Appendix A

Guidance for the Arsenic Advisory Area (AAA)
GUIDANCE

Well Driller Guidance for Well Construction in Areas with Naturally Occurring Arsenic Water Quality Problems

Any drillers constructing water supply wells in the designated areas of Outagamie and Winnebago Counties, as shown on the attached map should seriously review this advisory information. Please note references to Brown County.

Findings

1. Numerous well water samples indicate arsenic occurs naturally in water supply wells, in eastern Outagamie and Winnebago Counties, along a line stretching roughly from Seymour to Oshkosh. Approximately 32 percent of the wells sampled in this area have water with detectable levels of arsenic, while 3.5 percent of the wells have water with arsenic levels that exceed the drinking water standard of 50 parts per billion (ppb). With the exception of Brown County, studies conducted on wells beyond Outagamie and Winnebago Counties have found arsenic levels above 50 ppb in only one well, which is in Shawano County. This means the potential for elevated arsenic levels exists outside the advisory areas, but not enough information is available at this time to extend the advisory. The area west of the City of Oshkosh, and in the Town of Algoma, appears to have a higher incidence of elevated arsenic levels.

2. Limited sample results show elevated arsenic levels in specific areas within the Townships of Hobart and Lawrence in western Brown County.

3. Sample results show arsenic occurs more commonly in wells that are open to the upper St. Peter sandstone, but may not be limited to this sandstone only. Well water with a low pH or extremely high iron may be an indicator of high arsenic levels, although this is not always the case. Not every well open to the St. Peter sandstone will have arsenic in the water.

Guidance

1. Based on existing information, wells should be constructed to withdraw water from the upper (Platteville/Galena) and lower (Prairie du Chien) limestones in preference to the St. Peter sandstone.

2. The top 80 feet of the St. Peter sandstone should be cased off if it is necessary to penetrate that formation. Our experience tells us this will eliminate or reduce the bulk of the arsenic problems. There are no guarantees, regardless of well construction.
3. **Well drillers should contact Gary Paplham at the Lower Fox River Basin Office in Green Bay (920-448-5132) prior to construction of wells in the Townships of Hobart and Lawrence in western Brown County.** Mr. Paplham can provide you with information on the exact areas with known arsenic problems, and is also responsible for Outagamie County. Jerry Miller at our Oshkosh Service Center (920-424-7888), is responsible for Winnebago County.

4. **A water sample should be collected and submitted to a certified laboratory for total arsenic analysis, upon completion of the well.** This recommendation applies to wells drilled between the 5 mile boundary lines shown on the map, in addition to new wells drilled into the St. Peter sandstone in Brown County, west of the Fox River. The laboratory results should be sent directly to the owner, who can contact DNR if the arsenic concentration exceeds the drinking water standard of 50 ppb. An additional arsenic sample should be collected by the owner after the well has been in operation for a year and any time a change in water quality is noticed.

5. **Advise any well owners/clients with arsenic water quality problems that water treatment is an alternate option to new well construction or reconstruction.** Only State Department of Commerce approved devices are allowable. A list of these can be obtained through the Bureau of Drinking Water & Groundwater in Madison at 608-266-3415 or the Northeast Region Drinking Water Offices at 920-492-5885. Currently only distillation units are acceptable, as the approval for reverse osmosis units has been rescinded.

6. **Well drillers and pump installers, when talking with well owners and users in the designated areas, should inform them of this advisory.** You should suggest that a water sample be taken for arsenic from existing wells that are of unknown construction or are known to be finished in the upper sandstone. Customers should be informed of options available to solve or prevent arsenic contaminated drinking water. You should tell well owners or users that the buffered 5 mile advisory area is an approximation on the map and may actually be greater in certain areas and less than 5 miles in other areas. This is important information that the customer can utilize in decisions about their water supply system and that you can provide as their water quality professional.
More Questions and Answers about Arsenic
Wisconsin Division of Health

• WHAT ARE THE MAJOR SOURCES OF ARSENIC EXPOSURE?

People with average diets eat about 20 micrograms of inorganic arsenic a day. Fish products, especially shellfish, contain the greatest arsenic concentrations. A person with a high-seafood diet may consume greater amounts of arsenic than those without such diets. For the average person, water arsenic concentrations of 10 parts per billion (ppb) can double an person's inorganic arsenic intake if they drink about 2 quarts of water per day. Similarly, water containing arsenic at the standard of 50 ppb can increase a person's inorganic arsenic intake by five times.

Cigarette smoke also contains arsenic. An individual smoking two packs of cigarettes a day would inhale about 12 micrograms of arsenic a day.

• HOW CAN THE ARSENIC IN MY WATER ENTER MY BODY?

The vast majority of arsenic absorbed into the body is from drinking the water. Very little is absorbed through the skin. Therefore, showering and bathing in water containing arsenic presents little if any health hazard.

• WHAT SHOULD I DO IF I HAVE ARSENIC IN MY WATER?

Long-term low-level arsenic exposure may cause an unusual pattern of skin changes. These changes may lead to skin cancer. This type of cancer is also caused by excessive sun exposure and is rarely fatal. Routine physical examinations, in which the skin is examined carefully, will usually detect skin problems associated with arsenic exposure. Eating or drinking greater amounts of arsenic may cause liver, kidney and digestive problems. These problems usually disappear after the person stops consuming the contaminated food or water.

• HOW CAN I GET MORE INFORMATION?

For more information, call:

Dennis Hibray, Regional Director
Wisconsin Division of Health
200 N. Jefferson St., Suite 211
Green Bay, WI 54301-5158
Tel. (920) 448-5223

Mark Werner, Ph.D., Toxicologist
Wisconsin Division of Health
1400 E Washington Ave.
Madison, WI 53703
Tel. (608) 266-7480
ARSENIC

This fact sheet is a reference for people who may be exposed to chemical contamination in the environment. It does not refer to occupational exposure or emergency situations.

Chemical reference number (CAS): 07440-3802

Also known as: Arsen, Arsenia

WHAT IS ARSENIC?

Arsenic is a naturally occurring element in the earth’s crust, and is found in all living organisms. It is a silver-gray or tin-white, brittle, metallic substance. Arsenic is odorless and nearly tasteless.

Arsenic is used primarily in pesticides. It is also used in metal, glass and electronics manufacturing. Arsenic is important in the treatment of some human and animal diseases.

Household products such as ant poison and wood preservative contain arsenic. It is also found in cigarettes and cigarette smoke.

HOW ARE PEOPLE EXPOSED TO ARSENIC?

Arsenic may be absorbed when taken in by mouth, by breathing, or when skin or mucous membranes are exposed. Arsenic usually enters the body through the mouth, either in food or in water. It does not usually build up in the body.

For most people, food is the largest source of arsenic intake, with lower amounts from drinking water and air. The principal air release of arsenic in the U.S. is from coal-fuel power plants.

Levels of exposure that may lead to serious human health effects can occur in drinking water. Arsenic in drinking water can come from natural mineral deposits, pesticide use, or improper disposal of arsenic chemicals. Plants grown in arsenic-contaminated soils or sprayed with arsenic compounds may contain higher levels of arsenic than normal. Dolomite and bone meal used as nutritional supplements may also contain arsenic.

Since children are known to eat more soil than adults, and since they are more sensitive as a result of their small size and rapid development; contaminated soil may be of particular concern.

DO STANDARDS EXIST FOR REGULATING ARSENIC?

WATER

The Wisconsin Groundwater Enforcement Standard for private residential wells is 50 parts per billion (ppb). It is advisable to stop drinking water that contains more than that amount.
WHAT LEVELS OF EXPOSURE HAVE RESULTED IN HARMFUL HEALTH EFFECTS?

It is difficult to determine at what level arsenic causes specific health effects. The type and severity of health problems associated with exposure to arsenic are dependent on several factors:

* Previous exposures to chemicals;
* Amount of chemical exposure;
* Duration of the exposure;
* Route of exposure, i.e., whether the chemical exposure occurred by eating, drinking, skin contact or breathing;
* Age, sex, weight, ethnic background, and genetic factors;
* Personal habits such as cigarette smoking, medication use, or alcohol consumption;
* General health of the exposed individual;
* Individual reaction to chemical exposure.

The following health effects may occur immediately or shortly after exposure to low levels of arsenic:

* When taken by mouth (levels greater than 100 ppb in water) irritation of the digestive tract may occur. Symptoms may include nausea, diarrhea, loss of appetite and weakness.
* When exposure to arsenic dusts in air occurs, irritation of skin, eyes, or throat may result.

The following long-term effects can occur after exposure to arsenic:

* Cancer: Increased lung cancer rates occur in persons with high exposures to airborne arsenic in occupational settings. Arsenic in drinking water increases the risk of skin cancer.
* Reproductive Effects: It is uncertain whether low doses of arsenic cause reproductive problems or birth defects.
* Nerve damage: Numbness and tingling in arms and legs, muscle weakness may result.

* Organ Damage: Skin irritation that includes scaling and darkening is the primary effect from exposure to airborne arsenic. Serious effects on bone marrow, the liver and kidneys may occur.

Seek medical advice if you are experiencing any symptoms that you think may be related to chemical exposure.

IS THERE A MEDICAL TEST TO DETERMINE IF SOMEONE HAS BEEN EXPOSED TO ARSENIC?

Most arsenic is cleared from the blood within a few hours, so measurements of blood arsenic reflect only very recent exposures. Since most absorbed arsenic is quickly eliminated in urine, tests of urinary arsenic levels are useful as indicators of recent exposure. Urine levels of arsenic may be elevated, up to four hours, after eating some types of seafood. Arsenic tends to accumulate in hair and nails from external as well as internal sources. Such measurements may be a useful indicator of long-term arsenic exposure, but may not be definite evidence that a high dose has been absorbed.

This fact sheet summarizes information about this chemical and is not a comprehensive listing of potential effects. For more information contact the local Poison Control Center (the number is on the inside cover of phone books), your local public health agency, or write to the Division of Health, Environmental and Chronic Disease Section, Room 318, P.O. Box 309, Madison, WI 53701-0309.

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