How Does the Government Protect Public Water?

Lesson: 10

National Science Education Standards for Grades 9-12

Content Standard A: Abilities Necessary to Do Scientific Inquiry:

- *Design and conduct scientific investigations*
- *Use technology and mathematics to improve investigations and communications.*

Content Standard E: Science and Technology:

- *Technology, by its nature, has a more direct effect on society than science because its purpose is to solve human problems, help humans adapt and fulfill human aspirations.*

Content Standard F: Science in Personal and Social Perspectives: Personal and Community Health

- *Hazards and the potential for accidents exist. Regardless of the environment, the possibility of injury, illness, disability or death may be present. Humans have a variety of mechanisms—sensory, motor, emotional, social and technological—that can reduce and modify hazards.*

Student Learning Objectives

10.1 Describe the importance of the Clean Water Act and Safe Drinking Water Act.

10.2 Define the source and meaning of specific contaminant thresholds to ensure safe drinking water.

10.3 Describe how regulators determine specific contaminant thresholds that help ensure safe drinking water.

Teacher Info Table Time

Instruction time for this lesson: 60 minutes

Resources, Tools, Equipment and Supplies

10.1 Describe the importance of the Clean Water Act and Safe Drinking Water Act.

Resources

- SW.10.1.TM Slide: Gaps in Federal, State, and Local Standards and Regulations
- Summary of the Clean Water Act, U.S. EPA, http://www.epa.gov/lawsregs/laws/cwa.html
- Summary of the Safe Drinking Water Act, U.S. EPA, http://www.epa.gov/lawsregs/laws/sdwa.html
- Watershed Academy Web Modules on the SDWA http://www.epa.gov/owow/watershed/wacademy/acad2000/
- Watershed Academy Web Modules on the Clean Water Act, http://www.epa.gov/owow/watershed/wacademy/acad2000/

10.2 Define the source and meaning of specific contaminant thresholds to ensure safe drinking water.

Resources

- SW.10.2.SA Worksheet: Safe Drinking Water Thresholds — 1 copy for each student
- Slide SW.10.2.TM.A: Examples of Contaminants and Thresholds
- Slide SW.10.2.TM.B: Microbial Contamination by Bacteria or Viruses
- Slide SW.10.2.TM.C: Chemical Contamination from Fertilizers
- Slide SW.10.2.TM.D: Lead Contamination
- Slide SW.10.2.TM.E: Ensuring Safe Drinking Water
- Slide SW.10.2.TM.F: Enforcing Drinking Water Standards
- Drinking Water Contaminants, U.S. EPA, http://water.epa.gov/drink/contaminants/index.cfm
- Multiple Barrier Approach to Safe Drinking Water, Protecting America's Public Health: http://water.epa.gov/action/protect/landscapeposter.cfm

Resources, Tools, Equipment, and Supplies

10.3 Describe how regulators determine specific contaminant thresholds that help ensure safe drinking water.

Resources

- Drinking Water Contaminants, U.S. EPA, http://water.epa.gov/drink/contaminants/index.cfm
- Lesson: How Are Detection Limits Set for Water Pollutants?, The Water Sourcebook Grades 9-12, U.S. EPA, pp. 2-59 to 2-62: http://water.epa.gov/learn/kids/drinkingwater/teachers_9-12.cfm

Tools

Stopwatch
Small toy racing car
Inclined surface
Meter stick with cm divisions
Meter ruler with mm divisions
Scientific calculator

Key Terms

Accuracy

Action level

Maximum Contaminant Level (MCL)

Maximum Contaminant Level Goal (MCLG)

Method Detection Limit (MDL)

Precision

Standard deviation

Uncertainty

Variance or random error

SUMMARY OF CONTENT AND TEACHING STRATEGIES:

The Clean Water Act and Safe Drinking Water Act

A. Clean Water Act of 1972

1. This act authorized the Environmental Protection Agency (EPA) along with the states and some Indian Tribes to administer the Clean Water Act. The objective of the Act is to:
    a. Restore and maintain the chemical, physical and biological integrity of the nation's waters
    b. Employ a variety of regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities and manage polluted runoff

2. State adopted water quality standards must be reviewed and approved by the EPA. The following items are necessary for EPA approval:
    a. Identify all surface waters within state boundaries
    b. Designate uses for all bodies of water
        i. Uses may include: public drinking sources, agriculture, aquatic life, recreation, industry and navigation
    c. Adopt water quality criteria/standards for each designated use for each identified water body
    d. Develop an anti-degradation policy
        i. A state or tribal anti-degradation policy describes how the state or tribe will protect existing water quality
    e. Periodically hold public hearings to review and revise water quality standards

B. Safe Drinking Water Act of 1974

1. This Act provides authority to EPA to establish primary drinking water regulations that specify the maximum allowable levels of specific contaminants (the MCL) that apply to all public water systems in order to protect public health.

2. The Act also states that the MCLG for microbial and some carcinogens (cancer causing contaminants) must be set at zero.

3. EPA has set standards for approximately 90 contaminants and indicators in drinking water.

4. Health Advisories (HAs) provide information on contaminants that can cause human health effects and are known or anticipated to occur in drinking water. Health Advisories are guidance values based on non-cancer health effects for different durations of exposure (e.g., one-day, ten-day, and lifetime).

Safe drinking water quality thresholds

Congress passed the Safe Drinking Water Act (SDWA) in 1974 to protect public health by regulating public drinking water systems. The SDWA, which was amended in 1987 and 1996, is administered by the U.S. Environmental Protection Agency (EPA). A few highlights of the SDWA include the following:

- Authorizes EPA to set enforceable maximum levels for contaminants in drinking water
- Requires public notification of water systems violations, and that water systems fix the problem identified by the violation in order to come back into compliance with the regulations
- Establishes a federal-state partnership for enforcement of the drinking water regulations
- Requires an assessment of the vulnerability of all public drinking water sources to different kinds of contamination

The EPA has established pollutant-specific minimum testing schedules for public water systems. If a problem is identified, immediate retesting requirements go into effect along with strict instructions about how the system informs the public and fixes the system to come back into compliance.

Public water systems monitor their drinking water. Most states oversee the drinking water utilities and enforce the standards. EPA reviews state programs for effectiveness and may intercede in enforcement. County health departments have no formal role under the Safe Drinking Water Act but obviously have an interest, and perhaps a role, under state law.

C. Water quality terms

1. *Contaminant*: a potentially harmful physical, biological, chemical or radiological substance.
2. *Maximum Contaminant Level (MCL)*: the highest level of a contaminant allowed in drinking water.
    a. MCLs are set as close to the Maximum Contaminant Level Goal as feasible using the best available treatment technology
3. *Maximum Level Contaminant Goal (MCLG):* The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety. MCLGs are non-enforceable public health goals. Since MCLGs consider only public health and not the limits of detection and treatment technology, sometimes they are set at a level which water systems cannot meet. When determining an MCLG, EPA considers the risk to sensitive subpopulations (infants,

children, the elderly, and those with compromised immune systems) of experiencing a variety of adverse health effects.

4. *Action Level*: Concentration of a contaminant that, if exceeded, triggers treatment or other requirements that a water system must follow.

Contaminants and limits

National Primary Drinking Water Regulations are legally enforceable standards that apply to public water systems.[1]

Primary standards protect public health by limiting the levels of contaminants in drinking water. Contaminants can include:

- Microorganisms
- Disinfectants
- Disinfection byproducts
- Inorganic chemicals
- Organic chemicals
- Radionuclides

Examples of drinking water contaminant levels:

1. Microbial contamination: Contamination by bacteria or viruses

   Example: Cryptosporidium is a parasite commonly found in lakes and rivers, especially when the water is contaminated with sewage and animal wastes. It is very resistant to disinfection, and even a well-operated water treatment system cannot ensure that drinking water will be completely free of this parasite. The current EPA maximum contaminant level for Cryptosporidium is zero (meaning there should be NO detection of Cryptosporidium in the water supply in order for a water system to be in compliance with the regulations).

2. Chemical contamination from fertilizers

   Example: Nitrate, a chemical commonly used in fertilizers, poses a threat to infants when found in drinking water at levels higher than the MCL. The current EPA (or national) maximum contaminant level for nitrate is 10 mg/L.

1 Adapted from EPA, A Dictionary of Technical and Legal Terms Related to Drinking Water, http://water.epa.gov/aboutow/ogwdw/ glossary_technical.cfm#T

3. Lead contamination

   Example: Lead, a metal found in natural deposits, is commonly used in household plumbing materials and water service lines. Lead is rarely found in source water, but enters tap water through corrosion of plumbing materials. The current EPA action level for lead is .015 mg/L. Children ages 6 and under are at the greatest risk. Pregnant women and nursing mothers should avoid exposure to lead to protect their children. Exposure to lead can result in delays in physical and mental development.

Gaps in federal, state, and local standards and regulations

Safe Drinking Water Act:

1. Some water systems (particularly smaller systems) continue to violate requirements for monitoring water quality and meeting drinking water standards. The percentage of children getting their drinking water from community water systems that did not meet health-based drinking water standards has declined.[2]

2. The EPA has taken steps to address these problems

   A. Significant increase in the number of enforcement actions by states and EPA

   B. EPA gives grants to states and to technical service providers to support drinking water enforcement programs and water system compliance, as well as technical assistance and training to water system operators

   C. EPA writes guidance for states and water systems in order to assist with meeting the regulations

   D. EPA provides technical assistance to small systems. Since the passage of the Clean Water Act, significant progress has been made in cleaning up point sources of pollution coming directly from sewage treatment plants and industry. Today, nonpoint source (NPS) pollution is the leading cause of water quality impairment in the U.S. The vast majority of our nation's impaired waters, including the Gulf of Mexico and the Chesapeake Bay, stand little chance of being fully restored unless nonpoint sources are effectively remediated. Since the passage of the Clean Water Act, significant progress has been made in cleaning up point sources of pollution coming directly from sewage treatment plants and industry. Today, nonpoint source (NPS) pollution is the leading cause of water quality impairment in the U.S. The vast majority of our nation's

2 http://www.epa.gov/ace/contaminants/e6-graph.html

impaired waters, including the Gulf of Mexico and the Chesapeake Bay, stand little chance of being fully restored unless nonpoint sources are effectively remediated.

EPA's Clean Water Act Section 319 Nonpoint Source Program provides grants to states and tribes to support implementation of nonpoint source management programs. Funds can also support eligible entities, such as watershed groups, conservation districts and others in carrying out on-the-ground implementation of best management practices to help address nonpoint sources of pollution. Since many sources of nonpoint source pollution are not regulated, states rely heavily on voluntary programs to encourage farmers, homeowners and other citizens to help protect clean water.

INTEREST APPROACH:

Working in small groups to create a map or diagram of the material on the Clean Water Act of 1972 and Sale Drinking Water Act of 1974 that was the assigned homework reading, helps students integrate the content and prepare for the water quality criteria activity of this lesson.

A hands-on activity measuring in small units gets students out of their seats and involved in the kinds of activity in which water quality professionals may engage.

A suggestion for getting started:

Students will begin this lesson with a discussion of their homework reading assignment, SW.10.AS.HW, Federal Regulations and Source Water Protection.

Did they discover anything new or surprising in their reading? What is the significance of the Clean Water Act and the Safe Drinking Water Act in their lives? Ask the students to create a visual representation of the material they read for homework.

Divide the class into groups of three or four students. Provide each group with large paper and markers. Ask each group to make a map, web, or diagram of the history of clean drinking water and encourage them to include additional material, beyond the water acts described in homework reading. Allow five to seven minutes for developing the visual.

Have each group share their visual and describe the elements. Allow brief demonstration and question as necessary to draw out content.

The concern about clean drinking water has definitely increased over time. In fact, a manuscript from 2000 BCE revealed that water should be filtered through charcoal. Less than 100 years ago chlorination was introduced in the US. And not long after that Congress passed legislation to promote research into water pollution and its affect on human health. Now we have safeguards in place to keep drinking water safe.

Today we'll explore some of the specific things that legislation has identified to be monitored and how they have determined the criteria for safety.

OBJECTIVE BY OBJECTIVE:

Activity Outline and Teacher Support Information:

Lesson 10, *How does the government protect public water?,* presents the role of the EPA in developing water quality standards, presents specific contaminants and the threshold limits set for them, and involves students in an activity that highlights the challenges of measurement in extremely small units.

10.1. Describe the importance of the Clean Water Act and Safe Drinking Water Act.

Using slide SW.10.2.TM.B, *Gaps in federal, state, and local standards and regulations*, facilitate a classroom discussion about the barriers faced by regulators protecting source water. For example, budget cuts might decrease the number of tests regulators are able to perform.

Safe Drinking Water Act:

1. Over 90% of community public water systems meet health-based standards, and consistently provide safe, reliable drinking water to their customers. However, many small systems face a number of challenges in providing safe, reliable drinking water to their customers.
2. EPA's mission is to improve public water system sustainability and public health protection. Particularly for small systems, EPA continues to do this by:
    A. Working closely with stakeholders, such as States/Primacy Agencies and third party technical assistance providers, to target assistance to the systems with the most needs.
    B. Writing guidance for both states and water systems to assist them with regulatory compliance as well as managerial and financial aspects of running a public water system
    C. Continue to promote the use of the Drinking Water State Revolving Fund set-asides as well as infrastructure grants to target the systems with the most needs to ensure their return or to maintain compliance to protect public health.

Clean Water Act:

1. Since the passage of the Clean Water Act, significant progress has been made in cleaning up point sources of pollution coming directly from sewage treatment plants and industry. Today, nonpoint source (NPS) pollution is the leading cause of water quality impairment in the U.S. The vast majority of our nation's impaired waters, including the Gulf of Mexico and the Chesapeake Bay, stand little chance of being fully restored unless nonpoint sources are effectively remediated.

2. EPA's Clean Water Act Section 319 Nonpoint Source Program provides grants to states and tribes to support implementation of nonpoint source management programs. Funds can also support eligible entities, such as watershed groups, conservation districts and others in carrying out on-the-ground implementation of best management practices to help address nonpoint sources of pollution. Since many sources of nonpoint source pollution are not regulated, states rely heavily on voluntary programs to encourage farmers, homeowners and other citizens to help protect clean water.

3. Continue to promote the use of Clean Water Act Section 319 grant funds and Clean Water Act State Revolving Loan Funds to address nonpoint sources of pollutino that may be contaminanting drinking water sources.

10.2. Define the source and meaning of specific contaminant thresholds to ensure safe drinking water.

This activity serves as a review and can be assigned as homework reading (SW.10.2.AS) with a review session in class, or if time allows, presented in a set of slides (SW.10.2.TM.A-F) with a discussion session in class. Have students revisit their *Report to the Tell City Municipal Water Association* from Lesson 6. Ask the students to make a list of the recommendations made for action during that activity.

What agency or agencies are responsible for assuring that Tell City drinking water is safe?

A network of government agencies monitor tap water suppliers and enforce drinking water standards to ensure the safety of drinking water. These agencies include the EPA, state departments of health and environment, and local public health departments.

How can the public feel confident that their drinking water supply is safe?

The EPA requires public notification of water systems violations.

How can private well owners feel confident that their drinking water supply is safe?

Private well owners should have their water tested by a state certified laboratory on a regular basis, and should also stay in contact with their local health department if there are any drinking water issues of concern found in the course of routine water testing.

10.3. Describe how regulators determine specific contaminant limits that help ensure safe drinking water

EPA's has set standards for approximately 90 contaminants and indicators in drinking water. Public water systems are responsible for conducting monitoring of drinking water to ensure that it meets all drinking water standards. To do this, water systems and states use analytical methods developed by government agencies, universities, and other organizations. EPA is responsible for evaluating analytical methods developed for drinking water and approves those methods that it determines meet agency requirements for monitoring organic, inorganic, radionuclide and microbiological contaminants. Laboratories analyzing drinking water compliance samples must be certified by EPA or the state.[3]

Detecting substances in minute quantities can be challenging. In this activity students will measure time and length in increasingly smaller and smaller units, then compare their results, with a concluding discussion about the challenges of working in minute measurements. Teachers less familiar with statistical calculations may want to employ the help of a school physics or math teacher to run this activity.

3 Adapted from *Public Water Systems: Laboratories and Monitoring*, EPA, http://water.epa.gov/infrastructure/drinkingwater/pws/labmon.cfm

OBJECTIVES

Students will…

1. Explain the methods used to calculate detection limits.
2. Calculate detection limits on a set of data.
3. Demonstrate how reporting data close to detection limits must be qualified with an accuracy statistic.
4. Explain what happens to accuracy and precision as detection limits are set to increasingly lower levels.

BACKGROUND INFORMATION

EPA and the states set limits on the levels of certain regulated contaminants delivered to the public by public drinking water systems. Public water systems must follow monitoring and reporting requirements. Very specific tests are used to analyze water for pollutants, and each test has a limit of detection. Everyone's ideal would be that all drinking water would contain zero pollutants. Advancements in technology have made it possible to measure smaller and smaller amounts of pollutants. These advances in technology and the desire of the public in recent years for increased environmental protection has encouraged the trend toward research and requirements that identifies very small levels of contamination, for example in drinking water sources. EPA sets legal limits on the levels of certain contaminants in drinking water. The legal limits reflect both the level that protects human health and the level that water systems can achieve using the best available technology. Besides prescribing these legal limits, EPA rules set water-testing schedules and methods that water systems must follow. The rules also list acceptable techniques for treating contaminated water. The Safe Drinking Water Act gives individual states the opportunity to set and enforce their own drinking water standards if the standards are at least as strong as EPA's national standards. Most states and territories directly oversee the water systems within their borders.

There are several trade-offs involved in establishing more stringent limits and requiring monitoring agencies to measure and report down to very low levels. In exchange for the greater protection of public health that is provided, there is greater cost incurred by public water systems for the technology. Another tradeoff that must be considered is greater uncertainty in the measurement. Statistical measures and expressions of the variance or random error may be used to express that uncertainty. The lower the level of detection and reporting, the more important it becomes to use some expression that qualifies the reported value with an accuracy statistic.

TERMS

Accuracy: the closeness of a measurement to the true or accepted value
Method Detection Limit (MDL): the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero
Analyte: the substance or chemical component that is being analyzed.
Precision: the agreement among the numerical values of a set of measurements of the same quantity made in the same way
Standard deviation: a statistical value that is equal to the square root of the arithmetic average of the squares of the deviations from the mean in a frequency distribution. It is used in order to account for the range of uncertainty of a measurement; for example, a measurement may be reported as $x \pm SD$, meaning the value could be within one standard deviation below or above the reported value
Uncertainty: lack of certainty; doubt
Variance or random error: degree of change or difference; divergence; discrepancy

ADVANCE PREPARATION

A. Choose two objects to measure. One should be close to the length of a meter stick, with a length that is unambiguously close to a cm mark. The other object should be less than 1 cm; students will be estimating it to 0.1mm. This number inevitably will be ambiguous for students and is meant to be so.

B. Experiment and choose an incline and carefully mark a starting distance from the bottom that will allow a toy car to move to the endpoint in less than one second. Students will have trouble measuring this, but problem in measuring is the point.

C. Divide students into 10 groups of two to three students, number the groups, and give them a sequence of measurements: large object, small object, timed car. You will assist with the car.

PROCEDURE

1. Setting the stage

A. Explain to students that they will be making measurements in their groups and writing these down without discussing them with other groups. This is to preserve their unbiased scientific openness to the true value of the measurement. Measurements will be compared and used.

B. Explain to students that they will be using a statistical method published by the EPA to be used by environmental laboratories to set detection limits. Instruct them to estimate and round off measurements as follows: large object - nearest cm; small object - nearest 0.1 mm; car time - nearest 0.1 or 0.01 second if possible.

2. Activity

A. Take measurements of objects and time.

B. List on board ten group measurements.

C. Use a scientific calculator to analyze the three sets of data for mean and standard deviation.

D. Utilize the following procedure to calculate the detection limits of the meter stick, the metric ruler, and the stop watch.

1. Method Detection Limit = standard deviation x t (where t value is a statistical value used in the student's t test for testing the validity of data, a standard statistical method)

2. The t value to be used here is 2.821 for ten replicates at the 99 percent confidence level.

3. Follow-up

A. Ask students to explain what happened to the certainty of their data when they attempted to measure smaller things.

B. Ask students to suggest ways the certainty of their data could be improved. (Technology)

C. Involve students in a discussion about the factors involved in applications of new technology. One thing that may apply is the idea that because the technology exists, it is used to detect lower limits, even when there is not adequate information to judge the health effects of these lower levels, or adequate treatment technology to achieve lower levels. Whom do they think are the greatest advocates of this? (Often they are the companies that develop the technology.) Ask students to think about some analogies where the safety provided by a regulation has proven to be worth the cost to consumers. An example might be the cost of installing seatbelts in automobiles, as a cost per car purchase, compared with the numbers of lives saved each year because of seatbelt use. People make those kinds of decisions every day about various aspects of their lives.

REVIEW / SUMMARY:

Students will write answers to the following questions in their journals:

- Why has concern about the safety of drinking water increased over time?
- What are some factors that have led to the kinds of criteria that are in use as water quality standards?
- Under what circumstances would you expect the criteria and/or the types of contaminants evaluated to change in the future?
- What activities do you, your family, or other groups you participate in, do that could impact the contaminant levels of drinking water?

EVALUATION AND ANSWERS:

SW.10.AS.HW

Directions: For questions 1-5, identify if the statement is true or false. If the statement is true, write "true" on the line. If the statement is false, write "false" on the line.

1. _____ The objective of the Clean Water Act of 1972 was to restore and maintain the chemical, physical, and biological integrity of the nation's waters.
2. _____ The Safe Drinking Water Act of 1974 provided authority to the EPA to establish primary drinking water regulations.
3. _____ The SDW Act of 1974 also stated that the MCLG for carcinogenic (cancer-causing) items must be set at five.
4. _____ The EPA has regulated nearly 90 drinking-water contaminants.
5. _____ The Safe Drinking Water Act required states to assess drinking water sources for potential contaminants and sources.

Answers to SW.10.AS.HW

1. True
2. True
3. False
4. True
5. True

ACTIVITY WORKSHEET(S) – AS NEEDED

SW.10.2.AS

Safe Drinking Water Thresholds

National Primary Drinking Water Regulations are legally enforceable standards that apply to public water systems.[4]

Primary standards protect public health by limiting the levels of contaminants in drinking water. Contaminants can include:

- Microorganisms
- Disinfectants
- Disinfection byproducts
- Inorganic chemicals
- Organic chemicals
- Radionuclides

For most contaminants, EPA sets an enforceable regulation called a maximum contaminant level (MCL) based on maximum contaminant level goals (MCLG). MCLs are set as close to the MCLGs as possible, considering cost, benefits and the ability of public water systems to detect and remove contaminants using suitable treatment technologies. However, because lead contamination of drinking water often results from corrosion of the plumbing materials belonging to water system customers, EPA established a treatment technique rather than an MCL for lead. A treatment technique is an enforceable procedure or level of technological performance which water systems must follow to ensure control of a contaminant. The treatment technique regulation for lead (referred to as the Lead and Copper rule) requires water systems to control the corrosivity of the water. The regulation also requires systems to collect tap samples from sites served by the system that are more likely to have plumbing materials containing lead. If more than 10 percent of tap water samples exceed the lead action level of 15 parts per billion (ppb), then water systems are required to take additional actions including:

- Taking further steps optimize their corrosion control treatment (for water systems serving 50,000 people that have not fully optimized their corrosion control).

4 Adapted from EPA, A Dictionary of Technical and Legal Terms Related to Drinking Water, http://water.epa.gov/aboutow/ogwdw/glossary_technical.cfm#T

SW.10.2.AS *(continued)*

- Educating the public about lead in drinking water and actions consumers can take to reduce their exposure to lead.
- Replacing the portions of lead service lines (lines that connect distribution mains to customers) under the water system's control.

Examples of drinking water contaminant levels:

1. Microbial contamination: Contamination by bacteria or viruses

   Example: Cryptosporidium is a parasite commonly found in lakes and rivers, especially when the water is contaminated with sewage and animal wastes. It is very resistant to disinfection, and even a well-operated water treatment system cannot ensure that drinking water will be completely free of this parasite. The current EPA maximum contaminant level for *Cryptosporidium* is zero (meaning there should be NO detection of *Cryptosporidium* in the water supply in order for a water system to be in compliance with the regulations).

2. Chemical contamination from fertilizers

   Example: Nitrate, a chemical commonly used in fertilizers, poses an poses a threat to infants when found in drinking water at levels higher than the MCL. The current EPA (or national) maximum contaminant level for nitrate is 10 mg/L.

3. Lead contamination

   Example: Lead, a metal found in natural deposits, is commonly used in household plumbing materials and water service lines. Lead is rarely found in source water, but enters tap water through corrosion of plumbing materials. The action level for lead is 15 ppb. Children ages 6 and under are at the greatest risk. Pregnant women and nursing mothers should avoid exposure to lead to protect their children. Exposure to lead can result in delays in physical and mental development.

Ensuring Safe Drinking Water

Congress passed the Safe Drinking Water Act (SDWA) in 1974 to protect public health by regulating public drinking water and protecting sources of drinking water. The SDWA is administered by the U.S. Environmental Protection Agency (EPA). A few highlights of the SDWA include the following:

- Authorizes EPA to set enforceable maximum levels for contaminants in drinking water
- Requires public notification of water systems violations, and that water systems fix the problem identified by the violation in order to come back into compliance with the regulations

SW.10.2. AS *(continued)*

- Establishes a federal-state partnership for enforcement of the drinking water regulations
- Requires an assessment of the vulnerability of all public drinking water sources to different kinds of contamination

POWERPOINT SLIDES – AS NEEDED:

SW.10.2.TM.A

Gaps in federal, state and local standards and regulations

Safe Drinking Water Act:

1. Over 90% of community public water systems meet health-based standards consistently provide safe, reliable drinking water to their customers. Many water systems (particularly smaller systems) continue to violate requirements for monitoring water quality and meeting drinking water standards.
2. The EPA has taken steps to address these problems
    A. Significant increase in the number of enforcement actions by states and the EPA
    B. The EPA gives grants to states and to technical service providers to support drinking water enforcement programs and water system compliance, as well as technical assistance and training to water system operators
    C. The EPA writes guidance for states and water systems in order to assist with meeting the regulations
    D. The EPA provides technical assistance to small systems
3. Many small systems consistently provide safe, reliable drinking water to their customers. However, a large percentage of small systems face a number of challenges in providing safe, reliable drinking water to their customers.
4. EPA's mission is to improve public water system sustainability and public health protection. Particularly for small systems, EPA continues to do this by:
    A. Working closely with stakeholders, such as States/Primacy Agencies and third party technical assistance providers, to target assistance to the systems with the most needs.

SW.10.2.TM.A *(continued)*

B. Writing guidance for both states and water systems to assist them with regulatory compliance as well as managerial and financial aspects of running a public water system.

C. Continue to promote the use of the Drinking Water State Revolving Fund Set-Asides as well as infrastructure grants to target the systems with the most needs to ensure their return or to maintain compliance to protect public health. Since the passage of the Clean Water Act, significant progress has been made in cleaning up point sources of pollution coming directly from sewage treatment plants and industry. Today, nonpoint source (NPS) pollution is the leading cause of water quality impairment in the U.S. The vast majority of our nation's impaired waters, including the Gulf of Mexico and the Chesapeake Bay, stand little chance of being fully restored unless nonpoint sources are effectively remediated.

   EPA's Clean Water Act Section 319 Nonpoint Source Program provides grants to states and tribes to support implementation of nonpoint source management programs. Funds can also support eligible entities, such as watershed groups, conservation districts and others in carrying out on-the-ground implementation of best management practices to help address nonpoint sources of pollution. Since many sources of nonpoint source pollution are not regulated, states rely heavily on voluntary programs to encourage farmers, homeowners and other citizens to help protect clean water.

SW.10.2.TM.B

Examples of Contaminants and Limits

National Primary Drinking Water Regulations are legally enforceable standards that apply to public water systems

Primary standards protect public health by limiting the levels of contaminants in drinking water

Contaminants can include:

1. Microorganisms
2. Disinfectants
3. Disinfection byproducts
4. Inorganic chemicals
5. Organic chemicals
6. Radionuclides

SW.10.2.TM.C

Microbial Contamination by Bacteria or Viruses

Example: Cryptosporidium is a parasite commonly found in lakes and rivers, especially when the water is contaminated with sewage and animal wastes.

- It is very resistant to disinfection, and even a well-operated water treatment system cannot ensure that drinking water will be completely free of this parasite.
- The current EPA maximum contaminant level is zero.

SW.10.2.TM.D

Chemical contamination from fertilizers

Example: Nitrate, a chemical commonly used in fertilizers, poses an immediate threat to infants when found in drinking water above the national standard.

Maximum contaminant level is 10 mg/L

SW.10.2.TM.E

Lead contamination

Lead, a metal found in natural deposits, is commonly used in household plumbing materials and water service lines

- Lead is rarely found in source water, but enters tap water through corrosion of plumbing materials
- Action level is .015 mg/L
- Children ages 6 and under are at the greatest risk. Pregnant women and nursing mothers should avoid exposure to lead to protect their children. Exposure to lead can result in delays in physical and mental development

SW.10.2.TM.F

Ensuring Safe Drinking Water

- Congress passed the Safe Drinking Water Act (SDWA) in 1974 to protect public health by regulating public drinking water and protecting sources of water. SDWA was amended in 1996

- SDWA is administered by the EPA. A few highlights of the SDWA include the following:

    - Authorizes the EPA to set enforceable health standards for contaminants in drinking water
    - Requires public notification of water systems violations
    - Establishes a federal-state partnership for regulation enforcement
    - Requires an assessment of the vulnerability of all drinking water sources of contamination

SW.10.2.TM.G

Enforcing Drinking Water Standards

The EPA has established pollutant-specific minimum testing schedules for public water systems

If a problem is detected, immediate retesting requirements go into effect along with strict instructions about how the system informs the public

A network of government agencies monitor tap water suppliers and enforce drinking water standards to ensure the safety of drinking water

These agencies include the EPA, state departments of health and environment, and local public health departments