DEQ
Montana Department of Environmental Quality

Memo

TO: Brian Goodman, MDT; Shawn Sorenson, Sanders Co Sanitarian; Plains residents with deep water wells

FROM: Laura Alvey, Groundwater Remediation Program Laura Alvey

DATE: June 27, 2018

SUBJECT: Information about arsenic, iron, and manganese in the deep aquifer in Plains

Recently, the Montana Department of Transportation (MDT) installed three replacement wells for homeowners near Plains, in Sanders County. Salt from MDT's road maintenance operations at its Plains Maintenance Facility leached to shallow groundwater (approximately 50 feet deep) and contaminated several nearby residential wells. MDT installed the three replacement wells, each of which are approximately 280 feet deep, to provide residential water for homes with salt-contaminated shallow wells. On June 22, 2018, MDT reported to DEQ that tests of two of the deep replacement wells showed elevated concentrations of arsenic, iron, and manganese. The third well has not yet been tested for metals; however, MDT is sampling the well for metals during the week of June 25, 2018. DEQ understands MDT is assuming that the third well has elevated arsenic and needs a treatment system. MDT has indicated that it plans to install whole-home treatment systems to treat the arsenic, iron, and manganese for all residences with deep replacement wells. MDT continues to provide bottled water to all salt-affected residents for drinking and cooking, including those with new deep wells.

Table 1 is a summary of the June 14, 2018 test results for arsenic from the two deep replacement wells compared to standards. The units for the values in the table are in micrograms per liter (ug/L).

Table 1

	Well-L	Well-W	Maximum Contaminant Level/DEQ-7 Standard[1]
Arsenic (ug/L)	30	162	10

1. Maximum Contaminant Levels (MCLs) are federally mandated drinking water standards based on protection of human health, availability of treatment technologies, and costs for public drinking water supplies. MCLs are also known as National Primary Drinking Water Regulations. Montana's Circular DEQ-7 Numeric Water Quality Standards adopts the MCLs for groundwater, and this is the case for arsenic.

Table 2 is a summary of the June 14, 2018 test results for iron and manganese compared to applicable screening levels.

Table 2

	Well-L	Well-W	EPA Tapwater Regional Screening Level[1]	Secondary Maximum Contaminant Level[2]
Iron (ug/L)	120	540	14,000	300
Manganese (ug/L)	194	218	430	50

1. EPA establishes its Tapwater Screening Levels in its Regional Screening Levels table. The Tapwater Screening Levels are health-based, but are guidance for screening purposes. There is no DEQ-7 Standard or Primary MCL for iron or manganese.
2. EPA establishes the Secondary Maximum Contaminant Levels (also known as Secondary Drinking Water Standards) for nuisance chemicals. Iron and manganese can cause aesthetic problems with drinking water (taste, discoloration, staining).

DEQ provides the following information about arsenic, iron, and manganese.

Arsenic

- The water in the deep wells installed in Plains has arsenic at concentrations higher than EPA and DEQ's standard of 10 micrograms per liter (ug/L). Residents should not drink this water or use it for cooking. Instead, the bottled water provided by MDT should be used until treatment systems are installed and tested.

- The Environmental Protection Agency (EPA) and the Agency for Toxic Substances and Disease Registry (ATSDR) report that the primary routes for human exposure to arsenic are through ingestion (eating foods and drinking fluids that contain arsenic) and inhalation (for example, breathing in dust that contains arsenic). As noted above, residents should please continue to use bottled water for drinking and cooking.

- MDT is in the process of installing whole-home water treatment systems for the residents with deeper aquifer wells that will treat the arsenic to acceptable levels.

- Based on information provided in EPA's Risk Assessment Guidance for Superfund sites, Part E, exposure to shower water containing arsenic at the concentrations provided in the table above is likely to present very minimal risk to residents. However, DEQ still recommends residents limit their shower time and be careful not to drink the shower water until treatment systems are installed and tested.

- More information about the risks of arsenic may be found on the attached ADSDR ToxFAQ, and at the following website: https://www.atsdr.cdc.gov/toxfaqs/tfacts2.pdf

Iron

- The highest concentration of iron in the deep groundwater (540 ug/L) is less than the health-based screening level of 14,000 ug/L for iron.

- EPA set a Secondary Maximum Contaminant Level of 300 ug/L for iron, which is based upon the concentration at which iron becomes a nuisance. Iron levels greater than 300 ug/L can cause problems with the taste and color of the water, sedimentation, and can cause staining.

- For more information about iron and the Secondary Maximum Contaminant Levels, please refer to the attached information, which is also available at the following website: https://www.epa.gov/dwstandardsregulations/secondary-drinking-water-standards-guidance-nuisance-chemicals

Manganese

- The highest concentration of manganese in the deep groundwater (218 ug/L) is less than the health-based screening level of 430 ug/L for manganese.

- For health information about manganese, please refer to the attached ATSDR ToxFAQs sheet. This information is available at the following website: https://www.atsdr.cdc.gov/toxfaqs/tfacts151.pdf

- EPA set a Secondary Maximum Contaminant Level of 50 ug/L for manganese, which is based upon the concentration at which manganese becomes a nuisance. Manganese levels greater than 50 ug/L can cause problems with the taste and color of the water.

- For more information about manganese and the Secondary Maximum Contaminant Levels, please refer to the attached information, which is also available at the following website: https://www.epa.gov/dwstandardsregulations/secondary-drinking-water-standards-guidance-nuisance-chemicals

Arsenic - ToxFAQs™

CAS # 7440-38-2

This fact sheet answers the most frequently asked health questions (FAQs) about arsenic. 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 higher than average levels of arsenic occur mostly in the workplace, near hazardous waste sites, or in areas with high natural levels. At high levels, inorganic arsenic can cause death. Exposure to lower levels for a long time can cause a discoloration of the skin and the appearance of small corns or warts. Arsenic has been found in at least 1,149 of the 1,684 National Priority List (NPL) sites identified by the Environmental Protection Agency (EPA).

What is arsenic?

Arsenic is a naturally occurring element widely distributed in the earth's crust. In the environment, arsenic is combined with oxygen, chlorine, and sulfur to form inorganic arsenic compounds. Arsenic in animals and plants combines with carbon and hydrogen to form organic arsenic compounds.

Inorganic arsenic compounds are mainly used to preserve wood. Copper chromated arsenate (CCA) is used to make "pressure-treated" lumber. CCA is no longer used in the U.S. for residential uses; it is still used in industrial applications. Organic arsenic compounds are used as pesticides, primarily on cotton fields and orchards.

What happens to arsenic when it enters the environment?

- Arsenic occurs naturally in soil and minerals and may enter the air, water, and land from wind-blown dust and may get into water from runoff and leaching.
- Arsenic cannot be destroyed in the environment. It can only change its form.
- Rain and snow remove arsenic dust particles from the air.
- Many common arsenic compounds can dissolve in water. Most of the arsenic in water will ultimately end up in soil or sediment.
- Fish and shellfish can accumulate arsenic; most of this arsenic is in an organic form called arsenobetaine that is much less harmful.

How might I be exposed to arsenic?

- Ingesting small amounts present in your food and water or breathing air containing arsenic.
- Breathing sawdust or burning smoke from wood treated with arsenic.
- Living in areas with unusually high natural levels of arsenic in rock.
- Working in a job that involves arsenic production or use, such as copper or lead smelting, wood treating, or pesticide application.

How can arsenic affect my health?

Breathing high levels of inorganic arsenic can give you a sore throat or irritated lungs.

Ingesting very high levels of arsenic can result in death. Exposure to lower levels can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet.

Ingesting or breathing low levels of inorganic arsenic for a long time can cause a darkening of the skin and the appearance of small "corns" or "warts" on the palms, soles, and torso.

Skin contact with inorganic arsenic may cause redness and swelling.

Almost nothing is known regarding health effects of organic arsenic compounds in humans. Studies in animals show that some simple organic arsenic

Arsenic

CAS # 7440-38-2

compounds are less toxic than inorganic forms. Ingestion of methyl and dimethyl compounds can cause diarrhea and damage to the kidneys.

How likely is arsenic to cause cancer?

Several studies have shown that ingestion of inorganic arsenic can increase the risk of skin cancer and cancer in the liver, bladder, and lungs. Inhalation of inorganic arsenic can cause increased risk of lung cancer. The Department of Health and Human Services (DHHS) and the EPA have determined that inorganic arsenic is a known human carcinogen. The International Agency for Research on Cancer (IARC) has determined that inorganic arsenic is carcinogenic to humans.

How can arsenic affect children?

There is some evidence that long-term exposure to arsenic in children may result in lower IQ scores. There is also some evidence that exposure to arsenic in the womb and early childhood may increase mortality in young adults.

There is some evidence that inhaled or ingested arsenic can injure pregnant women or their unborn babies, although the studies are not definitive. Studies in animals show that large doses of arsenic that cause illness in pregnant females, can also cause low birth weight, fetal malformations, and even fetal death. Arsenic can cross the placenta and has been found in fetal tissues. Arsenic is found at low levels in breast milk.

How can families reduce the risks of exposure to arsenic?

- If you use arsenic-treated wood in home projects, you should wear dust masks, gloves, and protective clothing to decrease exposure to sawdust.
- If you live in an area with high levels of arsenic in water or soil, you should use cleaner sources of water and limit contact with soil.
- If you work in a job that may expose you to arsenic, be aware that you may carry arsenic home on your clothing, skin, hair, or tools. Be sure to shower and change clothes before going home.

Is there a medical test to determine whether I've been exposed to arsenic?

There are tests available to measure arsenic in your blood, urine, hair, and fingernails. The urine test is the most reliable test for arsenic exposure within the last few days. Tests on hair and fingernails can measure exposure to high levels of arsenic over the past 6-12 months. These tests can determine if you have been exposed to above-average levels of arsenic. They cannot predict whether the arsenic levels in your body will affect your health.

Has the federal government made recommendations to protect human health?

The EPA has set limits on the amount of arsenic that industrial sources can release to the environment and has restricted or cancelled many of the uses of arsenic in pesticides. EPA has set a limit of 0.01 parts per million (ppm) for arsenic in drinking water.

The Occupational Safety and Health Administration (OSHA) has set a permissible exposure limit (PEL) of 10 micrograms of arsenic per cubic meter of workplace air (10 $\mu g/m^3$) for 8 hour shifts and 40 hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological Profile for Arsenic (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 and Human Health Sciences, 1600 Clifton Road NE, Mailstop F-57, Atlanta, GA 30329-4027.

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.

Manganese - ToxFAQs™

CAS # 7439-96-5

This fact sheet answers the most frequently asked health questions (FAQs) about manganese. 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: Manganese is a trace element and eating a small amount from food or water is needed to stay healthy. Exposure to excess levels of manganese may occur from breathing air, particularly where manganese is used in manufacturing, and from drinking water and eating food. At high levels, it can cause damage to the brain. Manganese has been found in at least 869 of the 1,669 National Priorities List (NPL) sites identified by the Environmental Protection Agency (EPA).

What is manganese?

Manganese is a naturally occurring metal that is found in many types of rocks. Pure manganese is silver-colored, but does not occur naturally. It combines with other substances such as oxygen, sulfur, or chlorine. Manganese occurs naturally in most foods and may be added to some foods.

Manganese is used principally in steel production to improve hardness, stiffness, and strength. It may also be used as an additive in gasoline to improve the octane rating of the gas.

What happens to manganese when it enters the environment?

- Manganese can be released to the air, soil, and water from the manufacture, use, and disposal of manganese-based products.
- Manganese cannot break down in the environment. It can only change its form or become attached to or separated from particles.
- In water, manganese tends to attach to particles in the water or settle into the sediment.
- The chemical state of manganese and the type of soil determine how fast it moves through the soil and how much is retained in the soil.
- The manganese-containing gasoline additive may degrade in the environment quickly when exposed to sunlight, releasing manganese.

How might I be exposed to manganese?

- The primary way you can be exposed to manganese is by eating food or manganese-containing nutritional supplements. Vegetarians, who consume foods rich in manganese such as grains, beans and nuts, as well as heavy tea drinkers, may have a higher intake of manganese than the average person.
- Certain occupations like welding or working in a factory where steel is made may increase your chances of being exposed to high levels of manganese.
- Manganese is routinely contained in groundwater, drinking water, and soil at low levels. Drinking water containing manganese or swimming or bathing in water containing manganese may expose you to low levels of this chemical.

How can manganese affect my health?

Manganese is an essential nutrient, and eating a small amount of it each day is important to stay healthy.

The most common health problems in workers exposed to high levels of manganese involve the nervous system. These health effects include behavioral changes and other nervous system effects, which include movements that may become slow and clumsy. This combination of symptoms when sufficiently severe is referred to as "manganism". Other less severe nervous system effects such as slowed hand movements have been observed in some workers exposed to lower concentrations in the work place.

Manganese

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Exposure to high levels of manganese in air can cause lung irritation and reproductive effects.

Nervous system and reproductive effects have been observed in animals after high oral doses of manganese.

How likely is manganese to cause cancer?

The EPA concluded that existing scientific information cannot determine whether or not excess manganese can cause cancer.

How can manganese affect children?

Studies in children have suggested that extremely high levels of manganese exposure may produce undesirable effects on brain development, including changes in behavior and decreases in the ability to learn and remember. We do not know for certain that these changes were caused by manganese alone. We do not know if these changes are temporary or permanent. We do not know whether children are more sensitive than adults to the effects of manganese, but there is some indication from experiments in laboratory animals that they may be.

Studies of manganese workers have not found increases in birth defects or low birth weight in their offspring. No birth defects were observed in animals exposed to manganese.

How can families reduce the risk of exposure to manganese?

- Children are not likely to be exposed to harmful amounts of manganese in the diet. However, higher-than-usual amounts of manganese may be absorbed if their diet is low in iron. It is important to provide your child with a well-balanced diet.
- Workers exposed to high levels of airborne manganese in certain occupational settings may accumulate manganese dust on their work clothes. Manganese-contaminated work clothing should be removed before getting into your car or entering your home to help reduce the exposure hazard for yourself and your family.

Is there a medical test to determine whether I've been exposed to manganese?

Several tests are available to measure manganese in blood, urine, hair, or feces. Because manganese is normally present in our body, some is always found in tissues or fluids.

Because excess manganese is usually removed from the body within a few days, past exposures are difficult to measure with common laboratory tests.

Has the federal government made recommendations to protect human health?

The EPA has determined that exposure to manganese in drinking water at concentrations of 1 mg/L for up to 10 days is not expected to cause any adverse effects in a child.

The EPA has established that lifetime exposure to 0.3 mg/L manganese is not expected to cause any adverse effects.

The Food and Drug Administration (FDA) has determined that the manganese concentration in bottled drinking water should not exceed 0.05 mg/L.

The Occupational Health and Safety Administration (OSHA) has established a ceiling limit (concentration that should not be exceeded at any time during exposure) of 5 mg/m^3 for manganese in workplace air.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2012. Toxicological Profile for Manganese. Atlanta, GA: U.S. Department of Public 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 30329-4027.

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EPA United States Environmental Protection Agency

Secondary Drinking Water Standards: Guidance for Nuisance Chemicals

On this page:

What are Secondary Standards?

EPA has established National Primary Drinking Water Regulations (NPDWRs (National Primary Drinking Water Regulations)) that set mandatory water quality standards for drinking water contaminants. These are enforceable standards called "maximum contaminant levels" (MCLs) which are established to protect the public against consumption of drinking water contaminants that present a risk to human health. An MCL (Maximum Contaminant Level) is the maximum allowable amount of a contaminant in drinking water which is delivered to the consumer.

In addition, EPA has established National Secondary Drinking Water Regulations (NSDWRs) (National Secondary Drinking Water Regulations) that set non-mandatory water quality standards for 15 contaminants. EPA does not enforce these "secondary maximum contaminant levels" (SMCLs) (Secondary Maximum Contaminant Levels) They are established as guidelines to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color, and odor. These contaminants are not considered to present a risk to human health at the SMCL (Secondary Maximum Contaminant Level).

While SMCLs are not federally enforceable, EPA requires a special notice for exceedance of the fluoride SMCL of 2.0 mg/L. Community water systems that exceed the fluoride SMCL of 2 mg/L, but do not exceed the MCL of 4.0 mg/L for fluoride, must provide public notice to persons served no later than 12 months from the day the water system learns of the exceedance (40 CFR 141.208).

Why Set Secondary Standards?

These contaminants are not health threatening at the SMCL. P (Secondary Maximum Contaminant Level)ublic water systems only need to test for them on a voluntary basis. Then why it is necessary to set secondary standards?

EPA believes that if these contaminants are present in your water at levels above these standards, the contaminants may cause the water to appear cloudy or colored, or to taste or smell bad. This may cause a great number of people to stop using water from their public water system even though the water is actually safe to drink.

Secondary standards are set to give public water systems some guidance on removing these chemicals to levels that are below what most people will find to be noticeable.

What Problems are Caused by these Contaminants?

There are a wide variety of problems related to secondary contaminants.

These problems can be grouped into three categories:

- Aesthetic effects — undesirable tastes or odors;
- Cosmetic effects — effects which do not damage the body but are still undesirable
- Technical effects — damage to water equipment or reduced effectiveness of treatment for other contaminants

The SMCLs (Secondary Maximum Contaminant Level) related to each of these effects are shown in the table below.

Aesthetic effects

Odor and taste are useful indicators of water quality even though odor-free water is not necessarily safe to drink. Odor is also an indicator of the effectiveness of different kinds of treatment. However, present methods of measuring taste and odor are still fairly subjective and the task of identifying an unacceptable level for each chemical in different waters requires more study. Also, some contaminant odors are noticeable even when present in extremely small amounts. It is usually very expensive and often impossible to identify, much less remove, the odor-producing substance.

- Standards related to odor and taste: Chloride, Copper, Foaming Agents, Iron, Manganese pH, Sulfate, Threshold Odor Number (TON (Threshold Odor Number)), Total Dissolved Solids, Zinc

Color may be indicative of dissolved organic material, inadequate treatment, high disinfectant demand, and the potential for the production of excess amounts of disinfectant by-products. Inorganic contaminants such as metals are also common causes of color. In general, the point of consumer complaint is variable over a range from five to 30 color units. Most people find color objectionable over 15 color units. Rapid changes in color levels may provoke more citizen complaints than a relatively high, constant color level.

- Standards related to color: Aluminum, Color, Copper, Iron, Manganese, Total Dissolved Solids.

Foaming is usually caused by detergents and similar substances when water has been agitated or aerated as in many faucets. An off-taste described as oily, fishy, or perfume-like is commonly associated with foaming. However, these tastes and odors may be due to the breakdown of waste products rather than the detergents themselves.

- Standards related to foaming: Foaming Agents

Cosmetic effects

Skin discoloration is a cosmetic effect related to silver ingestion. This effect, called argyria, does not impair body function. It has never been found to be caused by drinking water in the United States. A standard has been set, however, because silver is used as an antibacterial agent in many home water treatment devices and so presents a potential problem which deserves attention.

- Standard related to this effect: Silver

Tooth discoloration and/or pitting is caused by excess fluoride exposures during the formative period prior to eruption of the teeth in children. The secondary standard of 2.0 mg/L (Milligrams per Liter) is intended as a guideline for an upper boundary level in areas which have high levels of naturally occurring fluoride. The level of the SMCL (Maximum Contaminant Level) was set based upon a balancing of the beneficial effects of protection from tooth decay and the undesirable effects of excessive exposures leading to discoloration. Information about the Centers for Disease Control's (CDC) recommendations regarding optimal fluoridation levels and the beneficial effects for protection from tooth decay can be found on CDC's Community Water Fluoridation page.

- Standard related to this effect: Fluoride

Technical effects

Corrosivity, and staining related to corrosion, not only affect the aesthetic quality of water, but may also have significant economic implications. Other effects of corrosive water, such as the corrosion of iron and copper, may stain household fixtures and impart objectionable metallic taste and red or blue-green color to the water supply. Corrosion of distribution system pipes can reduce water flow.

- Standards related to corrosion and staining: Chloride, Copper, Corrosivity, Iron, Manganese, pH, Total Dissolved Solids, Zinc

Scaling and sedimentation are other processes which have economic impacts. Scale is a mineral deposit which builds up on the insides of hot water pipes, boilers, and heat exchangers, restricting or even blocking water flow. Sediments are loose deposits in the distribution system or home plumbing.

- Standards related to scale and sediments: Iron, pH, Total Dissolved Solids, Aluminum

Table of Secondary Standards

Contaminant	Secondary MCL (Maximum Contaminant Level)	Noticeable Effects above the Secondary MCL (Maximum Contaminant Level) (Maximum Contaminant Level)
Aluminum	0.05 to 0.2 mg/L (Milligrams per Liter)* (Milligrams per Liter)	colored water
Chloride	250 mg/L (Milligrams per Liter)	salty taste
Color	15 color units	visible tint
Copper	1.0 mg/L (Milligrams per Liter)	metallic taste; blue-green staining
Corrosivity	Non-corrosive	metallic taste; corroded pipes/ fixtures staining
Fluoride	2.0 mg/L (Milligrams per Liter)	tooth discoloration
Foaming agents	0.5 mg/L (Milligrams per Liter)	frothy, cloudy; bitter taste; odor
Iron	0.3 mg/L (Milligrams per Liter)	rusty color; sediment; metallic taste; reddish or orange staining
Manganese	0.05 mg/L (Milligrams per Liter)	black to brown color; black staining; bitter metallic taste

Odor	3 TON (threshold odor number)	"rotten-egg", musty or chemical smell
pH	6.5 - 8.5	low pH: bitter metallic taste; corrosion high pH: slippery feel; soda taste; deposits
Silver	0.1 mg/L (Milligrams per Liter)	skin discoloration; graying of the white part of the eye
Sulfate	250 mg/L (Milligrams per Liter)	salty taste
Total Dissolved Solids (TDS (Total Dissolved Solids))	500 mg/L (Milligrams per Liter)	hardness; deposits; colored water; staining; salty taste
Zinc	5 mg/L (Milligrams per Liter)	metallic taste

*mg/L (Milligrams per Liter) is milligrams of substance per liter of water.

How Can these Problems be Corrected?

Although state health agencies and public water systems often decide to monitor and treat their supplies for secondary contaminants, federal regulations do not require them to do this. Where secondary contaminants are a problem, the types of removal technologies discussed below are corrective actions which the water supplier can take. They are usually effective depending upon the overall nature of the water supply.

Corrosion control is perhaps the single most cost-effective method a system can use to treat for iron, copper, and zinc due to the significant benefits in:

- Reduction of contaminants at the consumer's tap
- Cost savings due to extending the useful life of water mains and service lines
- Energy savings from transporting water more easily through smoother, uncorroded pipes
- Reduced water losses through leaking or broken mains or other plumbing

This treatment is used to control the acidity, alkalinity, or other water qualities which affect pipes and equipment used to transport water. By controlling these factors, the public water system can reduce the leaching of metals such as copper, iron, and zinc from pipes or fixtures, as well as the color and taste associated with these contaminants. It should be noted that corrosion control is not used to remove metals from contaminated source waters.

Conventional treatments will remove a variety of secondary contaminants. Coagulation (or flocculation) and filtration removes metals like iron, manganese and zinc. Aeration removes odors, iron, and manganese. Granular activated carbon will remove most of the contaminants which cause odors, color, and foaming.

Non-conventional treatments like distillation, reverse osmosis, and electrodialysis are effective for removal of chloride, total dissolved solids, and other inorganic substances. However, these are fairly expensive technologies and may be impractical for smaller systems.

Non-treatment options include blending water from the principal source with uncontaminated water from an alternative source.

What Can You Do?

If you are concerned about the presence of secondary contaminants in your drinking water supply, here are a few suggestions:

- **First**, identify your local public water system. If you pay a water bill, the name, address, and telephone number of your supplier should be on the bill. If you do not pay a water bill, then contact your landlord, building manager, or the local health department — they should know.
- **Second**, contact your local public water system. Inquire about your supplier's monitoring for secondary contaminants. Ask for the list of secondary contaminants which are being monitored in your water supply. Does the water being delivered to the public meet these SMCLs (Secondary Maximum Contaminant Levels)? If you have not yet received notice from your supplier, ask how you can get a copy of the monitoring results.
- **Third**, if you receive a public notice from your local public water system regarding other drinking water standards — **read it carefully** — and follow any instructions closely. If you have questions or concerns, contact the person from the water system who is indicated in the notice. If that person is unavailable, contact either the state drinking water program or your local health department.
- **Fourth**, contact your state drinking water program if your water supplier is unable to provide the information you need. Ask if your water supplier is consistently in compliance with *both* primary and secondary drinking water regulations. Request a copy of monitoring results that were submitted to the state by your supplier. Your state drinking water program is usually located in the state capital (or another major city) and is often part of the department of health or environmental regulation. Consult the blue

"government pages" of your local phone book for the proper address and phone number or call the Safe Drinking Water Hotline at 1-800-426-4791.

- **Fifth**, support rate increases for your local water supplier, where necessary, to upgrade your supplier's treatment facilities to meet drinking water standards.
- **Finally**, if you have a private well and you think that the well may be near a source of contamination or may have been contaminated—**have your water tested by a certified laboratory**. A list of certified labs is available from your state's laboratory certification officer. A list of the certification officers can be obtained from the calling the Safe Drinking Water Hotline.

For more information

For more information on secondary contaminants contact the Safe Drinking Water Hotline at 1-800-426-4791. Ask:

- For a list of the primary and secondary contaminants
- About monitoring requirements for these contaminants
- For a list of the health advisories available for these contaminants

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