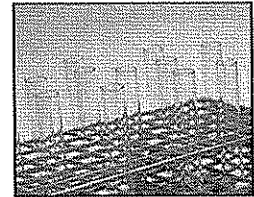
* Contact your Local Health Department or CT Dept. of Energy and Environmental Protection for advice about whether you should test for additional pesticides.

What If I Already Have A Treatment System In My Home?

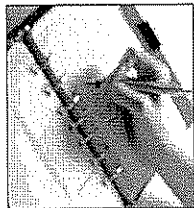
If you have water treatment equipment in your home, you should monitor whether the treatment system is doing its job by testing for the specific contaminant(s) that the system is treating. Be aware that water treatment systems are designed for specific contaminants. Treatment systems will not necessarily remove all contaminants! Periodically you should test your water before and after treatment to be sure the system is continuing to work properly. Refer to [Purchasing Water Treatment Equipment](#) for more information about treatment.

How Do I Get My Water Tested?

You can have your water tested at any State-certified water testing lab. A current list of certified labs can be obtained from your local health department or from the [DPH Certified Environmental Labs](#) website. Make sure the private lab is certified to test drinking water for the contaminants you are requesting.



In most cases, you can collect a sample of your tap water yourself, although many labs will send a technician to collect a sample if you request. If you collect your own sample, carefully follow the laboratory's instructions to obtain a good sample. How to take a sample varies depending on the tests being done. For example, some contaminants such as lead and copper may require that water remains stagnant in the pipes for a minimum of 6 hours and is collected upon the first draw of water. Other contaminants require that the water be flushed or run for a minimum period of time before collecting the sample. Some contaminants require special sample bottles and procedures. Cleanliness is a must; make sure that nothing but the water comes in contact with the opening of the bottle or the inside of the cap. Timeliness is important, too. Some contaminants deteriorate or change form with time. Most water samples need to be kept cool when being taken to the lab. To assure accurate results, make certain the lab receives your water sample within the specified time directed on the instructions.



Keep Records

Keep a record of all your water tests for reference. Include the date and the test results. A change in the concentration of a contaminant may indicate that a water quality problem is developing. By comparing test results over time, you may find that a change in treatment is necessary or that a treatment device is not functioning properly.

Understanding Your Water Test Results

There are federal and state criteria for many of the substances that you might find in your well water. These criteria represent the concentration above which your water might not be safe to drink or might have a noticeable taste or odor.

DPH sets state drinking water criteria specifically for private wells, called [Action Levels](#). Action levels are developed to protect you from health risks. Federal drinking water criteria to protect your health are set by the Environmental Protection Agency (EPA) and are called [Maximum Contaminant Levels \(MCLs\)](#). You should compare the results of your private well tests to these criteria to determine whether the water is safe. If any chemical detected in your water is higher than an Action Level or an MCL, you should:

- Retest the water to confirm the exceedance,
- Stop drinking the water until the issue is resolved,
- Contact your Local Health Department, DPH, or DEEP for specific advice about using your water.
- Consider treatment to remove the contaminant(s) from your water. Refer to DPH's Publication about [Purchasing Water Treatment Equipment](#) for more information about treatment.

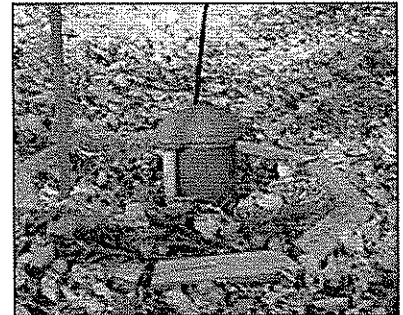
Refer to DPH's factsheet Chemical Contaminants in Private Wells factsheet for more information about drinking water criteria.

EPA also sets drinking water criteria to protect you from aesthetic concerns such as taste, color and odor. These criteria are called Secondary Standards. Secondary contaminants themselves do not present a health risk but could be an indication that your water has problems that could pose a health risk. One example is pH. If the pH of your water is too low, you might notice a bitter taste. The bitter taste does not pose a health risk but water with low pH is corrosive and corrosive water can leach metals like lead from pipes and fixtures. High levels of lead in your water does pose a health risk, particularly for young children.

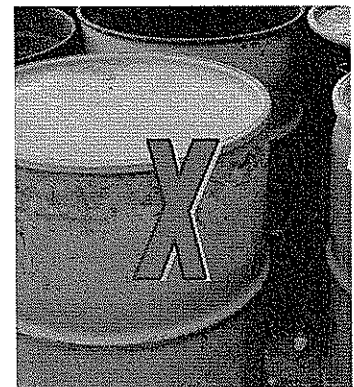
Results of a Basic Indicators Test should be compared with the appropriate limits shown in Table 2 in this fact sheet. However, be aware that some of the parameters in the Basic Indicators Test are based on aesthetics (taste/color/odor) and some are based on health risk. If your water tests results exceed any of the limits on the Basic Indicators Test, contact your Local Health Department for advice regarding whether you should stop drinking the water.

Protect Your Well!

You can protect your private well by paying careful attention to what you do in and around your home as well as your neighbor's activities near your well. Regular testing and good practices to prevent contamination can help ensure that your well supplies you and your family with good quality drinking water. Here are some important ways you can protect your drinking water well.

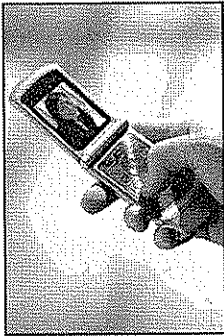


- ⇒ Locate a new well far from potential contamination sources.
- ⇒ Hire a professional to construct a new well and periodically inspect an existing well.
- ⇒ Use backflow prevention devices on outside faucets.
- ⇒ Properly seal abandoned and unused wells.
- ⇒ Never flush gasoline, motor oils, automotive chemicals, painting chemicals or solvents down the sink or toilet into a septic system.
- ⇒ Inspect and maintain your septic system.
- ⇒ Keep livestock and pet waste away from well.
- ⇒ Do not allow road, driveway or roof runoff to collect around well.
- ⇒ Do not mix or use pesticides, herbicides, fertilizers, fuels or other hazardous materials near well.
- ⇒ Do not allow waste oils or gasoline to get into soil. Make sure home heating tanks are above ground or in basement. Never do automotive maintenance or repair on exposed soils in your yard.
- ⇒ Test your well water according to recommendations in this fact sheet.
- ⇒ As needed, consult sources of additional information listed at the end of this fact sheet.



For more information on well protection refer to Publication #26: Private Drinking Water Wells-Types of Construction

For More Information



For more information, please contact:

CT Department of Public Health

- Environmental and Occupational Health Assessment Program: 860-509-7740
- Private Well Program: 860-509-7296

CT Department of Energy and Environmental Protection

- Remediation Division: 860-424-3705

Your Local Health Department

For more information, click on the following links:



Safe Drinking Water Limits:

- [Action Levels](#)
- [MCLs](#)
- [Secondary MCLs](#)

CT Department of Energy and Environmental Protection

- [Potable Water Program](#)
- [Remediation Division](#)

DPH Private Well Fact Sheets:

- [Arsenic in Private Wells](#)
- [Lead in Private Wells](#)
- [Uranium in Private Wells](#)
- [Fluoride in Private Wells](#)
- [Bacteria in Private Wells](#)
- [Iron and Manganese in Private Wells \(1\), Iron and Manganese in Private Wells \(2\)](#)
- [Nitrogen Contamination in Private Wells](#)
- [pH Acidity of Private Wells](#)
- [Questions to Ask When Purchasing Water Treatment Equipment](#)
- [Flood and Storm Water Concerns for Private Wells](#)
- [Private Wells-Types of Construction](#)
- [Hardwater-Softeners Facts and Issues](#)
- [Corrosion of Copper Pipe and Fittings](#)

Other Resources:

- [DPH Certified Environmental Labs](#)
- [Chemical Contaminants in Private Wells Fact Sheet](#)
- [DPH Groundwater and Well Contamination Publications](#)
- [DPH Private Well Program Publications](#)
- [ATSDR Hazardous Substances Fact Sheets \(ToxFAQs\)](#)
- [Hazardous Waste Site Lists](#)
- [EPA Office of Groundwater and Drinking Water](#)
- [EPA New England](#)

If you require aid/accommodation to fully and fairly enjoy this publication, please contact 860 - 509 -7740.

Appendix B
ATSDR Aldrin/Dieldrin and Chlordane
Fact Sheets

Aldrin and Dieldrin- ToxFAQs™

CAS # 309-00-2 and 60-57-1

This fact sheet answers the most frequently asked health questions (FAQs) about aldrin and dieldrin. For more information, call the CDC Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to aldrin and dieldrin happens mostly from eating contaminated foods, such as root crops, fish, or seafood. Aldrin and dieldrin build up in the body after years of exposure and can affect the nervous system. Aldrin has been found in at least 207 of the 1,613 National Priorities List (NPL) sites identified by the Environmental Protection Agency (EPA). Dieldrin has been found in at least 287 of the 1,613 sites.

What are aldrin and dieldrin?

Aldrin and dieldrin are insecticides with similar chemical structures. They are discussed together in this fact sheet because aldrin quickly breaks down to dieldrin in the body and in the environment. Pure aldrin and dieldrin are white powders with a mild chemical odor. The less pure commercial powders have a tan color. Neither substance occurs naturally in the environment.

From the 1950s until 1970, aldrin and dieldrin were widely used pesticides for crops like corn and cotton. Because of concerns about damage to the environment and potentially to human health, EPA banned all uses of aldrin and dieldrin in 1974, except to control termites. In 1987, EPA banned all uses.

What happens to aldrin and dieldrin when they enter the environment?

- Sunlight and bacteria change aldrin to dieldrin so that we mostly find dieldrin in the environment.
- They bind tightly to soil and slowly evaporate to the air.
- Dieldrin in soil and water breaks down very slowly.
- Plants take in and store aldrin and dieldrin from the soil.
- Aldrin rapidly changes to dieldrin in plants and animals.
- Dieldrin is stored in the fat and leaves the body very slowly.

How might I be exposed to aldrin or dieldrin?

- Dieldrin is everywhere in the environment, but at very low levels.

- Eating food like fish or shellfish from lakes or streams contaminated with either chemical, or contaminated root crops, dairy products, or meats.
- Air, surface water, or soil near waste sites may contain higher levels.
- Living in homes that were once treated with aldrin or dieldrin to control termites.

How can aldrin and dieldrin affect my health?

People who have intentionally or accidentally ingested large amounts of aldrin or dieldrin have suffered convulsions and some died. Health effects may also occur after a longer period of exposure to smaller amounts because these chemicals build up in the body.

Some workers exposed to moderate levels in the air for a long time had headaches, dizziness, irritability, vomiting, and uncontrolled muscle movements. Workers removed from the source of exposure rapidly recovered from most of these effects.

Animals exposed to high amounts of aldrin or dieldrin also had nervous system effects. In animals, oral exposure to lower levels for a long period also affected the liver and decreased their ability to fight infections. We do not know whether aldrin or dieldrin affect the ability of people to fight disease.

Studies in animals have given conflicting results about whether aldrin and dieldrin affect reproduction in male animals and whether these chemicals may damage the sperm. We do not know whether aldrin or dieldrin affect reproduction in humans.

Aldrin and Dieldrin

CAS # 309-00-2 and 60-57-1

How likely are aldrin and dieldrin to cause cancer?

There is no conclusive evidence that aldrin or dieldrin cause cancer in humans. Aldrin and dieldrin have shown to cause liver cancer in mice. The International Agency for Research on Cancer (IARC) has determined that aldrin and dieldrin are not classifiable as to human carcinogenicity. The EPA has determined that aldrin and dieldrin are probable human carcinogens.

How can aldrin and dieldrin affect children?

Children can be exposed to aldrin and dieldrin in the same way as adults. There are no known unique exposure pathways for children. Children who swallowed amounts of aldrin or dieldrin much larger than those found in the environment suffered convulsions and some died, as occurred in adults. However, we do not know whether children are more susceptible than adults to the effects of aldrin or dieldrin.

We do not know whether aldrin or dieldrin cause birth defects in humans. Pregnant animals that ingested aldrin or dieldrin had some babies with low birth weight and some with alterations in the skeleton. Dieldrin has been found in human breast milk, therefore, it can be passed to suckling infants.

How can families reduce their risk for exposure to aldrin and dieldrin?

- Since aldrin and dieldrin are no longer produced or used, exposure to these compounds will occur only from past usage.
- Because aldrin and dieldrin were applied to the basement of some homes for termite protection, before buying a home families should investigate what, if any, pesticides have been used within the home.

Is there a medical test to show whether I've been exposed to aldrin and dieldrin?

There are laboratory tests that can measure aldrin and dieldrin in your blood, urine, and body tissues. Because aldrin changes to dieldrin fairly quickly in the body, the test has to be done shortly after you are exposed to aldrin. Since dieldrin can stay in the body for months, measurements of dieldrin can be made much longer after exposure to either aldrin or dieldrin. The tests cannot tell you whether harmful health effects will occur. These tests are not routinely available at the doctor's office because they require special equipment.

Has the federal government made recommendations to protect human health?

The EPA limits the amount of aldrin and dieldrin that may be present in drinking water to 0.001 and 0.002 milligrams per liter (mg/L) of water, respectively, for protection against health effects other than cancer. The EPA has determined that a concentration of aldrin and dieldrin of 0.0002 mg/L in drinking water limits the lifetime risk of developing cancer from exposure to each compound to 1 in 10,000.

The Occupational Safety and Health Administration (OSHA) sets a maximum average of 0.25 milligrams of aldrin and dieldrin per cubic meter of air (0.25 mg/m³) in the workplace during an 8-hour shift, 40 hour week. The National Institute for Occupational Safety and Health (NIOSH) also recommends a limit of 0.25 mg/m³ for both compounds for up to a 10-hour work day, 40-hour week.

The Food and Drug Administration (FDA) regulates the residues of aldrin and dieldrin in raw foods. The allowable range is from 0 to 0.1 ppm, depending on the type of food product.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2002. Toxicological Profile for Aldrin/Dieldrin. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Human Health Sciences, 1600 Clifton Road NE, Mailstop F-57, Atlanta, GA 30333.

Phone: 1-800-232-4636

ToxFAQs™ Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaqs/index.asp>.

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

This fact sheet answers the most frequently asked health questions (FAQs) about chlordane. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to chlordane occurs mostly from eating contaminated foods, such as root crops, meats, fish, and shellfish, or from touching contaminated soil. High levels of chlordane can cause damage to the nervous system over time. This chemical has been found in at least 171 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is chlordane? (Pronounced klôr'dān')

Chlordane is a manufactured chemical that was used as a pesticide in the United States from 1948 to 1988. Technical chlordane is not a single chemical, but is actually a mixture of pure chlordane mixed with many related chemicals. It doesn't occur naturally in the environment. It is a thick liquid whose color ranges from colorless to amber. Chlordane has a mild, irritating smell.

Some of its trade names are Octachlor and Velsicol 1068. Until 1983, chlordane was used as a pesticide on crops like corn and citrus and on home lawns and gardens.

Because of concern about damage to the environment and harm to human health, the Environmental Protection Agency (EPA) banned all uses of chlordane in 1983 except to control termites. In 1988, EPA banned all uses.

What happens to chlordane when it enters the environment?

- Chlordane entered the environment when it was used as a pesticide on crops, on lawns and gardens, and to control termites.
- Chlordane sticks strongly to soil particles at the surface and is not likely to enter groundwater.

- It can stay in the soil for over 20 years.
- Most chlordane leaves soil by evaporation to the air.
- It breaks down very slowly.
- Chlordane doesn't dissolve easily in water.
- It builds up in the tissues of fish, birds, and mammals.

How might I be exposed to chlordane?

- By eating crops grown in soil that contains chlordane.
- By eating fish or shellfish caught in water that is contaminated by chlordane.
- By breathing air or touching soil near homes treated for termites with chlordane.
- By breathing air or by touching soil near waste sites or landfills.

How can chlordane affect my health?

Chlordane affects the nervous system, the digestive system, and the liver in people and animals. Headaches, irritability, confusion, weakness, vision problems, vomiting, stomach cramps, diarrhea, and jaundice have occurred in people who breathed air containing high concentrations of chlordane or accidentally swallowed small amounts of chlordane. Large amounts of chlordane taken by mouth can cause convulsions and death in people.

ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>

A man who had long-term skin contact with soil containing high levels of chlordane had convulsions. Japanese workers who used chlordane over a long period of time had minor changes in liver function.

Animals given high levels of chlordane by mouth for short periods died or had convulsions. Long-term exposure caused harmful effects in the liver of test animals.

We do not know whether chlordane affects the ability of people to have children or whether it causes birth defects. Animals exposed before birth or while nursing developed behavioral effects later.

How likely is chlordane to cause cancer?

The International Agency for Research on Cancer has determined that chlordane is not classifiable as to its carcinogenicity to humans. Studies of workers who made or used chlordane do not show that exposure to chlordane is related to cancer, but the information is not sufficient to know for sure. Mice fed low levels of chlordane in food developed liver cancer.

Is there a medical test to show whether I've been exposed to chlordane?

Laboratory tests can measure chlordane and its breakdown products in blood, fat, urine, feces, and breast milk. The amount of breakdown products measured in body fat or breast milk does not tell how much or how long ago you were exposed to chlordane or if harmful effects will occur.

Has the federal government made recommendations to protect human health?

In 1988, the EPA banned all uses of chlordane. The EPA recommends that a child should not drink water with more

than 60 parts of chlordane per billion parts of drinking water (60 ppb) for longer than 1 day. EPA has set a limit in drinking water of 2 ppb.

EPA requires spills or releases of chlordane into the environment of 1 pound or more to be reported to EPA.

The Food and Drug Administration (FDA) limits the amount of chlordane and its breakdown products in most fruits and vegetables to less than 300 ppb and in animal fat and fish to less than 100 ppb.

The Occupational Safety and Health Administration (OSHA), the National Institute for Occupational Health and Safety (NIOSH), and the American Conference of Governmental Industrial Hygienists (ACGIH) set a maximum level of 0.5 milligrams of chlordane per cubic meter (mg/m^3) in workplace air for an 8-hour workday, 40-hour workweek. These agencies have advised that eye and skin contact should be avoided because this may be a significant route of exposure.

Glossary

Carcinogenicity: Ability to cause cancer.

Long-term: Lasting one year or longer.

Milligram (mg): One thousandth of a gram.

Pesticide: A substance that kills pests.

ppb: Parts per billion.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1994. Toxicological profile for chlordane (update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html> ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

