



Stockton Water Utility Disinfection and Chloramines

City Council Special Meeting
March 26, 2016

Disinfection of Public Water Supplies (1)

History

- In 1908, Jersey City, New Jersey was the first city in the United States to begin routine disinfection of community drinking water
- Typhoid Fever in U.S.
 - 1900 (100 cases per 100,000 people)
 - 1920 (33.8 cases per 100,000 people)
 - 2006 (0.1 cases per 100,000 people)

Chlorine and chloramine are the major disinfectants used to disinfect public water systems

Disinfection of Public Water Supplies (con't)

☞ Centers for Disease Control (CDC)

- *“Current studies indicate that using or drinking water with small amounts of monochloramine does not cause harmful health effects. These studies reported no observed health effects from drinking water with monochloramine levels of less than 50 mg/L in drinking water. A normal level for drinking water disinfection can range from 1.0 to 4.0 mg/L.”*

http://www.cdc.gov/healthywater/drinking/public/water_disinfection.html

∞ Environmental Protection Agency (EPA)

- *“Research and experience indicate that monochloramine is safe at levels that are typically used to treat drinking water.”*

<https://www.epa.gov/sites/production/files/2015-09/documents>

Disinfection of Public Water Supplies (con't)

- ☞ Chlorine alone had been used by the City Water Utility until January, 2016
- ☞ Prior to 2012, U.S. EPA allowed utilities to report disinfection by-product results by averaging quarterly samples system-wide
- ☞ Current regulations require averaging quarterly results at each sampling location
- ☞ In early 2013, the City experienced a Total Trihalomethane (TTHM) violations.
- ☞ In late 2015, TTHM violations occurred at two stations.
- ☞ TTHM's are carcinogens that utilities have to address

Summary of DBPs in the North System

- ⌘ Low flow months of December, January and February typically produce the highest DBP levels
- ⌘ Areas near the 14 Mile Reservoir and Northwest Reservoir (west side) typically produce the highest DPB levels
- ⌘ System-wide DBP averages easily meet the Stage 1 standards using chlorine
- ⌘ Two drinking water standard violations (2013, 2015) under the Stage 2 DBPR standards with free chlorine
- ⌘ The City can no longer rely on chlorine alone as a residual disinfectant in the North Water System

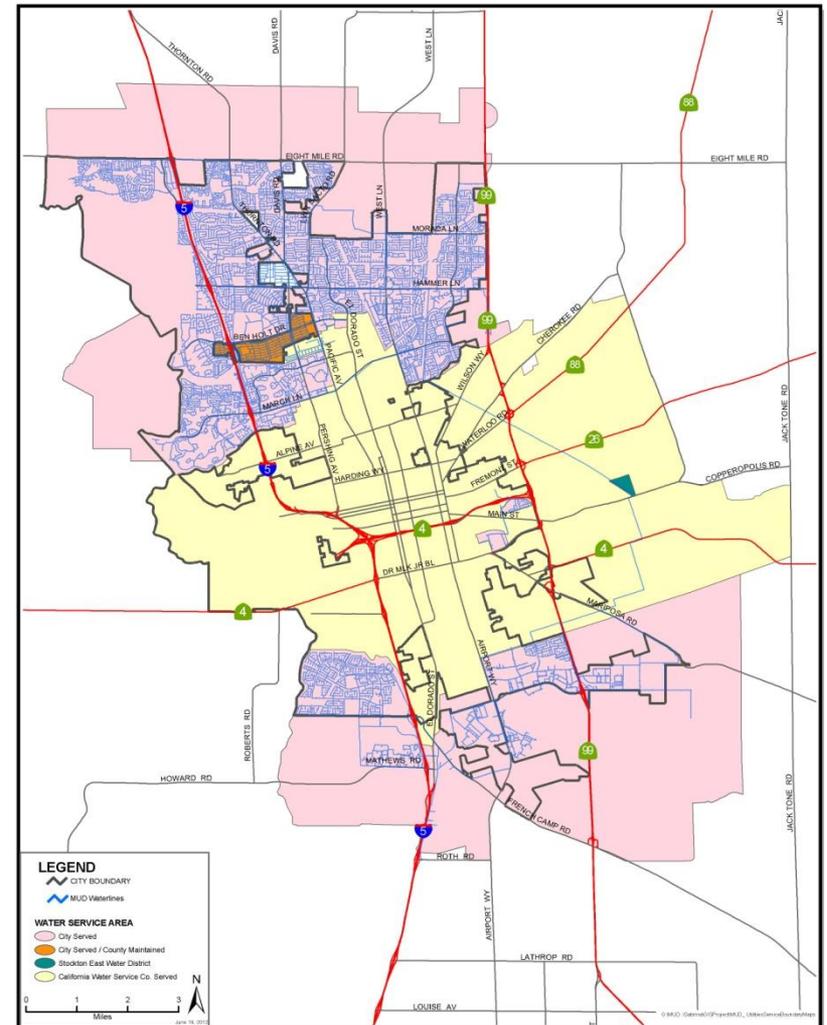
Water Treatment for Protection of Public Health

- ∞ Water disinfection through the use of chemicals is a balancing act aimed at killing harmful bacteria that cause acute sickness.
- ∞ The balancing act must also prevent the formation of harmful byproducts, including carcinogens.
- ∞ Chloramines are a federally recognized, long-standing, widely used and closely regulated means for controlling byproducts.
- ∞ Chloramines are a safe, efficient and cost effective method approved by the City Council.

Stockton Water Service Areas

Stockton Metropolitan Area served by

- City of Stockton
 - North and South
- California Water Service Company
 - Central
- San Joaquin County



Delta Water Supply Project (DWSP)

∞ Project Elements

- 30 MGD Water Treatment Plant
 - Dedicated May 30, 2012
 - Substantially complete June 23, 2012
 - Final completion January 2015
- Raw and Treated Water Pipelines
- Intake and Pump Station
 - Substantially complete August 16, 2012



Delta Water Supply Project (con't)

- ∞ The Delta Water Supply is part of the overall water supply for the Stockton Metropolitan Area
 - Protects against shortages in other supplies
 - Protects against groundwater overdraft
 - Positions Stockton for the future

Treatment Processes

☞ Ozonation

- Taste and Odor Control

☞ Flocculation/Sedimentation

- Clarification

☞ Microfiltration by Pressure Membranes

☞ Disinfection

- Sodium Hypochlorite (Chlorine - Primary)
- Chlorine + Ammonia (Chloramines - Residual)

Water Treatment Plant (2012)



Disinfection By-Products & Chloramines

- ∞ Total Trihalomethanes (TTHMs) & Haloacetic Acids (HAAs)
 - Formed when Total Organic Carbon comes in contact with Chlorine
 - TTHM regulated to 80 parts per billion on Local Running Annual Average, HAA regulated to 60 parts per billion on Local Running Annual Average
- ∞ Chloramines are an Effective Distribution System Disinfectant
 - Stable and Persistent, Produces Fewer Disinfection By-Products
 - Use in United States dates back to 1929

Chloramine Use in California

- ☞ Large California Water Utilities using Chloramines
 - San Francisco – 2004 (pop. 865,000)
 - East Bay Municipal Utilities District – 1998 (pop. served 1,300,000)
 - Metropolitan Water District of Southern California – 1984 (pop. served 19,000,000)
- ☞ Other nearby cities that use chloramines
 - Tracy (pop. 85,000)
 - Mountain House (pop. 9,800)
 - Brentwood – 2007 (pop. 55,000)

Chloramines and Public Health

- ☞ Strictly Regulated by the U.S Environmental Protection Agency and State Water Resources Control Board
- ☞ Centers for Disease Control
 - Small Amount of Chloramine – No Harmful Health Effects
 - No Observed Health Effects Less than 50 mg/L
 - Normal Level for Drinking Water: 1 to 4 mg/L
 - Protects Against Waterborne Diseases
- ☞ City of Stockton Water Permit limit is 4 mg/L
 - Target application at 2.5 mg/L

Chloramine Discussion Timeline

- ∞ 9/18/07 – DWSP Design Contract Awarded
- ∞ 3/21/08 – Water Quality/Project Cost Meeting
 - Disinfection By-Products Potential
 - Chlorine vs. Chloramine Discussion
 - Two Viable Options to Control Disinfection By-Products
 - Post Filter Granular Activated Carbon
 - Chloramines (Selected to Move Forward)
- ∞ 4/24/08
 - Council Water Committee Discussion of Disinfection By-Products
 - Decision to Go Forward with Chloramine Disinfection to Minimize Operations and Maintenance Cost

Chloramine Decision Timeline (con't)

- ☞ 8/10/11 Council Water Committee
 - Detailed discussion on chloramine conversion
- ☞ 4/13/13 City Council
 - Staff Presented Disinfection By-Product Issue
 - City Council Approved a Construction Contract Amendment
 - North Stockton System Conversion to Chloramines
- ☞ August 2013 – Outreach to Public
- ☞ 9/10/13 City Council
 - Public concerns regarding chloramines
- ☞ 10/3/13 Water Advisory Group
 - Provided Update on chloramines

Chloramine Decision Timeline (con't)

∞ 11/13/13 Council Water Committee

- Update on chloramines
 - Decision History/Outreach
 - Citizen Concerns
 - Treatment Options
 - Chloramine Safety and Use in United States

∞ 11/13/13 Council Water Committee

- Disinfection By-Product Control Costs
- Opposition to Chloramines
 - Lead and Copper – Not an Issue (Control pH, no lead pipes in our system)
 - Argument to Avoid Chloramines Political, not Scientific

Summary of Current Status

- ∞ Water treatment is complicated. Regulations to ensure public health protection are continually changing and our water utility continues to manage its water supply accordingly
- ∞ City Council chose the most efficient, safe and cost effective method to provide disinfection of our water supplies delivered each and every day

Concerns Chloramine Use

- Recent communications state chloramines will leach lead and copper from distribution pipes and cause corrosion problems
 - Stockton's water system has always complied with the federal Lead and Copper Rule
 - Recent sampling, after chloramine conversion, indicates lead and copper levels orders of magnitude lower than the regulated limit (posted to website)
 - Water treatment operators sample water before treatment and apply a corrosion inhibitor and pH control, if needed, prior to distribution to our customers

Granular Activated Carbon Alternative

- ∞ Granular Activated Carbon was evaluated as the alternative to chloramines for the DWSP.
- ∞ GAC has a higher installation and ongoing maintenance cost.
- ∞ The use of GAC could also provide safe drinking water, but would not provide measurably safer water than using chloramines.
- ∞ The cost to retrofit the DWSP to use GAC would be higher than the original installation costs.
- ∞ Retrofitting the DWSP to use GAC would take 4 to 5 years, during which time chloramines will continue to be used.

Original GAC Cost Estimates

- ☞ DWSP Water Treatment Design Estimate for Post Membrane GAC contactors (2012)¹:
 - ☞ Capital cost = \$16.2M
 - ☞ Capital Recovery (30 years @ 6% interest) = \$1,162,023/yr
 - ☞ Annual O&M cost = \$4.24M
 - ☞ Total Annualized Capital and O&M = \$5,406,855
 - ☞ \$0.49/1,000 gallons treated
- ☞ California Urban Water Agencies Estimate of Annualized Capital and O&M (2012)²:
 - ☞ \$0.53/1,000 gallons treated
 - ☞ 30 mgd = \$5,803,500/yr
- ☞ ¹ 2008 Estimate of \$15M Capital and \$4M O&M Inflated at 2%/yr for 3 years
- ☞ ² Triennial Public Health Goals 2013 Report

Impact to Water Rates

- ☞ 2012 Water Rate = \$1.60/ccf (unit)
 - 1 unit = 748 gallons
- ☞ Cost for GAC Treatment:
 - \$0.49/1,000 gallons or \$0.37/ccf
- ☞ New Water Rate = \$1.60 + 0.37 = \$1.97/ccf
 - **23% Rate Increase**
- ☞ Chloramine Conversion Total Annual Capital and O&M included in current rates (before the 2016 recommended rate increases)

Next Steps

- ☞ Continue to monitor the City's water supply.
 - Next quarterly readings are scheduled for April.
 - The City is seeking volunteers for the residential lead and copper sampling program.
- ☞ There is no new recommended action.
- ☞ Council will consider the proposed Water Rate increase at the March 29th Public Hearing, and could consider changes to the proposed rates to address GAC at that time.

Questions?