Arkansas Department of Health

Engineering Section, Operator Licensing Program

presents the

Public Water System Compliance Course

TRAINING ID NUMBER

Last 4 Digits of Social Security Number plus First 3 Letters of Last Name

PLEASE PRINT LEGIBLY

Training ID is Last 4 Digits of Social Security Number + First 3 Letters of Last Name: 1234XXX

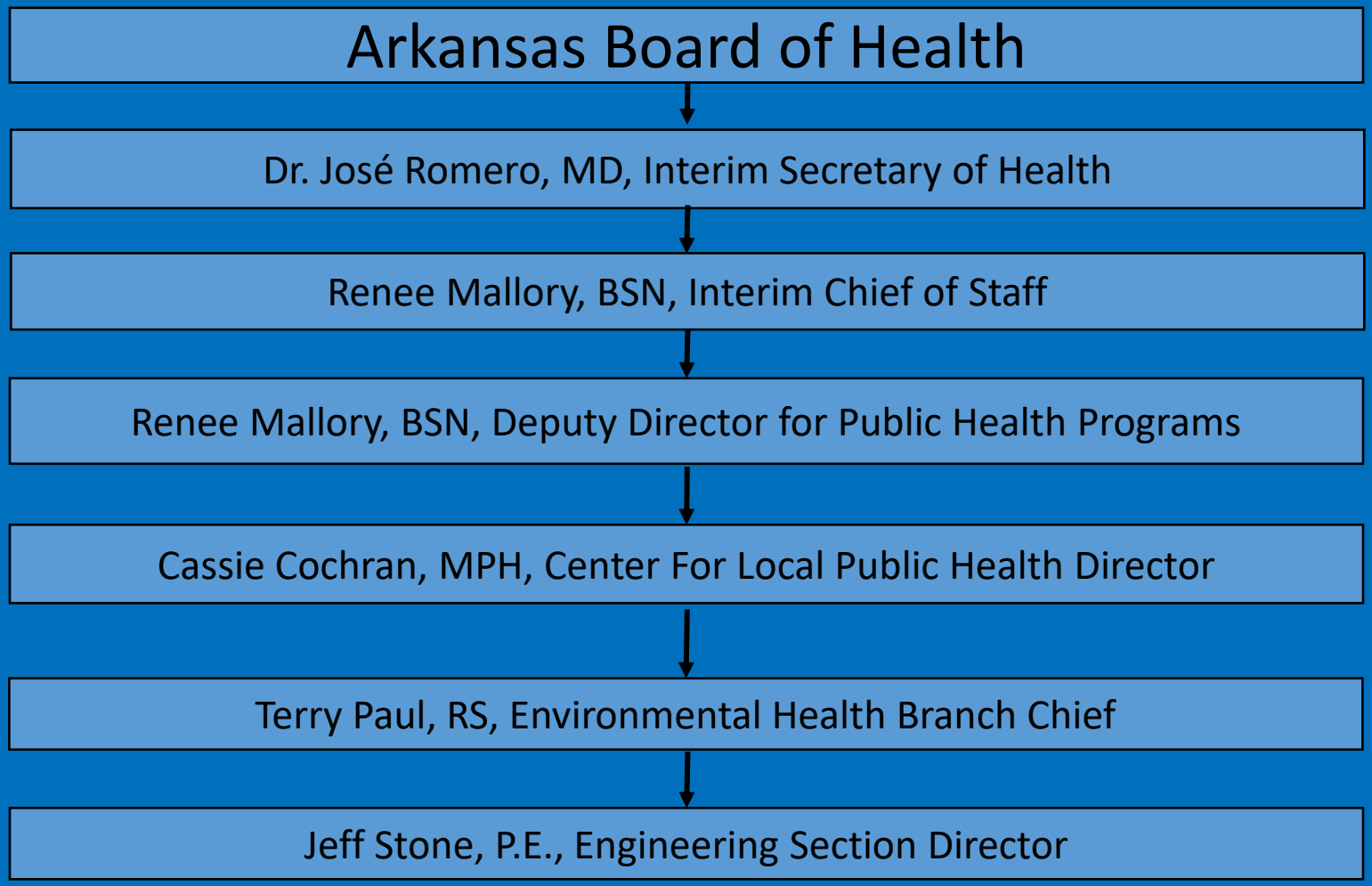
#	Training ID	Last Name	First Name	Mid Initial	System Name	Hrs
1	8362NUT	Nutt	Andrew	M	Arkansas Department of Health	8
2						8
3						8
4						8
5						8
6						8
7						8
8						8
9						8
10						8
11						8
12						8

Engineering Section

Mission Statement

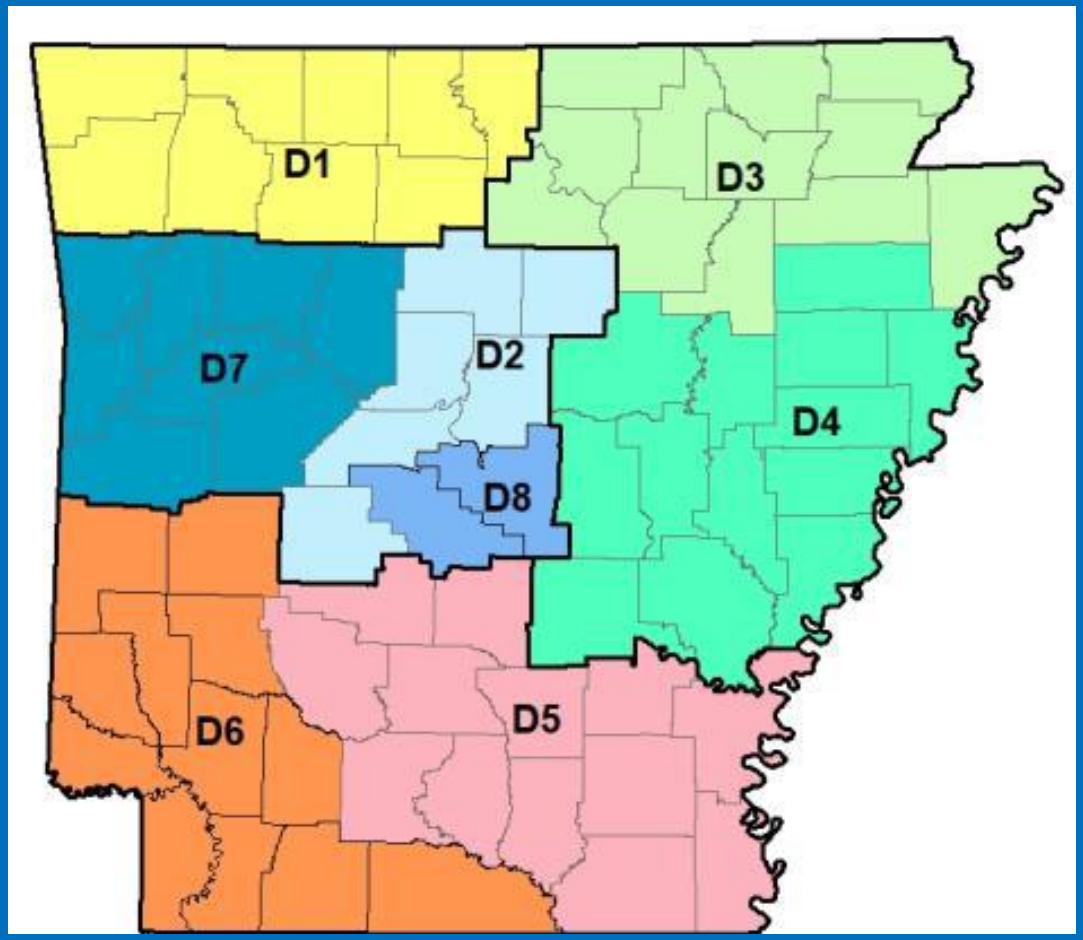
The mission of the Engineering Section is to protect the health of all of Arkansas' citizens and visitors by providing technical assistance, analytical services, training, regulation, and public education for the purpose of ensuring that public water systems provide adequate quantities of safe, palatable water and that community sewerage systems dispose of domestic wastes in a safe manner.

Arkansas Department of Health



ENGINEERING DISTRICTS

ADH Main Engineering Number 501-661-2623



Engineering Section

Primary Contact

8 Geographical Districts

Each District has:

District Specialist

- General Inquiries
- Monitoring/Bacti Requirements
- Operational/Treatment Reports
- Sanitary Surveys

District Engineer

- Water System Modifications & Improvements Plan Review
- Sanitary Surveys

Engineer Supervisor

Licensing Program Staff

Water Licensing Program General Email:
Primary e-mail to communicate with any of us.
ADH.Water.Licensing@arkansas.gov

Training and Certification Officer	
Martin Nutt	Martin.Nutt@arkansas.gov
Training Coordinator	
Krista Myrick	Krista.Myrick@arkansas.gov
Administrative Specialist	
Ida Hampton	Ida.Hampton@arkansas.gov

Compliance Course Agenda Topics

* Compliance Course Introduction
* Chlorine Residual and Waterborne Diseases
* PWS Rules
* Monitoring and Bacteriological Sampling
* Surface Water Treatment Rules
* Disinfection By-Products Rule
* General Compliance Requirements
* Compliance Course Overview/Q & A

Compliance Course Basis

Much of this 8 Hour Day will be for both

Treatment and Distribution Examinees

Because Treatment Operators are held responsible for more Federal and State Requirements,

Treatment topics will be given more discussion time.

Arkansas Department of Health

The information from today's Compliance Course is based on the Rules Pertaining to Public Water Systems and the Public Water System Compliance Summary

Due to time constraints, not all the Rules or Compliance Summary will be covered. Study the Rules and Summary for items not covered in the presentations.

Exams no longer have specific compliance items, but compliance concepts/methods may be on all exams which may be covered in the presentations.

Purpose & Goal

- Course Primary Goal
  - Prepare Operators to Operate Public Water Systems in Compliance with State and Federal Requirements

- Course Primary Purposes
  - Preparation for AR Water Operator License Exams
    - Mandatory Course for License Exam
  - Continuing Education for License Renewal
    - 8 Hours Direct Credit

Obtaining A License!
Where Do You Start?

MAKE APPLICATION

(Is This Completed Yet?)

Applications Are Available

OR

Can Be Downloaded From The ADH “Obtain A License” Webpage

www.healthy.arkansas.gov/water-license

GET THE STUDY PACKET (CD)

Mailed to applicant after an application has been submitted

Water System Operator License Application

APPLICATION FOR WATER SYSTEM OPERATOR LICENSE

ARKANSAS DEPARTMENT OF HEALTH
ENGINEERING SECTION

(Register for Exam: www.healthy.arkansas.gov/water-license)

FOR ADH OFFICE USE ONLY

Application Rec'd _____
Customer # _____
Pending # P_____ 2nd P_____
Exam Fee _____ License Fee _____
PWS # _____ Eng. Dist. # _____ Water Dist. _____

This application is submitted pursuant to Arkansas Code Annotated 17-51-101 et. seq.). The **fully** completed application should be filed at least 60 days prior to the desired exam session. All required **fees must be included** for it to be processed. Each license by exam or reciprocity requires a license fee ($10.00) and either an exam fee ($25.00) or reciprocity evaluation fee ($25.00). This license application does not register you for your license exam.

Qualified applicants with disabilities, as defined in the Rehabilitation Act of 1973 or the Americans with Disabilities Act of 1990 may request any needed reasonable accommodations to participate in the licensing process.

Mail application and make check payable to:

Licensing Office, Slot 29
Arkansas Department of Health
4815 West Markham
Little Rock, Arkansas 72205-3867

Check the fee that has been enclosed:

_____ License by Examination Fee - $35.00 for each License **(Register for Exam: http://health.arkansas.gov/eng)**
_____ Re-examination Fee – $25.00 per Exam (save effort, use Exam Fee Invoice provided with failed exam letter)
_____ License by Reciprocity Evaluation Fee - $35.00 for each License
(Provide a copy of the license & proof it is current for License(s) being submitted for reciprocity evaluation.)

Applying for (circle grade): **Treatment License** *, Grade I II III IV and/or **Distribution License** *, Grade VSS I II III IV

Other Water License(s) Held _____

Last Name: _____ First: _____ Middle: _____

Name to appear on License certificate ***(Print Clearly)***: _____

Mailing Address for License Info: _____

City: _____ State: _____ Zip Code: _____ - _____

Social Security Number: _____ - _____ - _____ Driver's License #: _____

Home Phone # (_____) _____ - _____ Cell/Other Phone # (_____) _____ - _____ E-Mail: _____

(A) Are you an active duty military service member stationed in the State of Arkansas? Yes _____ or No_____
(B) Are you a returning military veteran applying within one (1) year of discharge from active duty? Yes _____ or No_____
(C) Are you the spouse of a person meeting A above? Yes _____ or No_____ or B above? Yes _____ or No_____.
(D)Have you ever pled guilty or nolo contendere or been convicted of a crime? YES_____ NO_____
If YES, provide the date, the state and nature of the offence: _____

MUST CHECK

For a listing of criminal offenses of concern, please see (internet search) Ark. Code Ann. §17-3-102 et. seq.

Education Background (Must complete):

High School Diploma: Yes ____ No ____ If no, GED earned: Yes ____ No ____ ** Highest grade level completed _____

Name of School Attended: _____ Location _____

List College Degree or Specialized Education Certificates for Evaluation of Experience Credit:

Institution Name & Location	Degree/Course Name	# Yrs Attended	Degree Earned

Apply above degree(s) to: Experience requirement ___ or Mandatory Training Courses ___. See regulations for details.

* Please see enclosed charts to determine which license type and grade your water system job duties require.
** No HS Diploma or GED. Please contact Certification Officer for information on a possible waiver by the Licensing Committee.

Employment:

Water System Operated: _____ PWS ID # _____
If you operate additional water systems, please list their system information on back of this page and check this box. ☐

Present Position Title _____ Office Phone # _____ - _____ - _____

Employment Background for Evaluation of Experience Credit Determination:

(Be sure to begin with your **present employment/job duties and start date.** List your water system operation, maintenance and/or management experience and job duties for each specific job duty/position held. Attach additional information, if warranted. This list of experience and the above listed education will be evaluated to determine your compliance with the experience requirement. I understand that a renewable Operator-In-Training wallet card will be issued to me, when the license exam is passed prior to meeting the experience requirement. Incomplete or vague descriptions may delay the issuance of your license.)

FROM: (MM/DD/YY)	TO: (MM/DD/YY)	Employer's Name	Describe All Job Duties Related To License (If Job Duties/Position Changed List Separate)
From:	To: Present		
Duties			
From:	To:		
Duties			

List additional experience to be considered for credit on the back of this page and check this box. ☐

I, the below signed individual, authorize the release of my employment, education and license records to the Arkansas Department of Health, to the extent necessary to determine my eligibility to obtain a license. I understand my License and Application information, except for my Social Security Number, is available to the public under the Freedom of Information Act. I agree to perform my duties as a Licensed Operator or Operator In Training in accordance with all applicable State and Federal Laws. I understand that failure to do so can result in administrative and/or civil penalties and the loss of my license. I certify that the information in this application is true and complete to the best of my knowledge.

The license or OIT will be valid for the balance of the present two-year renewal period. (Each renewal period ends June 30 of odd numbered years.) A renewal fee of ten dollars ($10.00) will be charged for each license renewed. In order to renew the certificate or license, I understand I must obtain at least twenty-four (24) hours of approved training for each two-year renewal period. (The first renewal period will be prorated at one hour per month the certificate or license has been held.) Also, I understand that all training must be certified by registering for the training courses attended and providing a written list of this training to the Drinking Water Advisory and Operator Licensing Committee with each renewal period's renewal documents and fee remittance.

Applicant Signature: _____ **YOU MUST SIGN** Date: _____ _____, 20_____

Experience Validation & Verification: Must be SIGNED by Owner, Mayor, Board Chair, or System Management Representative. (If this section is not properly signed the application will be **denied**.)

The above-named license applicant has provided an accurate and complete description of their criminal history, work experience and education to the best of my knowledge. (The license applicant should not sign here.)

Print name: (not applicant) _____ Title: _____

Signature: (not applicant) _____ **BOSS MUST SIGN** Date: _____, 20_____

Updated December 21, 2020

REQUIRED MANDATORY TRAINING

TRAINING HOUR REQUIREMENTS FOR EXAMS										
COURSE NAME	LENGTH	VSS	D-1	D-2	D-3	D-4	T-1	T-2	T-3	T-4
RULES, REGS, COMPLIANCE	8 hr.	X	X	X	X	X	X	X	X	X
BASIC MATH	8 hr.	X	X	X	X	X	X	X	X	X
APPLIED MATH	8 hr.			X	X	X		X	X	X
DISTRIBUTION BASIC	24 hr.	X	X	X	X	X				
DISTRIBUTION INTERMEDIATE	24 hr.			X	X	X				
DISTRIBUTION ADVANCED	24 hr.					X				
TREATMENT BASIC	24 hr.						X	X	X	X
TREATMENT INTERMEDIATE	24 hr.							X	X	X
TREATMENT ADVANCED	24 hr.								X	X
	Total hrs.	40	40	72	72	96	40	72	96	96

Mandatory Training

- Mandatory Training Courses
  - No Expiration for Meeting License Exam Requirements
  - Do Expire Used for License Renewal Requirements
    - Expire End of Renewal Period in which Attended
    - Can be used to Renew License obtained after Attendance

Training Class Sources

Treatment, Distribution & Math Courses

- **AR Environmental Academy**
  - Jeremy Rowe - Instructor
  - East Camden, AR
  - (870) 574-4562
  - http://www.sautech.edu/aeta/index.aspx
  - E-mail: jrowe@sautech.edu

Training Class Sources

Treatment, Distribution & Math Courses

- **AR Rural Water Association (ARWA)**
  - Dennis Sternberg, Exec. Dir.
  - Lonoke, AR
  - (501) 676-2255
  - www.arkansasruralwater.org
  - E-mail: arkrwa@sbcglobal.net

•Course Options

Classroom – ARWA & AETA
(Arkansas Rural Water Association)
(Arkansas Environmental Training Academy)

Internet – AETA
(Arkansas Environmental Training Academy)

Correspondence Course Substitutions using Exam Reference Manuals –
CSUS-Office of Water Programs
(California State University at Sacramento)

Reference Books

- California State University Sacramento (CSUS)
  - Mandatory Course Curriculum Source
  - Self Study Course Manuals
  - Review Questions Do Not Follow ABC Item Standard
    - Many Are Specific to the Book
  - ≈ $200

- American Water Works Association (AWWA)
  - Offers Excellent Additional Knowledge
  - ≈ $400

Reference Books

Where To Purchase?

Drinking Water Education Material Cooperative
Arkansas Rural Water Association Administers

Must I Purchase All?

Treatment and Distribution manual requirements differ, some manuals more essential

Manuals Listed In ABC “Needs-To-Know” Criteria

NTK helps focus on study topics/where to spend study time

End Of Introduction

Water Sector Workforce

Water sector professionals are vital to protecting public health through the operation and maintenance of water and wastewater treatment plants.

They ensure that clean and safe water is consistently provided to the public.

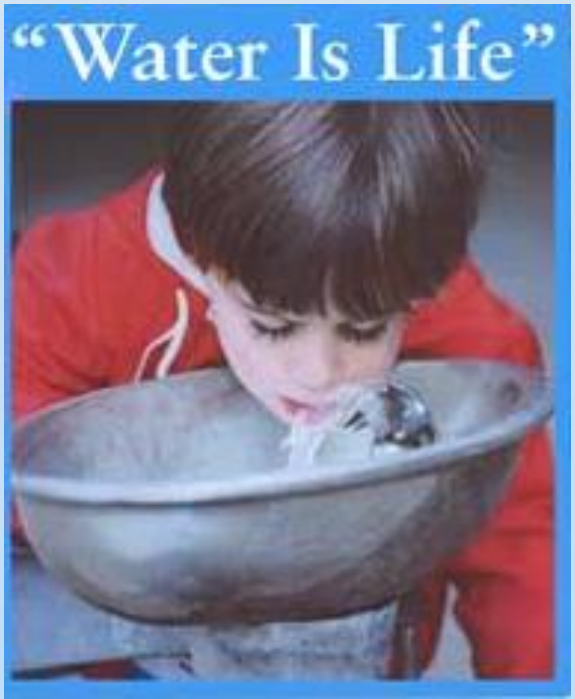
Learn about what EPA is doing to promote and ensure a sustainable water sector workforce.

http://water.epa.gov/infrastructure/drinkingwater/pws/dwoperatorcert/index.cfm

Arkansas Department of Health

Public Water System

History, Chlorination & Public Safety



Why Treat Water?

Large Percent of Microbial Diseases Are Waterborne and Treatable

Many diseases are transmitted through water infiltrated with sewage. Microorganisms that cause illness cannot be seen, smelled, or tasted.

History, Chlorination & Public Safety

The History of Drinking Water Treatment

http://www.epa.gov/safewater/sdwa25/sdwa.html

- Ancient civilizations established themselves around water sources
- Saw need for ample water *quantity* for drinking and other purposes
- Understanding water *quality* was not well known or documented
- Aesthetic (appearance, taste or smell) problems was the focus
- Ancient writings water treatment methods such as filtering through charcoal, exposing to sunlight, boiling, and straining
- Visible cloudiness (later termed turbidity) was the driving force behind earliest water treatments

History, Chlorination & Public Safety

- 4000 B.C.: methods to improve the taste and odor recorded
- 1500 B.C.: Egyptians used alum to settle suspended particles in water
- 1700s: filtration effective means to remove particles from water
- Early 1800s: slow sand filtration used regularly in Europe
- Mid to late 1800s: scientists greater understanding of sources and effects of drinking water contaminants, especially those not visible to the naked eye
- In 1855: epidemiologist Dr. John Snow proved cholera
  - was waterborne disease
  - Linked cholera outbreak to public London well contaminated by sewage
- Late 1880s: Louis Pasteur demonstrated the “germ theory” of disease
  - Explains how microscopic organisms transmit disease through water

History, Chlorination & Public Safety

- 1890's: 1st use of chlorine disinfectants to water facilities in England
- Early 1900s: Disinfectants (chlorine) largest role in reducing waterborne disease outbreaks
- 1908: Chlorine 1st used as primary disinfectant in Jersey City, NJ
- 1918: Over 1,000 U.S. cities employ chlorine disinfection. Treatment progressed to improved turbidity removal and other contaminant treatments
- 1914: US Public Health Service Water Standards initially established
  - Standards Expanded 1925, 1946, & 1962 to total of 28 substances
- 1916: ADH gained legislative authority to regulate AR drinking water
  - Used USPHS Water Standards to guide water quality enforcement

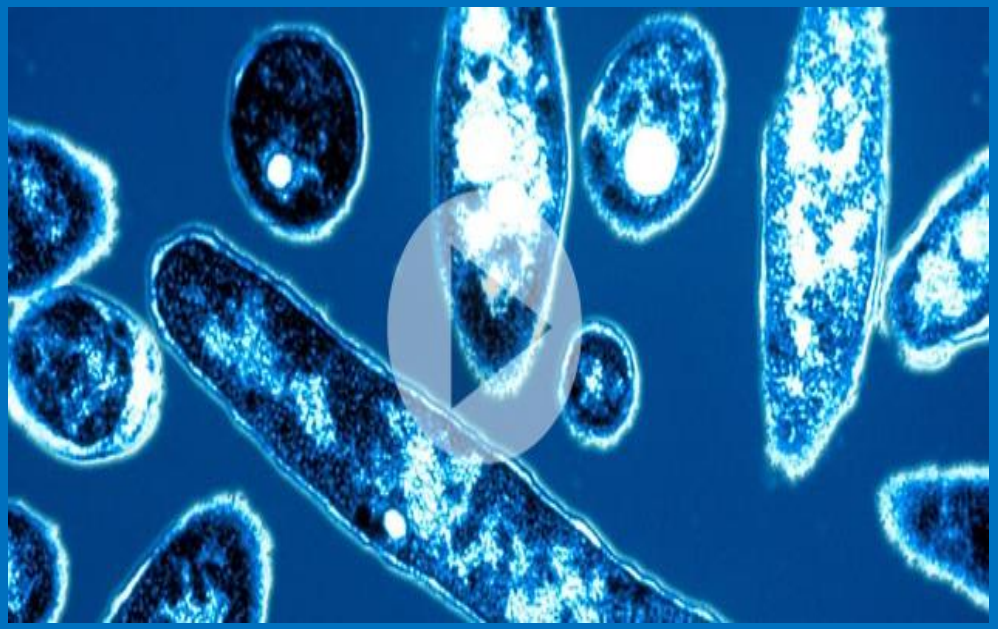
History, Chlorination & Public Safety

- 1957: Mandatory Water Licenses established
- 1972: Passage of the USEPA Clean Water Act to restore and maintain surface water quality
- 1974: Passage of the USEPA Safe Drinking Water Act; provided authority to set water quality standards which states must enforce
- 1976: ADH gained SDWA Primacy (primary enforcement)
- 1996: Amendments to the SDWA extend existing law to recognize
  - Source water protection, operator training, funding for water system improvements, and public information
- 2010 . . . The Rest of the Day

Waterborne Pathogens

A *Pathogen* is a bacterium, virus, or other microorganism that can cause disease.

- *Giardia*
- *Cryptosporidium*
- *Campylobacter*
- *Salmonella*
- *E. coli* O157:H7
- *Cholera*
- *Hepatitis A virus*
- *Legionella*



Legionella pneumophila, the bacteria responsible for Legionnaires' disease.

Chlorine Residual

in

Public Water Systems

Arkansas Rules and Regulations require that all water supplied to the public must be disinfected by an approved method.

Chlorination disinfection most common method

Chlorine Residual Benefits of Chlorine

Potent Germicide

Chlorine disinfectants can significantly reduce the level of many disease-causing microorganisms in drinking water

Taste and Odor Control

Chlorine oxidizes many naturally occurring substances such as foul-smelling algae secretions, sulfides and odors from decaying vegetation

Chlorine Residual
Benefits of Chlorine

Biological Growth Control

Chlorine disinfectants reduces the occurrence of slime bacteria, molds and algae that commonly grow in water supply reservoirs, on the walls of water mains and in storage tanks

Maintains a Disinfectant Residual

Protects against secondary contamination in the distribution system. Other disinfectants do not.

Algae

Chlorine in Water

The amount of Chlorine required to disinfect water is referred to as

Chlorine Demand

How does Chlorine *disinfect?*

Chlorine combines with impurities to ***inactivate*** microorganisms
and
oxidize organic & inorganic matter

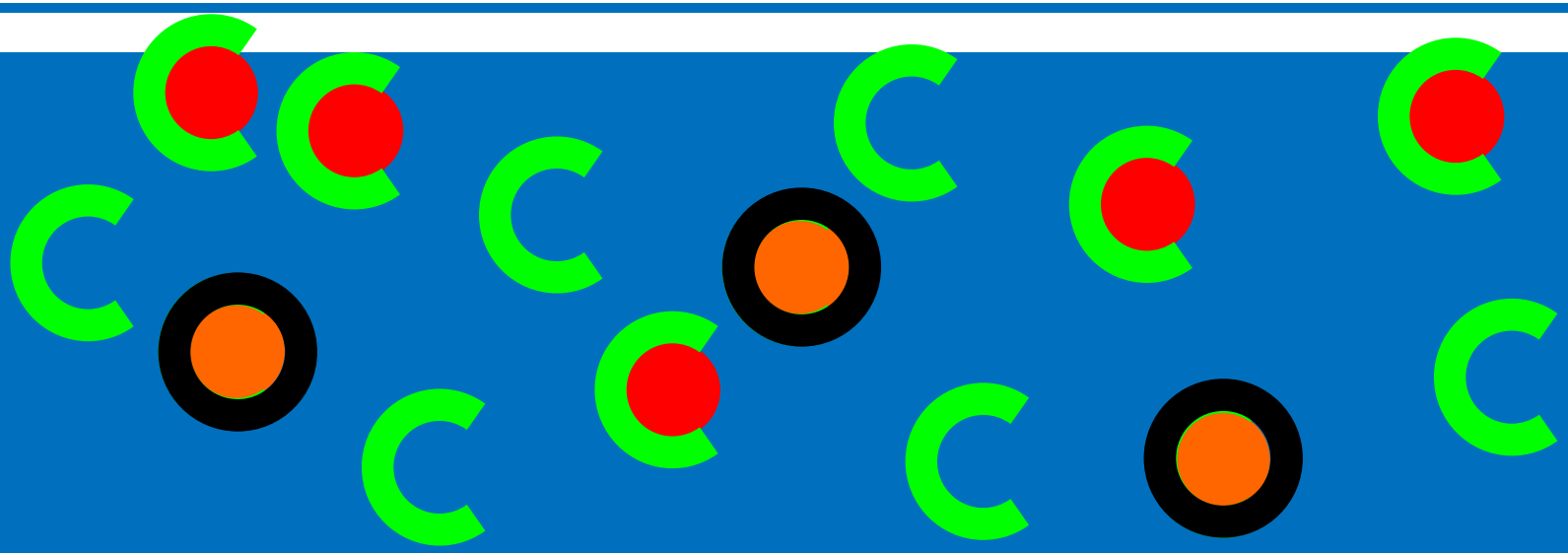
Chlorine in Water

Where more Chlorine is added to water than what is necessary to combine with contaminants, the Chlorine left over is referred to as

Free Available Chlorine
Hypochlorous acid (HOCl)
Hypochlorite ion (OCl-)

The chlorine in the water still available for disinfection (combined or free) constitutes the **Chlorine Residual**

Chlorine in Water



If the amounts of the residuals are the same, **Combined** Chlorine requires about 100 times more contact time than **Free Available Chlorine**

Chlorine in Water

The amount of Chlorine required to combine with contaminants **(Chlorine Demand)** ***plus*** the desired amount of chlorine left over **(Chlorine Residual)** is referred to as the

Chlorine Dose

(Chlorine Demand + Chlorine Residual)

We monitor **Chlorine Residual** when taking samples to determine whether **the Chlorine Dose** is sufficient to protect against secondary contamination in all parts of the distribution system

Chlorine Residual Monitoring

Chlorine Residual Monitoring

Chlorine Test Kit

Chlorine Residual Monitoring

The Kit should test for

DPD Free chlorine residual
DPD Combined chlorine residual
DPD Total chlorine residual

Free Cl_2 + Combined Cl_2 = Total Chlorine

The Kit should

be kept in a safe place
have fresh/in-date chemical
be used daily

Chlorine Residual Monitoring

DPD (N, N-diethyl-p-phenylenediamine) is the current industry standard testing reagent.

The DPD method is more **accurate** and **versatile** than the unapproved Orthotolidine (OT) method - Which might be used in some swimming pool kits.

The **DPD** method accurately measures **free, combined,** and **total** chlorine residuals.

Is not the only approved reagent

Chlorine Residual Monitoring

It is Recommended That You:

- ✓ **Check Your Residual Daily**
- ✓ **Keep a record of your residual and provide ADH a copy of the record.**

Residual **is that which remains after the greater part or quantity of something is gone.**

Chlorine Residual
Minimum Residual

Two Places Speak To Minimum Required Residual

PWS Rules states an “Adequate” residual

Federal SDWA (Safe Drinking Water Act) & SWTR (Surface Water Treatment Rules) states a “Detectable” amount

Neither is a definitive level or type residual

Generally a residual of at least **0.2 mg/L** free is recommended in the remote points in the distribution system.

Chlorine Residual
Minimum Residual – Chloramination

If combined residual (chloramination) is used
Critical to monitor chlorine & ammonia feed rates
Higher combined residual needed
To avoid nitrification 2.5 mg/L mono-chlorine residual
Should monitor for mono & total chlorine residuals

- Mono requires specific test procedure

Should monitor for free ammonia

- Detected in distribution network indicates nitrification

Summer temps encourage rapid micro-organism growth exceeding mono-chlorine's inactivation rates

Chlorine Residual Monitoring

By maintaining an adequate Chlorine Residual - your water should be safe…

Which In turn Keeps The Public Safe.

Maintaining your residual will also help in troubleshooting…if a problem should arise.

SECONDARY CONTAMINATION

Definition: Contamination after Treatment

It Is Why Residuals Are Maintained
Why Bacti's Are Monitored in Dist System

How does It Happen?
Poor Repair / Maintenance Procedures
Cross Connections
Others?

Reducing the Risk
Example Case

One Operator for Both Water & Wastewater Treatment Plants

A potential source of waterborne diseases

Make Sure to Utilize

Disposable gloves
Protective clothing
Disinfectant for shoes

Reducing the Risk
Rules of Thumb

Schedule drinking water system maintenance and inspections before wastewater system maintenance and inspections

Immunization of staff

Use separate equipment and tools
or clean thoroughly

Keep a handle on Personal Hygiene
Avoid Taking “work microbes” Home

Fluoridation of Drinking Water

Fluoridation is the process of adding **Fluoride** (the water soluble form of **Fluorine**) to a substance in order to reduce the occurrence of tooth decay.

Fluoridation - History

Fluoridation of drinking water was first introduced in the United States in the 1940s.

The studies leading up to the introduction of fluoridation centered around water supplies with higher levels of naturally occurring fluoride

The populations served by these water supplies showed lower instances of dental caries . . . tooth decay

Fluoridation - History

1901 to 1930s

Dr. Frederick McKay, DDS

Studied “Colorado Brown Stain” . . . (Fluorosis)

Proposed a connection between naturally occurring fluoride & resistance to tooth decay

Fluoridation - History

1930s

H. Trendley Dean, DDS (USPHS)

Studied effects of Fluoride in some 345 U.S. communities

Determined that a 1ppm concentration of fluoride in drinking water greatly reduced the occurrence of tooth decay without promoting fluorosis

Fluoridation - History

1940s

U.S. Public Health Service endorses fluoridation in U.S. water systems

Recent Studies

Show 20% to 40% reduction in tooth decay in communities using fluoridated water

Today, approximately 73% of U.S. Water Systems fluoridate their water

Fluoridation - History

Arkansas

More than 150 water supplies have naturally occurring fluoride in concentrations ranging from 0.2 - 1.7 mg/L. A few get as high as 5.2 mg/L.

86% AR Public Water Systems are optimally fluoridated to optimal levels.

Approximately 85% of AR residents are provided with optimally fluoridated water.

Fluoridation

Act 197 of 2011 requires all water systems that serve a total of at least 5,000 persons or more to optimally fluoridate

Delta Dental Foundation is funding PWS required to Fluoridate

Why - Every $1 invested in water fluoridation saves approximately $50 in unnecessary dental treatment costs

Any PWS can fluoridate - ADH does support the fluoridation of all Arkansas Drinking Water

Fluoridation

Application Standards

Maximum Contaminant Level (MCL)

An MCL is the maximum allowable amount of a contaminant in drinking water which is delivered to the consumer .

Secondary Maximum Contaminant Level (SMCL)

SMCLs are established only 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.

Source: www.water.epa.gov

Fluoridation Application Standard

Maximum Contaminant Level (MCL)

4.0 ppm (4.0 mg/L)

Secondary MCL (SMCL)

2.0 ppm (2.0 mg/L)

AR Drinking Water Optimum Concentration

0.7 ppm (0.7 mg/L)

AR Drinking Water Optimum Range

0.6 mg/L to 1.2 mg/L

Fluoridation - Monitoring

Should monitor and record *daily*:

Amount and *Type* of chemical added

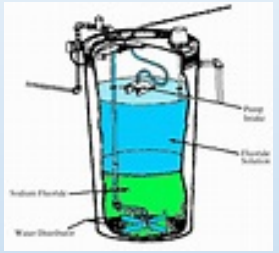
Total gallons of water treated

Fluoride Concentration

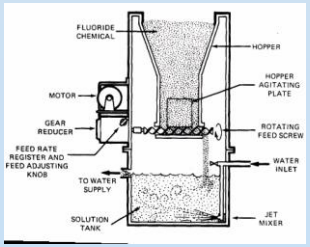
Fluoridation

Fluoride comes in 3 basic forms

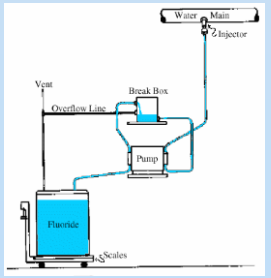
Sodium Fluoride (NaF)
Saturator Feeder



Sodium Fluorosilicate (Na_2SiF_6)
Volumetric Feeder



Fluorosilicic Acid (H_2SiF_6)
Solution Feeder



Fluoridation
Specific Ion Electrode

Fluoridation
SPADNS

Fluoridation - Monitoring

All sampling/monitoring should be done at the *entry point* to the distribution system (finished water)

The Department sends Fluoride Sample Bottles and Water Sample Collection Reports to the PWS

The majority of the report information is completed prior to sending to the PWS

Fluoridation - Monitoring

Taking the Compliance Sample

Lab

Take at SAME TIME

Field Analysis

Fluoridation

ADH Fluoride Engineer

Glenn Greenway, PE
501-661-2623

District Staff will offer training, monitoring and reporting assistance for Fluoride..

Review

Questions?

The amount of chlorine used right away after addition that reacts with impurities is the

A. Chlorine dose
B. Chlorine demand
C. Chlorine residual
D. Free Chlorine

B. Chlorine demand

The total amount of chlorine fed to the system is the

A. Chlorine dose
B. Chlorine demand
C. Chlorine residual
D. Free Chlorine

A. Chlorine dose

The _____ gives you protection from secondary contamination

A. Chlorine dose
B. Chlorine demand
C. Chlorine residual
D. Chlorine Back-feed

C. Chlorine residual

Which of the following, in equal amounts, is the more powerful disinfectant?

A. Free Chlorine
B. Combined Chlorine
C. Chloramine
D. All about the same

A. Free Chlorine

What method is approved for field measurement of Chlorine residual levels in the water distribution system?

A. Chlorine residual method C
B. Colorimetric method using Orthotolidine
C. Colorimetric method using DPD
D. Titration method using BOD

C. Colorimetric method using DPD

The Chlorine test kit should measure

A. Free chlorine, combined chlorine, and total chlorine
B. Chlorine dose, chlorine residual, and chlorine demand
C. Free chlorine, chlorine dose, and total chlorine
D. None of the above

A. Free chlorine, combined chlorine, and total chlorine

Combined Chlorine + Free Chlorine equals _____ _____?

A. Chlorine dose
B. Total Chlorine
C. Chlorine residual
D. Water that smells like Chlorine

B. Total Chlorine

What is the recommended Chlorine Residual level for remote sites?

A. 0.5 mg/L
B. 0.2 mg/L
C. 0.5 g/L
D. 0.2 g/L

B. 0.2 mg/L

"MCL" stands for _____?

A. Minimum Chlorine Level
B. Maximum Chlorine Level
C. Maximum Contaminant Level
D. Multiple Contact Line

C. Maximum Contaminant Level

Compliance and field analysis samples should be collected _____.

A. at different points in the distribution system
B. at the same time
C. at different times for comparison
D. in mason jars

B. at the same time

The MCL for Fluoride in Drinking Water is _____ ____.

A. 4.0 µg/L
B. 0.8 ppm
C. 4.0 ppm
D. 2.0 mg/L

C. 4.0 ppm

The colorimetric field method for analyzing Fluoride concentration is _____.

A. Electrophoresis
B. HACH Fluoride Test Strips
C. Specific Ion Electrode
D. SPADNS

D. SPADNS

THE END