

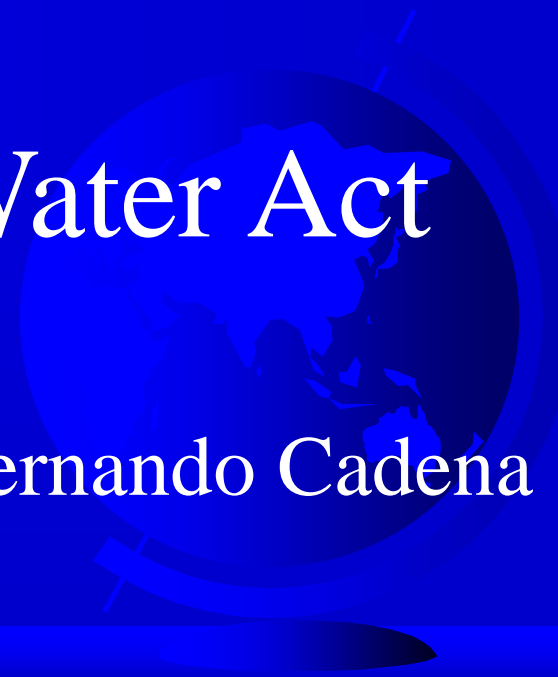
# FUNDAMENTALS OF ENVIRONMENTAL ENGINEERING

CE 356

The Safe Drinking Water Act



Adopted from Dr. Fernando Cadena  
©1997



# Learning Objectives

- 1 Comprehend the roles of the parties responsible for implementing the SDWA.
- 2 As a civil engineer: comprehend, interpret, and apply requirements of the SDWA in the context of designing a municipal water system.



# SDWA Legislation

- ☞ Congress passed SDWA in 1974
- ☞ Revised several times



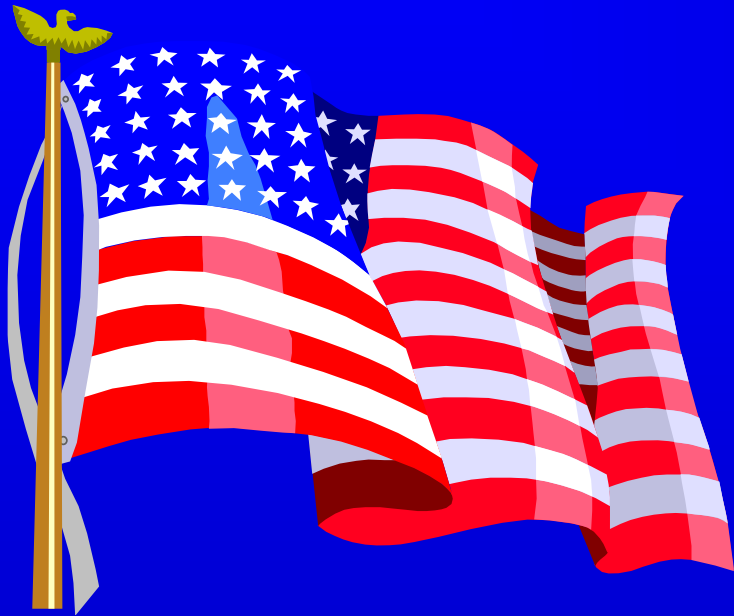
# Impact of the SDWA

➡ Goal: ensures  
potable water for  
U.S.

➡ Applies to  
communities:  
– 15 or more  
connections, or  
– 25 or more people



# Legislative Authority



- Congress authorized the Act
- Congress appoints the EPA to enforce the Act at a Federal Level
- EPA makes sure States comply

# EPA's Role



EPA grants  
NM  
primacy

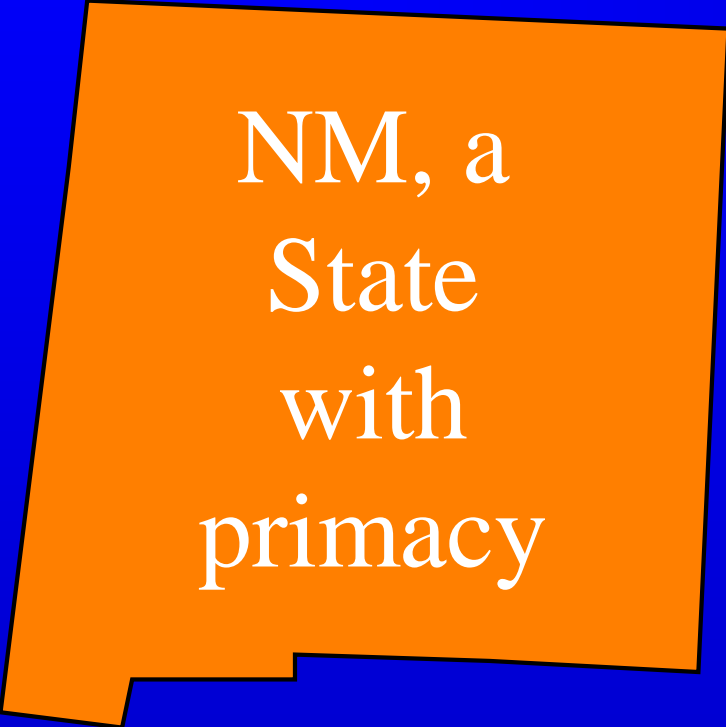
## ☞ Responsibilities:

- Set national standards to protect against health risks considering available technology and costs
- Establish Primary drinking water regulations: enforceable maximum contaminant levels
- Set requirements for ways to treat water
- Set requirements for testing for contaminants
- Provide guidance, assistance, and public information
- Collects drinking water data
- Oversee state drinking water programs

# State's Role

## ☞ Primacy:

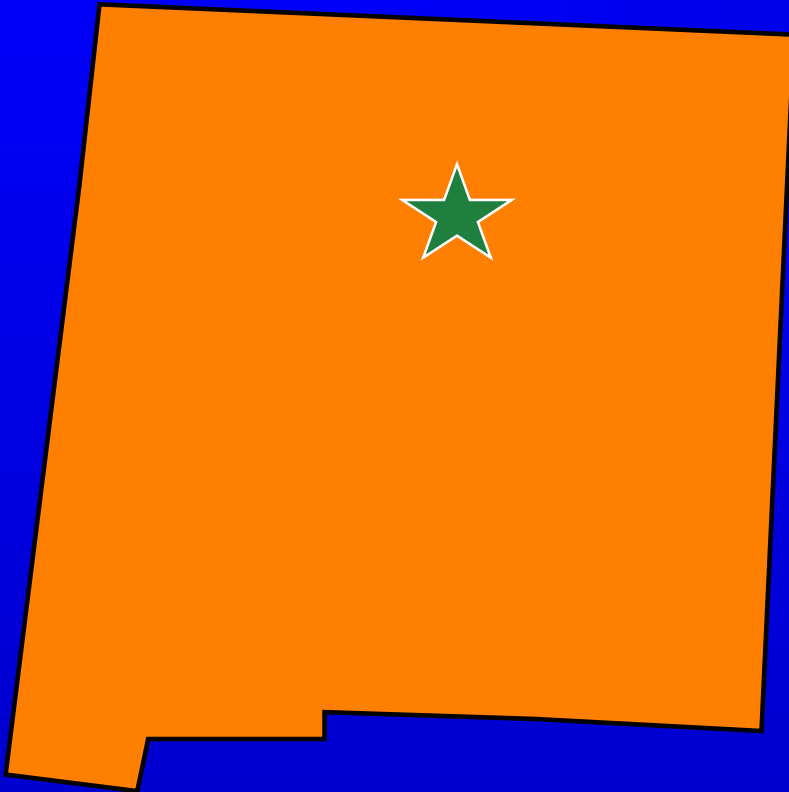
- State enforces SDWA
- Make sure water systems test for contaminants
- Review water system plans
- Conduct on-site inspections and sanitary surveys
- Provide training and technical assistance
- Take action against violators



NM, a  
State  
with  
primacy



# State's Privileges



- ☞ Abide by the SDWA
- ☞ May impose more stringent, or broader, standards





# Water System's Role

## ☞ Responsibilities:

- Treat water
- Test for specified contaminants
- Report testing results to states
- Notify customers of violations
- Annual report to municipalities

NM  
communities  
comply with  
NMED  
requirements



# Public's Role

## ☞ Responsibilities:

- Help local water suppliers set priorities
- Make decisions on funding and system improvements
- Establish programs to protect drinking water sources
- Examples of citizen groups: advisory committees, rate boards, volunteers, civic leaders



NM  
citizens  
provide  
input

# Civil Engineer's Role

## ☞ Responsibilities:

- Comprehensive knowledge of SDWA: standards & technology
- Establish community's water demand
- Match and design technologies for water quality
- Assist client in obtaining funding for: planning, design, construction, operation of the water treatment plant

Represent  
client in all  
facets of  
design

# History of the SDWA

- Adopted in 1974
- Frequently updated
- Each amendment is subject to congressional approval



# Requirements of the SDWA

EPA must set standards for a number of pollutants.

- The standards include a list of 80+ pollutants written into the law.
- Advances in technology contribute to need for updating the list



# Requirements of the SDWA

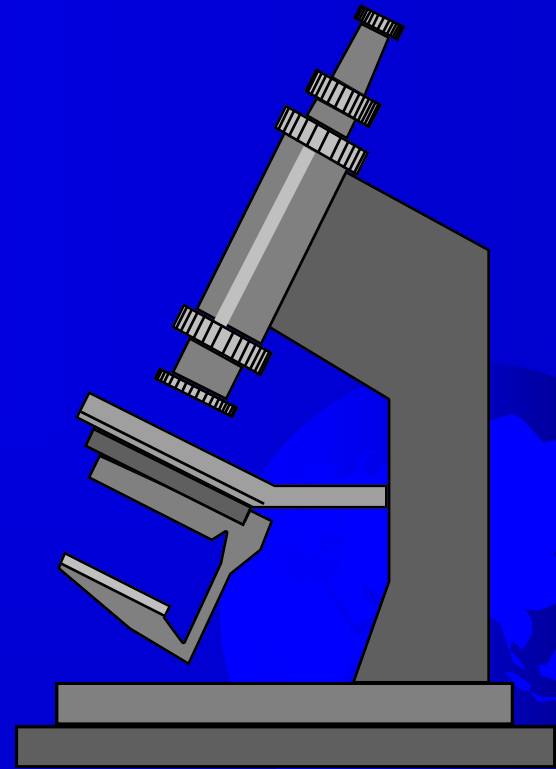
Water utilities must provide the results of water analysis to its customers.

See Las Cruces report



# SDWA Pollutant Categories

1. Organics
2. Inorganics
3. Radionuclides
4. Microorganisms
5. Disinfectant
6. Disinfection by-products



# Let's Visit the Office of Water at USEPA



- ☞ Primary Standards
- ☞ Secondary Standards





# Primary and Secondary Standards Comparison

## ☞ Secondary:

- not enforceable and
- refer to aesthetics (i.e., cosmetic characteristics of water)

## ☞ Primary:

- enforceable by law and
- related to health effects of water



# Types of Primary Standards

## ☞ Maximum Concentration Level (MCL)

- Intended to protect public health
- Enforceable

## ☞ Maximum Concentration Level Goal (MCLG)

- No known or expected health risk
- Not enforceable



# EPA Sets Primary Standards

- ☞ Identify contaminants that occur in drinking water and may affect public health
- ☞ Determine a Maximum Concentration Level Goal (MCLG)
- ☞ Specify a Maximum Concentration Level (MCL)

# MCL vs Treatment Technique

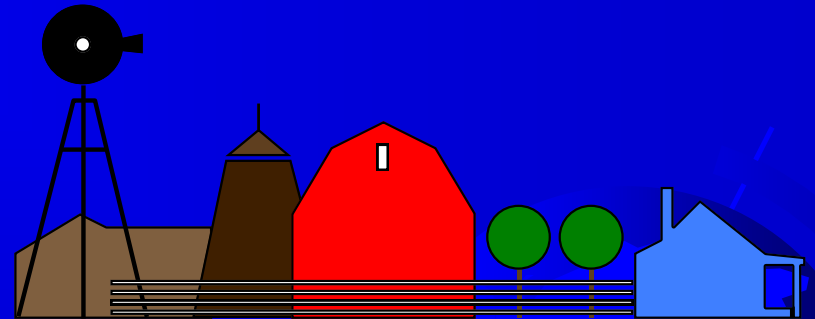
- ✎ Not economically or technically feasible to set an MCL
- ✎ No reliable economic method to detect contaminants
- ✎ Set a treatment technique (TT)
  - Specify a way (technology) to treat water to remove contaminants

# Organics

☞ 50+ parameters

☞ Includes:

- solvents
- pesticides
- petrochemicals



# Organic Chemicals

- ☞ Synthetic organic chemicals
- ☞ Trihalomethanes (THMs)
- ☞ Volatile organic chemicals (VOCs)



# Synthetic Organics

- ☞ Man-made chemicals
- ☞ Discharged in industrial wastewater
- ☞ More than 1,000 different SOC's have been detected in drinking water



# Trihalomethanes (THMs)

☞ By-products of chlorine disinfectant

Simple organics + chlorine  $\longrightarrow$  THMs

- ☞ THMs may cause or contribute to cancer
- ☞ THMs can be prevented by good control of the chlorination process





# VOCs

- ☞ Volatile organic chemicals
- ☞ Volatile = evaporates readily
- ☞ Often used as solvents
- ☞ Most common contaminant of groundwater at Superfund sites



# VOCs

- Many VOCs are known or suspected carcinogens
- Expensive to treat, especially in groundwater



# Inorganics

- 10+ pollutants
- Includes:
  - Heavy metals
  - Fluoride
  - Cyanide
  - Asbestos
  - Nitrates and nitrites



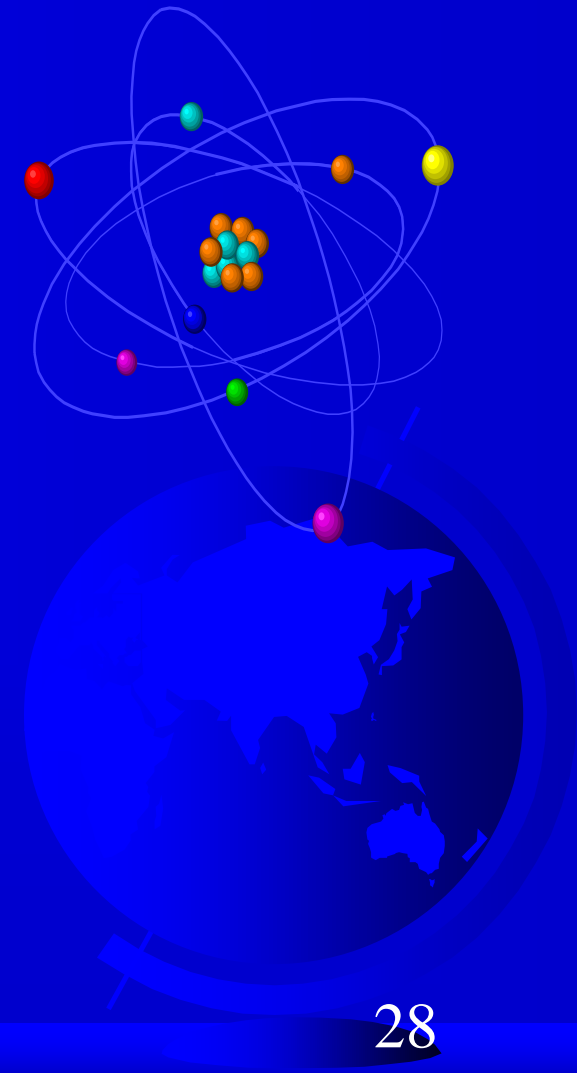
# Radionuclides

☞ Current standards for:

- Radium
- Alpha emitters (total)

☞ Proposed standards for:

- Radon
- Uranium



# Microorganisms

- ☞ Includes:
- Giardia
  - Legionella
  - Coliforms
  - Viruses

