

Drinking Water 101

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Outline

- Public Water Supplies
- Principles of Providing Safe Drinking Water
- Federal Role
- National Primary Drinking Water Standards
- State Role
- Oversight of Public Water Supplies

What is a Public Water System?

- **A facility that:**
 1. Provides water for drinking or household purposes to persons other than the supplier of the water.
 2. Serves more than one living unit.

• **Serving water means water used for:**

1. Drinking
2. Food preparation
3. Bathing & showering
4. Tooth brushing
5. Dishwashing



Types of Public Water Supplies

Type I - Community

Type II - Noncommunity

Type III – Other

Groundwater

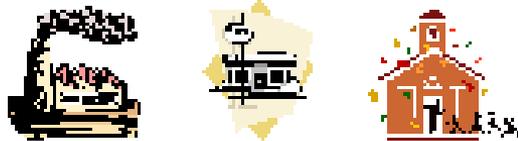
Surface Water

Water System Categories & Definitions



Public Water System

A waterworks system which provides water for drinking or household purposes to persons other than the supplier of the water, except those supplying water to only one living unit.



Noncommunity
Where people work & play. PWS that is not a community water supply & that serves a nonresident population.



Community
Where people live. PWS that has at least 15 service connections or living units used by year-round residents, or regularly serves at least 25 year-round residents.



Transient
PWS that serves 25 or more different people a day at least 60 days of the year but does not serve the same 25 people over 6 months of the year.
Ex: Restaurants, campgrounds, hotels, golf courses, highway rest stops, parks...



Nontransient
PWS that serves the same 25 or more people at least 180 days of the year (6 months).
Ex: Schools, industries, offices, child care...

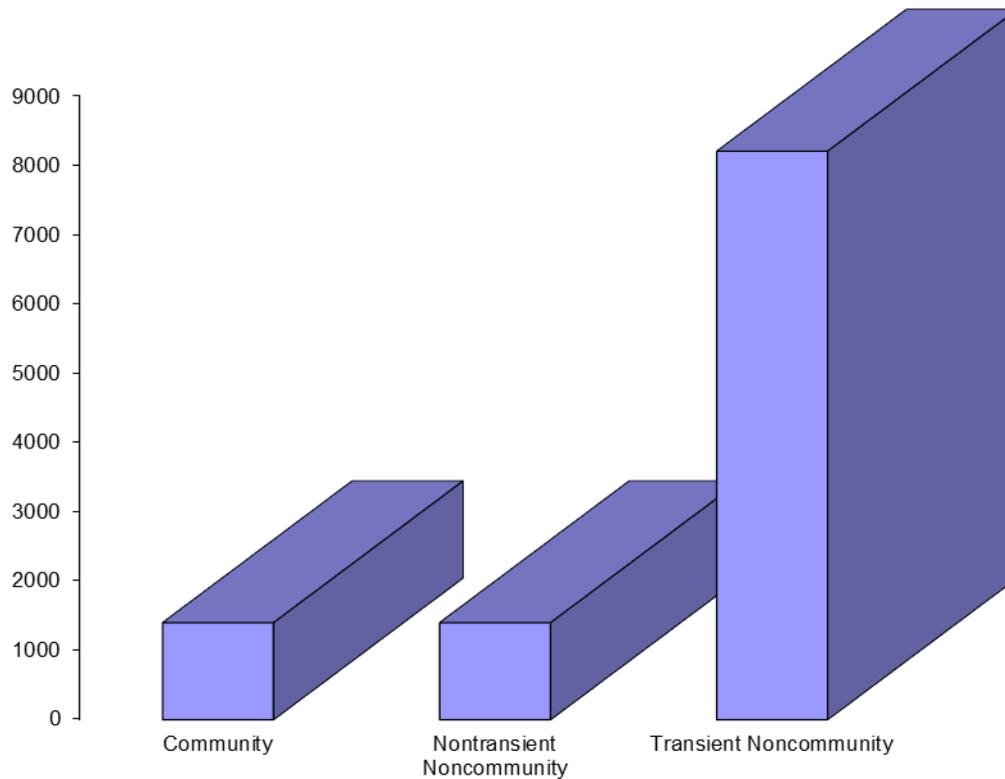


Non-Municipal
PWS that serves at least 25 year-round residents, or serves 15 service connections used by year-round residents.
Ex: Nursing homes, Mobile Home Parks, Apts.



Municipal
PWS that serves at least 25 year-round residents, or serves 15 service connections used by year-round residents. Owned by a municipality.
'The City or'

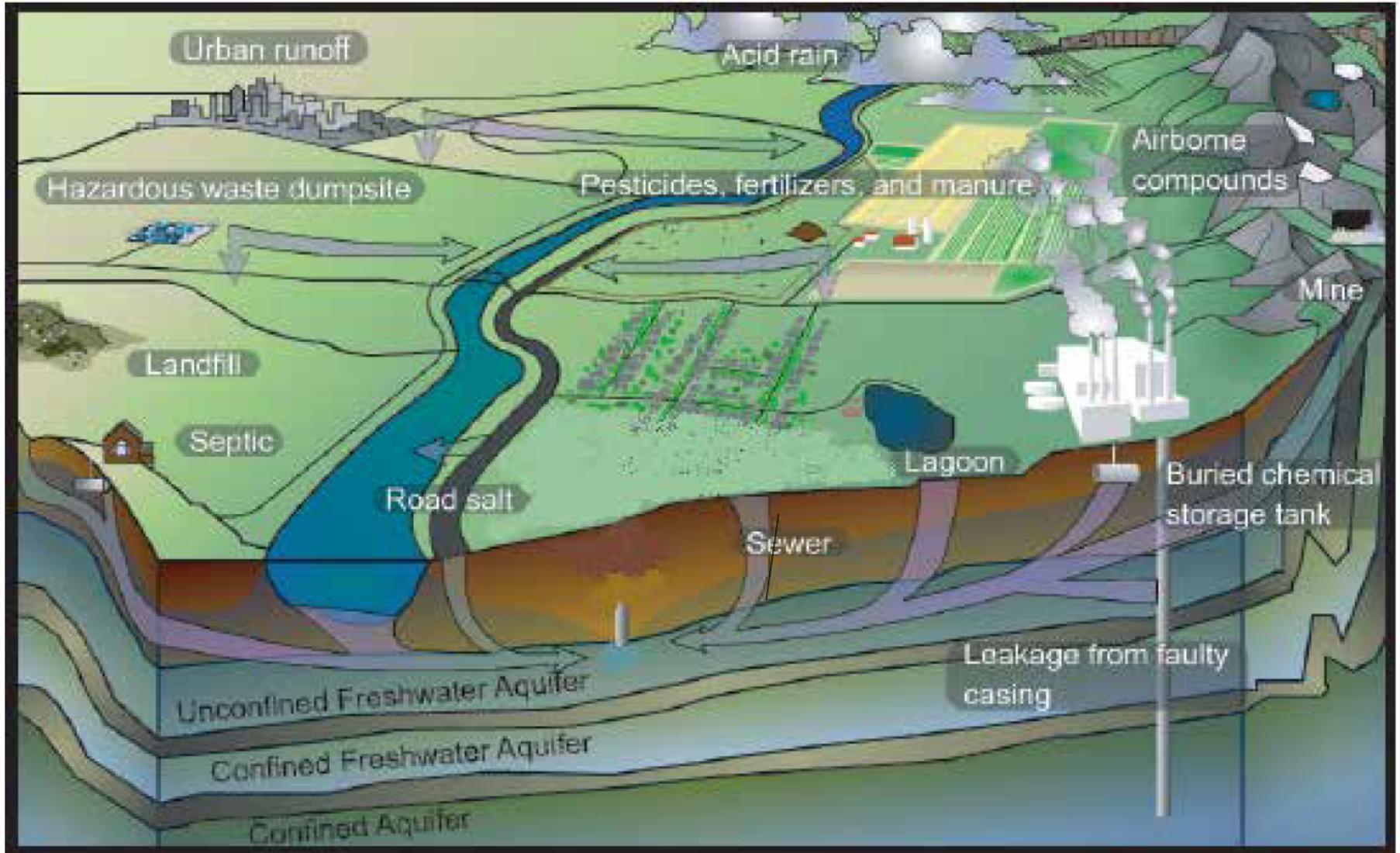
Michigan Type I & II Supplies



Principles for Providing Safe Drinking Water

- Provide a safe, reliable and adequate supply of water to the public
- Assure multiple barriers of protection are in place, if one fails will not adversely impact public health:
 - Source water/groundwater protection
 - Well construction
 - Treatment
 - Distribution system integrity
 - Cross connection control program
 - Operator certification and training
 - Provide information to the public

Source Water Protection



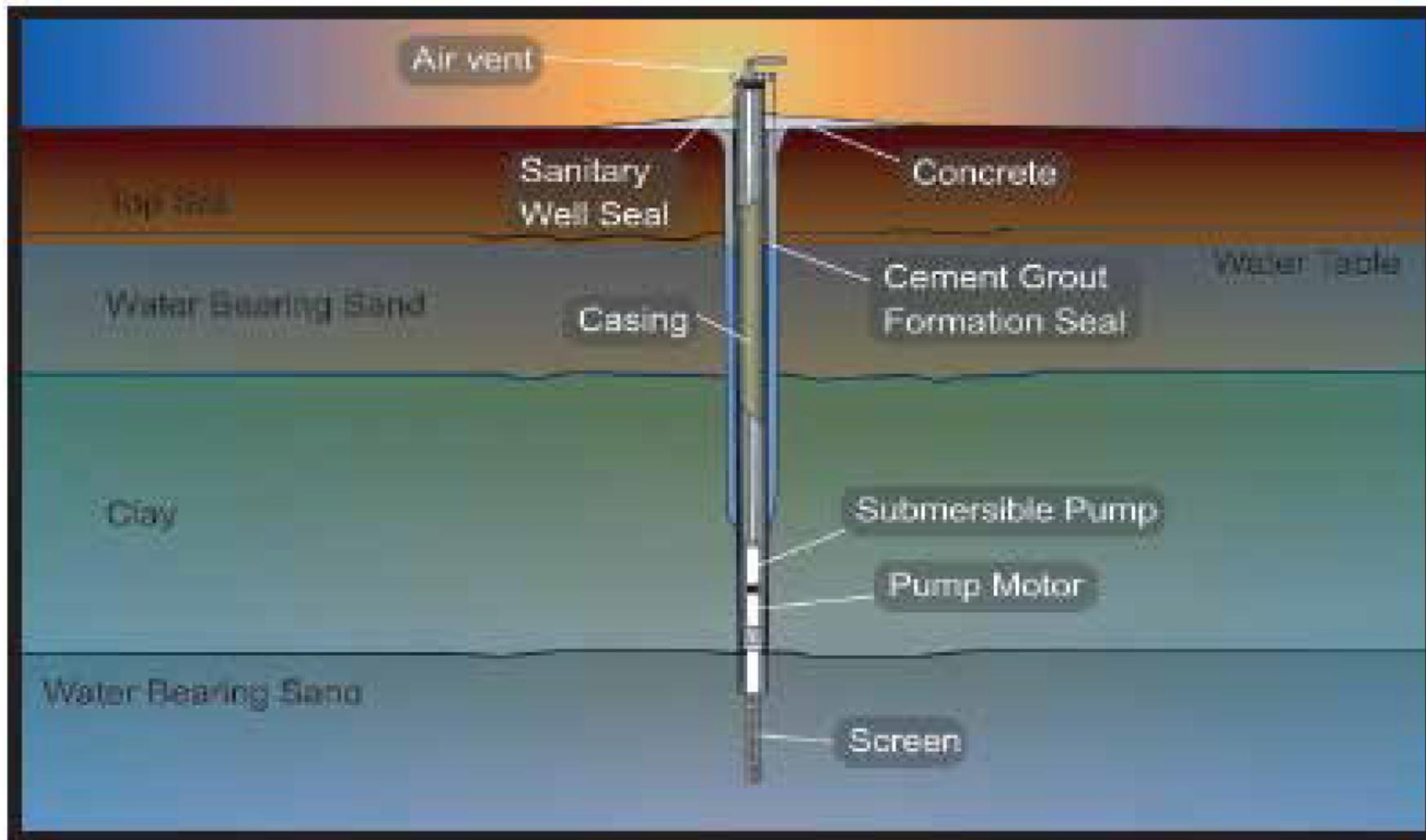
Source Water Protection Protection & Isolation



Protective posts

Tight fitting well cap

Proper Well Construction



Well Construction



Surface Water Treatment

Purpose: Make water of poor physical & microbiological quality fit for human consumption

To make surface waters potable:

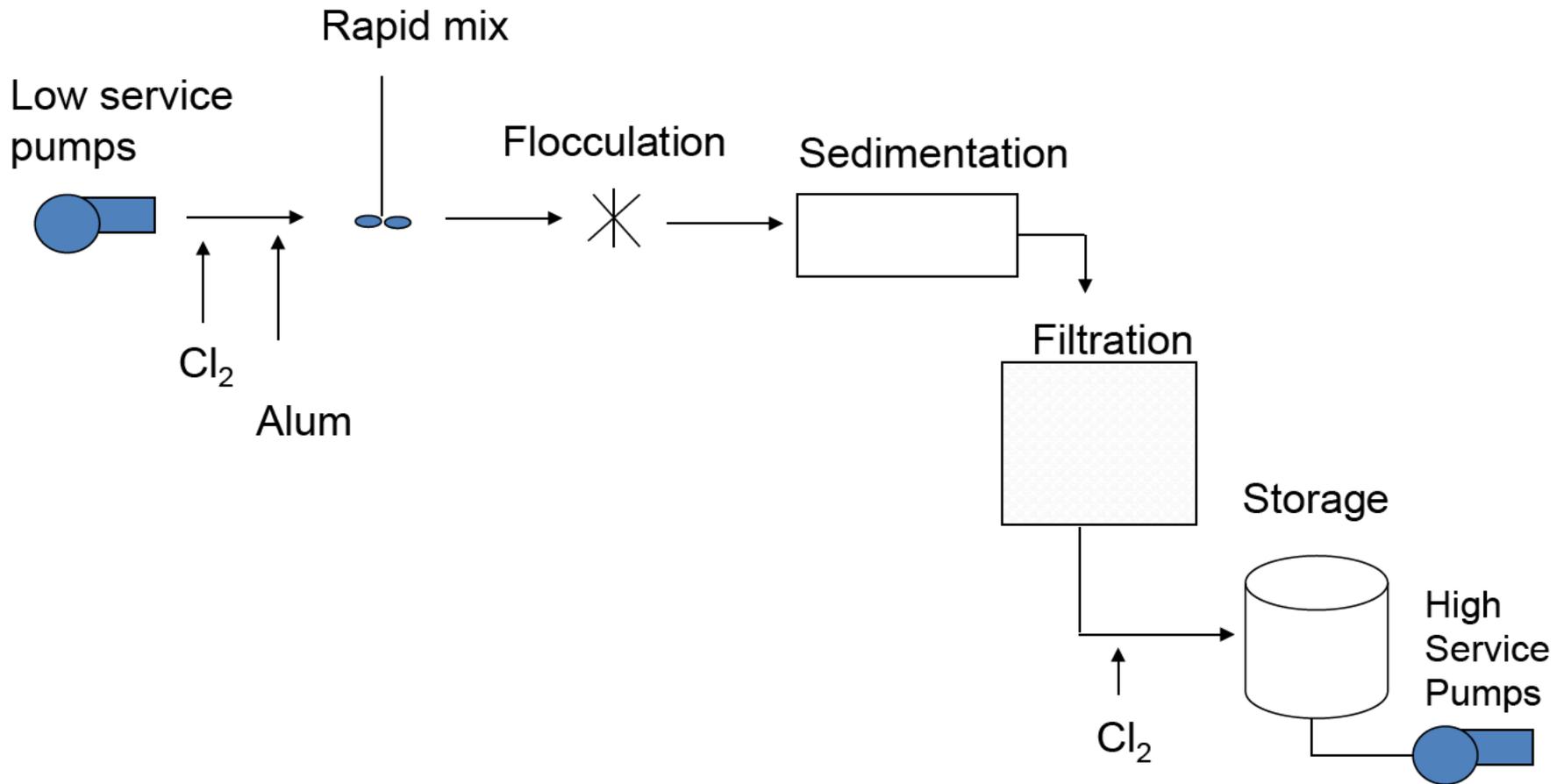
- Suspended particles must be removed
- Harmful organisms must be destroyed

How: Complete treatment requires disinfection and filtration

Types of Complete Treatment

- Conventional Treatment
- Direct Filtration
- Lime Softening
- Membrane filtration

Conventional Treatment



Other Treatment and Distribution System Safeguards

- **Continuous Positive Pressure**
 - Prevents backsiphonage & entry of contaminants
 - Result of adequate supply & storage and proper design
 - Loss of pressure = posting, chlorination & sampling
- **Frequent Testing & Record Keeping**
 - Lets you know if there is a breach in system
 - Records let others know what has happened in your absence
- **Routine Maintenance**
 - Well/pump, storage, distribution piping, treatment devices, cross connections, safety & security



Cross-Connection

A connection or arrangement of piping or appurtenances through which backflow could occur.

Or

Any piping arrangement which allows a potable water system to be connected to a non potable system.



Backflow Caused by Heavy Demands

Water Main Breaks



Fire Fighting





Operator Certification and Training



Consumer Confidence Report

Disinfectants and Disinfection By-products

The BWL adds chlorine to its water at the conditioning plant to protect against bacterial growth. We use chlorine rather than other disinfection systems because it minimizes the number and level of disinfection by-products, protects better in the distribution system, and lasts longer at its application rate and taste. The following table lists the chlorine levels and disinfection by-products created by the reaction of our chlorine treatment and naturally occurring organic compounds. The chlorine levels were measured at the water plant and the disinfection by-products were measured in the distribution system.

Substance	Unit	MCL	MCLG	Average Detected Level	Range of Detected Levels	Major Sources	Violation?
Haloacetic Acids (HAA5)	PPB	60	60	2.8	1.4 to 3.4	By product of drinking water chlorination	No
Total Trihalomethanes (TTHM)	PPB	80	80	3.3	2.2 to 4.0	By product of drinking water chlorination	No
Chloramine	PPM	<	<	2.24	0.00 to 2.8	Water additive for microbial control	No

Unregulated Contaminants

Unregulated contaminants are those that have no MCL or MCLG but are monitored for the purpose of providing information to MICH and EPA on their occurrence.

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER

Availability of Monitoring Data for Unregulated Contaminants for Lansing Board of Water & Light

Our water system has sampled for a series of unregulated contaminants. Unregulated contaminants are those that don't yet have a drinking water standard set by EPA.

The purpose of monitoring for these contaminants is to help EPA decide whether the contaminants should have a standard. As our customers, you have a right to know that these data are available. If you are interested in examining the results, please contact Bill Mear at 517-702-6833 or at wbm@lansing.com.

Substance	Unit	Average Detected Level	Lowest Detected Level	Highest Detected Level	Major Source	Violation?
Selenium	PPM	46.5	43	50	Natural constituent of groundwater	No

Cryptosporidium: We tested for Cryptosporidium in 2000 and did not detect any. Cryptosporidium is a microbial pathogen occasionally found in surface waters. If ingested it can cause cryptosporidiosis, a gastrointestinal infection with symptoms of cramping, nausea or diarrhea. Cryptosporidium can be spread by means other than drinking water, it is a concern for water systems like ours, which draw drinking water from deep wells.

Radon: We last monitored for radon in 2000. The results were between 140 and 150 picocuries per liter (pCi/L). This is a relatively low level for groundwater, which contains radon gas that has dissolved into the water from surrounding soils. A proposed EPA rule for radon, since withdrawn, would have established maximum contaminant levels of between 100 to 4,000 pCi/L for public water supplies. Radon is a colorless gas that you can't see, taste, or smell. It is found throughout the United States. Radon can move up through the ground and into a home through cracks and holes in the foundation. Radon can build up to high levels in all types of homes. Radon can seep into basins or when released from tap water from showering, washing dishes, and other household activities. Compared to radon entering the home through soil, radon entering the home through tap water will, in most cases, be a small source of radon in indoor air. Radon is a known human carcinogen. Breathing air containing radon can lead to lung cancer. Drinking water containing radon may also cause increased risk of stomach cancer. If you are concerned about radon in your home, test the air in your home. Testing is inexpensive and easy. For more information on the level of radon in your air or in your water, there are simple steps to fix a radon problem that aren't too costly. For additional information, call your state radon program or EPA's Radon Hotline (800-555-RADON).

Radium 226 and 228: We monitored for both radium 226 and radium 228 in 2001 and did not detect either.

General Health Information Provided by EPA

To ensure that tap water is safe to drink, EPA prescribes limits on the amounts of certain contaminants in water provided by public water systems. EPA regulations establish limits for contaminants in finished water.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (800-426-4791).

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and radioactive material, and can pick up substances resulting from the presence of animals or human activities. Contaminants that may be present in source water include:

- Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.
- Inorganic contaminants, such as salts and metals, which can be naturally occurring or result from urban storm runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
- Pesticides and herbicides, which may come from a variety of sources such as agriculture, stormwater runoff and residential use.
- Organic chemical contaminants, including synthetic and volatile organics, which are by-products of industrial processes and petroleum production, can also come from gas stations, urban stormwater runoff and septic systems.
- Radioactive contaminants, which can be naturally occurring or be the result of oil and gas production and mining activities. In order to ensure that tap water is safe to drink, EPA prescribes regulations which limit the amounts of certain contaminants in water provided by public water systems. FDA regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

Some people may be more vulnerable to contaminants in drinking water than the general population. Infants and compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with immunodeficiency or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their healthcare providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium are available from the Safe Drinking Water Hotline (800-426-4791).

National Primary Drinking Water Regulation Compliance

For more information about our water quality, please contact Water Quality Administrator Bill Mear at 517-702-6833. Learn more about the Lansing Board of Water & Light water system at www.lansing.com. For more information about safe drinking water, visit the U.S. Environmental Protection Agency (EPA) at www.epa.gov/safewater/.

LANSING BOARD OF WATER & LIGHT

2009 ANNUAL WATER QUALITY REPORT

Dear Customer:

We are pleased to present the twelfth annual report summarizing the quality of the drinking water provided to you during the past year. This "Consumer Confidence Report" is required by the Safe Drinking Water Act (SDWA). It tells you where your tap water comes from, what our tests show about it, and includes other things you may wish to know about drinking water.



The BWL is a publicly owned utility. We encourage public interest and participation in our community's decisions affecting drinking water. Our Board of Commissioners meets on the fourth Tuesday of every other month at our Customer Service Center, 1232 Haco Drive in Lansing. Meeting dates and times are published in advance and may be accessed on the BWL's website at www.lansing.com, or by calling us at 517-702-6006. Our meetings are open to the public.

The Bottom Line

During 2009 your drinking water from the BWL met or exceeded all quality standards issued by the U.S. Environmental Protection Agency (EPA) and the Michigan Department of Natural Resources and Environment (MDNRE).

Water Source

Our drinking water comes from 118 wells, drilled about 400 feet into the Earth's surface. The source of this plentiful supply is an underground aquifer called the Saginaw Formation, which underlies much of the mid-Michigan region. Water from our wells is



transported through large transmission mains to one of two conditioning plants. There, a process removes about 60 percent of the water hardness. The softened water is then chlorinated, flocculated, filtered and stored in reservoirs for distribution to our customers. Lansing is one of the larger cities in the country to take its drinking supply entirely from groundwater.

Public Notice

Nitrate MCL Exceedance Notice – Template 1-1

DRINKING WATER WARNING

[System] water has high levels of nitrate -

**DO NOT GIVE THE WATER TO INFANTS UNDER 6 MONTHS OLD
OR USE IT TO MAKE INFANT FORMULA**

On [give date], we received notice that the sample collected on [give date] showed nitrate levels of [level and units]. This is above the nitrate standard, or maximum contaminant level (MCL), of [state/federal MCL]. Nitrate in drinking water is a serious health concern for infants less than six months old.

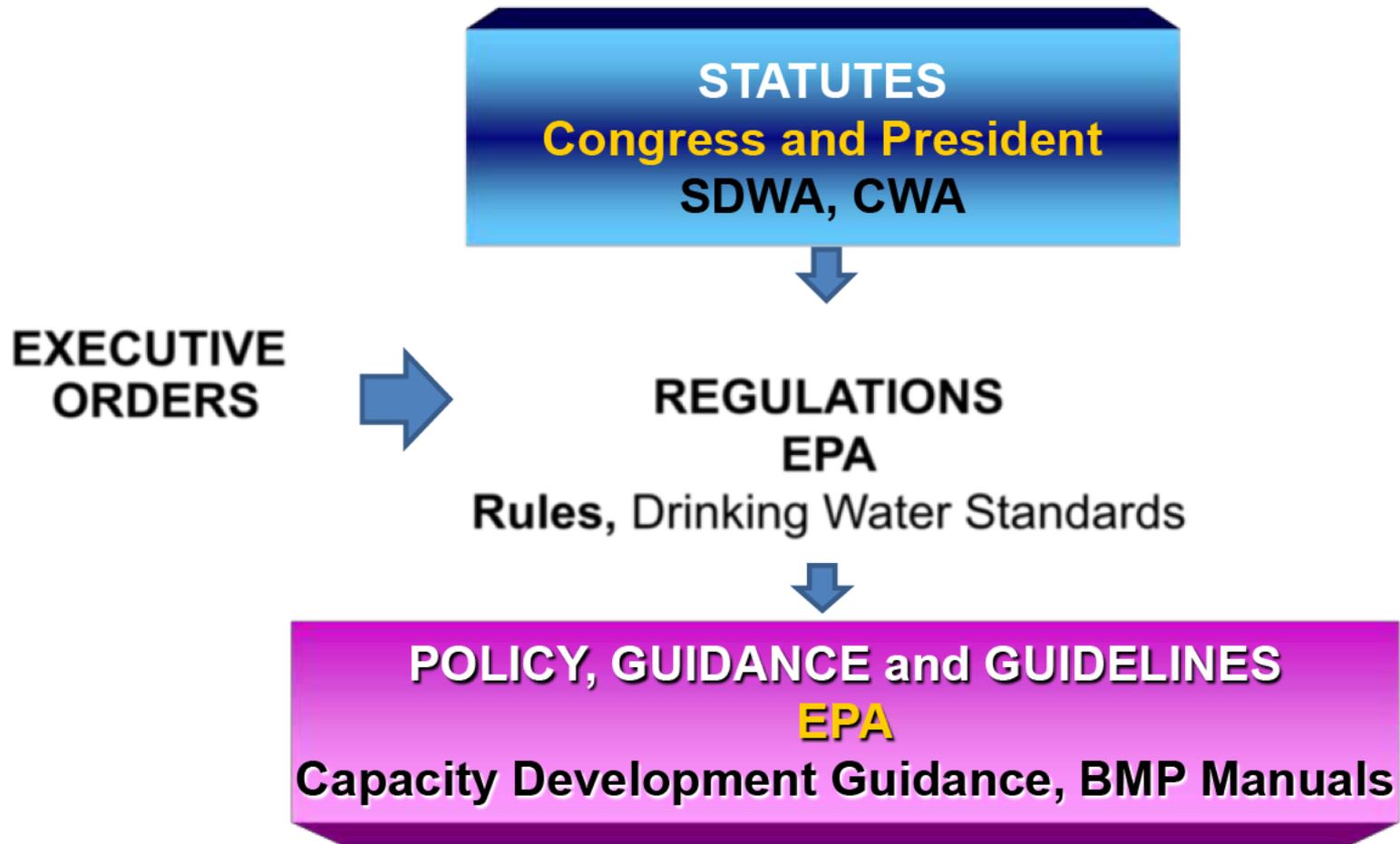
Nitrate in drinking water can come from natural, industrial, or agricultural sources (including septic systems and run-off). Levels of nitrate in drinking water can vary throughout the year.

What should I do? What does this mean?

- **DO NOT GIVE THE WATER TO INFANTS.** **Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.** Blue baby syndrome is indicated by blueness of the skin. Symptoms in infants can develop rapidly, with health deteriorating over a period of days. If symptoms occur, seek medical attention immediately.
- Water, juice, and formula for children under six months of age should not be prepared with tap water. Bottled water or other water low in nitrates should be used for infants until further notice.
- **DO NOT BOIL THE WATER.** Boiling, freezing, filtering, or letting water stand does not reduce the nitrate level. Excessive boiling can make the nitrates more concentrated, because nitrates remain behind when the water evaporates.

Public Water Supply Regulations

Federal Role



Federal Role

- Safe Drinking Water Act of 1974 – Authorized the Environmental Protection Agency (EPA) to regulate all public drinking water supplies.
- EPA is authorized to set National Primary Drinking Water Standards (NPDWS).
- Standards are legally enforceable, there are two types of standards: Maximum Contaminant Levels (MCLs) and Treatment Techniques (TTs).
- EPA grants authority to states to implement the SDWA and the drinking water standards; called PRIMACY.

Contaminants Regulated Under NPDWS

- Microorganisms – cryptosporidium, total coliforms, *E.coli*
- Disinfection Byproducts – haloacetic acids (HAA5), total trihalomehtanes (TTHMs)
- Inorganic Chemicals – arsenic, lead, nitrates, nitrates
- Organic Chemicals – atrazine, benzene
- Radionuclides – alpha and beta particles, uranium

Steps To Federal Regulation

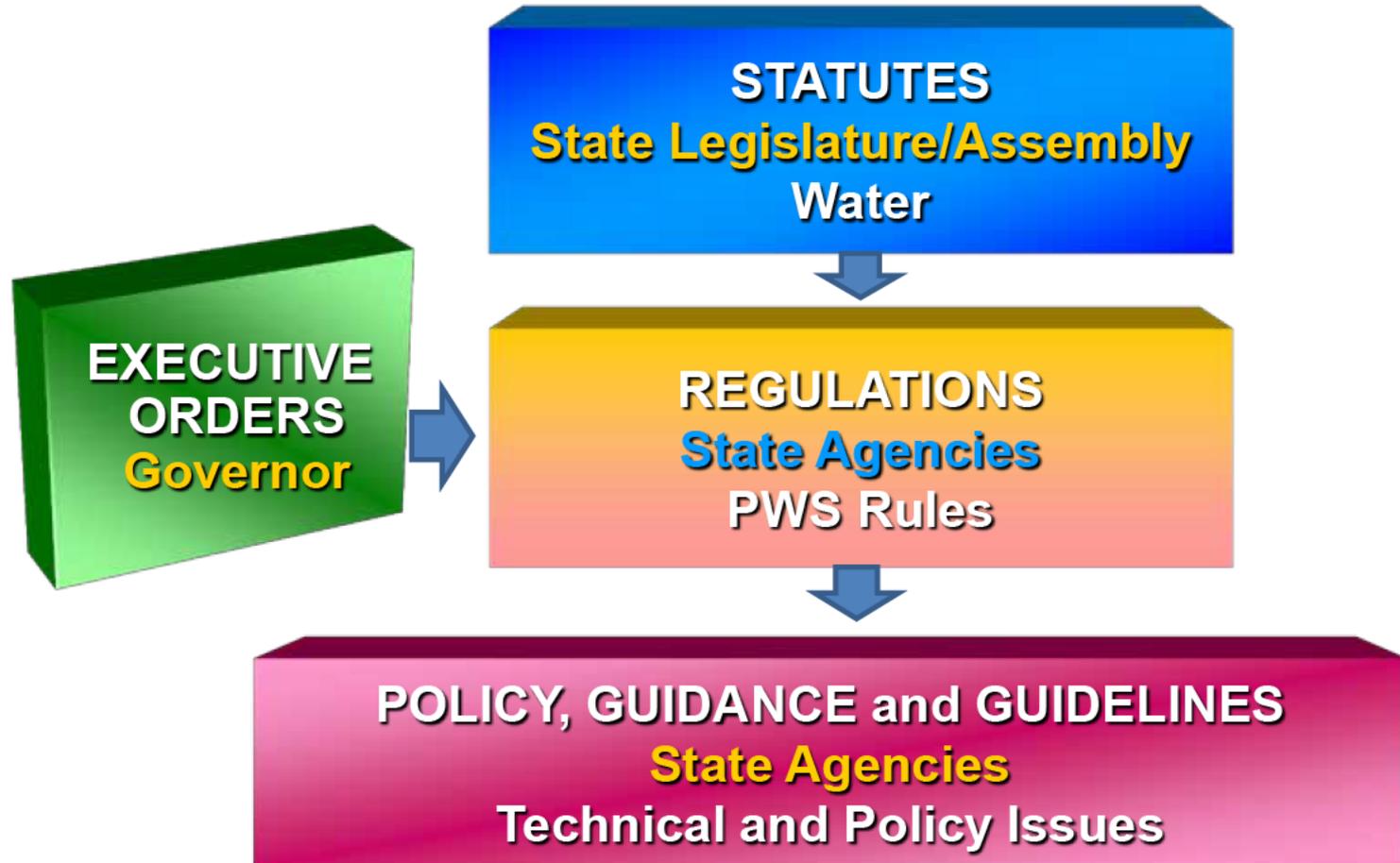
1. Contaminant Candidate List
2. Unregulated Contaminant Monitoring Program
3. Regulatory Determination
4. Regulation Development
5. Draft Rule Published
6. Comment Period
7. Final Rule Published
8. Rule in Effect 3 Years After Final
9. Review by EPA Every 6 Years

Primacy

- EPA grants authority to states to implement the SDWA
- Standards must be as stringent as federal
- States have 2 years to adopt new regulations and apply for Primacy
- Adequate compliance and enforcement program
- Authority to compel compliance with standards, assess and collect fines and penalties
- All states have primacy except Wyoming

Public Water Supply Regulations

State Role



Michigan Safe Drinking Water Act

Public Act 399 of 1976

- Statute, rules, policies and procedures add state program activities beyond those required by the federal government:
 - Construction permitting
 - Routine system surveillance
 - Technical assistance
 - General plans and reliability studies
 - Cross connection program
 - Bottled water and water hauling
 - Water withdrawal

Michigan Oversight

- DEQ - Oversight of CWS
 - Sanitary Surveys and Visits
 - Data Analysis and Reporting
- Local Health Departments - Oversight of NCWS
 - Sanitary Surveys and Visits
 - Data Analysis and Reporting
 - Annual Contract with DEQ
 - DEQ Oversees and Evaluates LHD Performance

Questions?

www.michigan.gov/deq/drinkingwater

Contact Program staff: 800-662-9278