PRACTICAL ASPECTS OF CHLORINE RESIDUAL ANALYSIS AND COLIFORM BACTERIA SAMPLING

2026 PNWS ANNUAL CONFERENCE

MAY 8, 2026

DOUG GREENLUND

CITY OF SPOKANE

WATER QUALITY COORDINATOR



CITY OF SPOKANE WATER SERVICE AREA

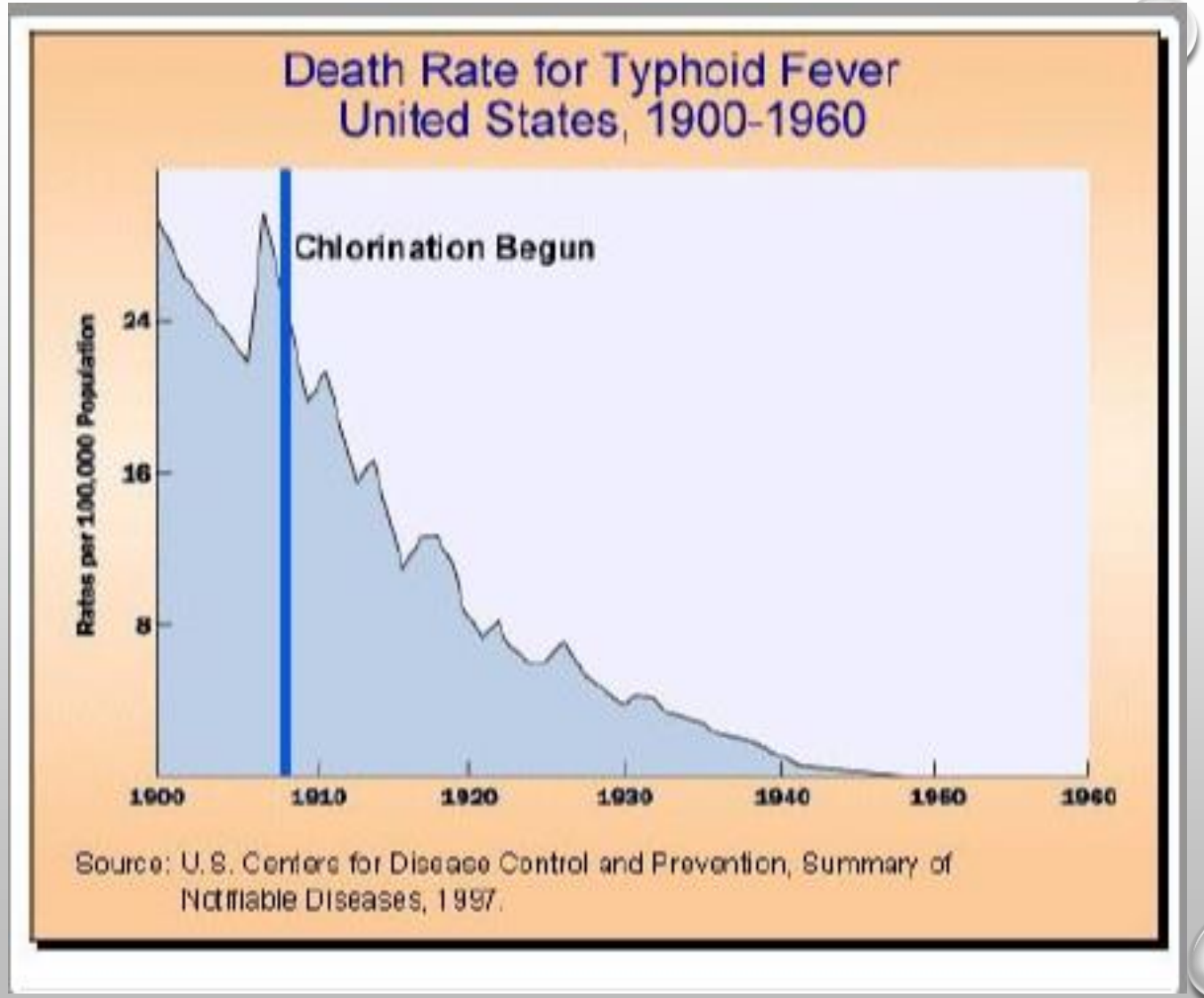
- SOURCE SPOKANE VALLEY RATHDRUM PRAIRIE AQUIFER
- 8 WELL FIELDS – 28 PUMPS
- 26 BOOSTER STATIONS
- 117 MG STORAGE
- 255,000 CUSTOMERS
- 180 COLIFORM SAMPLES PER MONTH
- DISINFECT WITH CHLORINE GAS
- WINTER 35 MG/DAY
- SUMMER 130 MG/DAY

TODAYS TOPICS

- CHLORINE RESIDUAL MEASUREMENT
  - WHY
  - HOW
  - EQUIPMENT
- COLIFORM BACTERIA SAMPLING
  - WHY
  - HOW

RESIDUAL CHLORINE MEASUREMENT - WHY

- DISINFECTION
- ONE OF THE BEST PUBLIC HEALTH CASE STUDIES USE OF CHLORINE DISINFECTION AND DECLINE IN WATER BORNE DISEASE
- WANT ENOUGH BUT NOT TOO MUCH



CHLORINE RESIDUAL MEASUREMENT - HOW

- TWO PRIMARY METHODS AMPEROMETRIC AND COLORIMETRIC (DPD)
- COLORIMETRY IS SPECTROPHOTOMETRY IT USES THE BEERS LAMBERT LAW
  - THE CONCENTRATION ON A SOLUTE IS PROPORTIONAL TO THE ABSORBANCE
- DPD (N,N-DIETHYL-P-PHENYLENEDIAMINE) REACTS WITH HYPOCHLOROUS ACID AND TURNS PINK
- THE INTENSITY OF THE PINKNESS IS PROPORTIONAL TO THE CHLORINE CONCENTRATION
- METER MEASURES HOW MUCH IS ABSORBED

USING THE HANDHELD METER
THE PRACTICAL PART

- WATER SAMPLE – REPRESENTATIVE AND CLEAN, LOW TURBIDITY
  - TAKEN ALONG WITH A COLIFORM BACTERIA SAMPLE
- THE SAMPLE VIAL
  - CLEAN, NOT STAINED OR SCRATCHED
    - CARRY SPARES
    - VIAL CAN VARY WITH EXPECTED CONCENTRATION
- **DO NOT POUR SAMPLE DIRECTLY INTO TESTER**

CHLORINE TESTING CONTINUED

- ZERO TESTING UNIT, FOLLOW MANUFACTURES INSTRUCTIONS---HAVE THE MANUAL WITH YOU
- ADD DPD
  - FREE – QUICK 30 SECONDS
  - TOTAL – 3-MINUTE HOLD TIME
  - USE PACKETS OR A DISPENSER
  - CHECK YOUR DPD – USE DI WATER AND CHECK THE “ZERO” HAS AN EXPIRATION DATE

RESIDUAL TESTING

- TEST AFTER THE ZERO
- COLD WATER ON A HOT DAY IS A PAIN, NEED THE CLEAN DRY VIAL
- MAKE SURE THE UNIT IS THE PROPER MODE
- KNOW YOUR ERROR CODES
- BRING NEW BATTERIES
- EMPTY RINSE AND CLEAN THE VIALS WHEN YOU ARE DONE
- DPD STAINS THE VIALS
- WRITE DOWN THE RESULTS

MORE ON TESTING AND EQUIPMENT

- METERS ARE ELECTRONIC MAKE SURE THEY ARE NOT TOO HOT OR TOO COLD
- CLEANING DISPENSER, MOISTURE PLUGS THEM, USE AIR OR BRUSH
- KEEP YOUR STORAGE DRY, DISPENSERS PLUG EASILY
- CALIBRATION CHECKS
- CAPABILITY CHECKS FOR NEW EMPLOYEES

OTHER RESOURCES

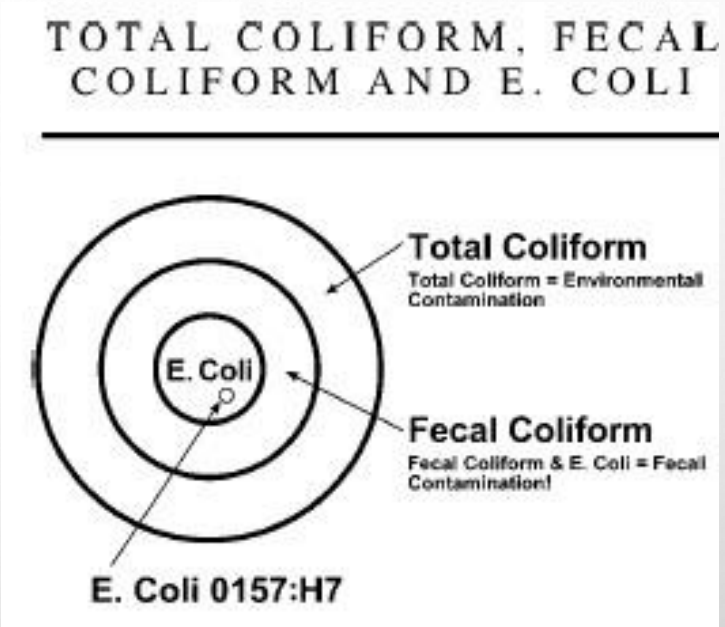
- GREAT CLASS STARTED BY STEVE DEEM RETIRED DOH CHECK WITH JEFF LUNDT FOR PNWS TRAINING IN A BOX
- CHLORINE RESIDUAL USED AS TROUBLESHOOTING TOOL FOR OTHER ISSUES
  - CHECK OUT JULY/AUGUST 2025 AND SEPTEMBER 2025 OPFLOW

COLIFORM BACTERIA

- REQUIRED TESTING BASED ON POPULATION
- CONSTRUCTION
- CUSTOMER CONCERNS

WHAT IS COLIFORM BACTERIA?

•Total coliform bacteria are commonly found in the environment (e.g., soil or vegetation) and are generally harmless. If only total coliform bacteria are detected in drinking water, the source is probably environmental. Fecal contamination is not likely. However, if environmental contamination can enter the system, there may also be a way for pathogens to enter the system. Therefore, it is important to find the source and resolve the problem.



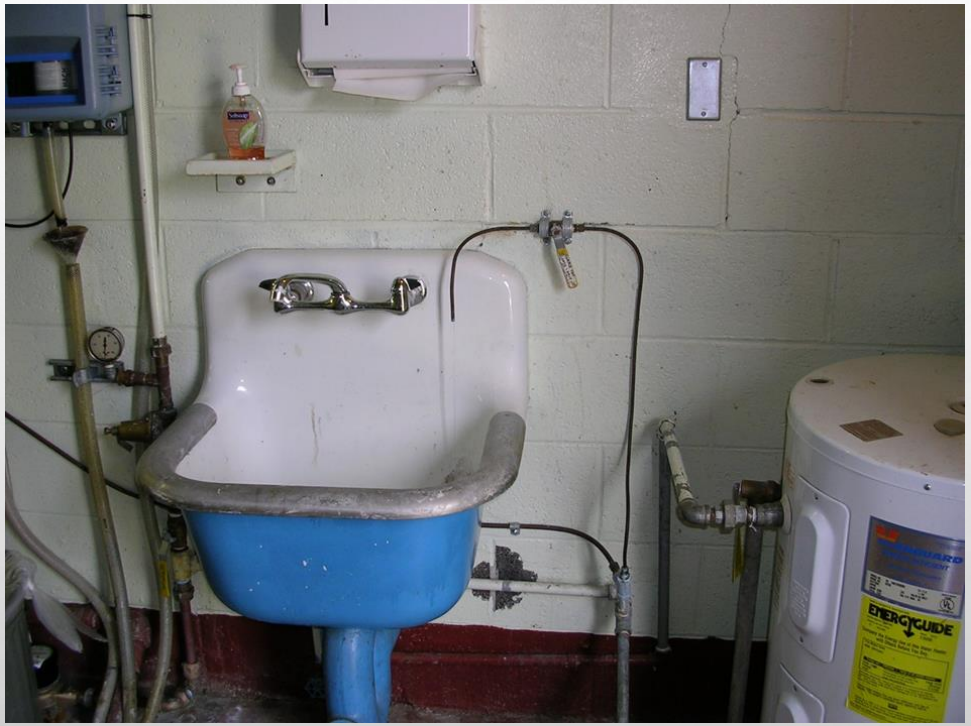
WHAT ARE WE GOING TO COVER

- COLLECTION SAMPLES
  - LOCATIONS
    - DEDICATED, CONSTRUCTION, CUSTOMER CONCERNS
  - SAMPLING
  - CHAIN OF CUSTODY
  - SUBMITTING SAMPLES

COLLECTING SAMPLES SAMPLE STATION



DEDICATED COPPER SAMPLE LINE



SAMPLE LOCATIONS

- CONSTRUCTION SAMPLING
  - DISINFECT – TESTING THE PROJECT NOT YOUR EQUIPMENT
- CUSTOMER
  - DISINFECT
  - CLEAN AERATOR
  - HARD WATER DEPOSITS
  - SEPARATE HOT AND COLD
    - WHAT DO YOU DELIVER
  - ENOUGH GAP, SPLASH BACK

FLAME THE LINE IF POSSIBLE



HOW TO COLLECT SAMPLE:

STEPS

- FLUSH LINE
- TURN ON LOW STREAM
- ONLY SAMPLE BOTTLES SUPPLIED BY LAB
- REMOVE CAP- FINGERTIPS ONLY
- CAP FACING DOWN ONLY
- **DO NOT** RINSE BOTTLE
- FILL TO LINE
- SECURE LID

EXAMPLE



OTHER CONSIDERATIONS

- HOLDING TIME
- CHLORINE LEVEL
- SAMPLE TEMPERATURE
- SAMPLE BOTTLES EXPIRE
  - DO NOT USE THE ONE ROLLING AROUND UNDER THE SEAT OF THE TRUCK
- DO NOT FREEZE THE SAMPLE

CHAIN OF CUSTODY

- IMPORTANT
- FILL THEM OUT IN INK
- LEGIBLE
- SAMPEL DESIGNATION MATCHES THE PAPERWORK

PRESERVATION AND HOLDING TIMES

- WHAT IS THE HOLDING TIME FOR CHLORINE SAMPLE
- WHAT IS THE HOLDING TIME FOR COLIFORM BACTERIA SAMPLE