

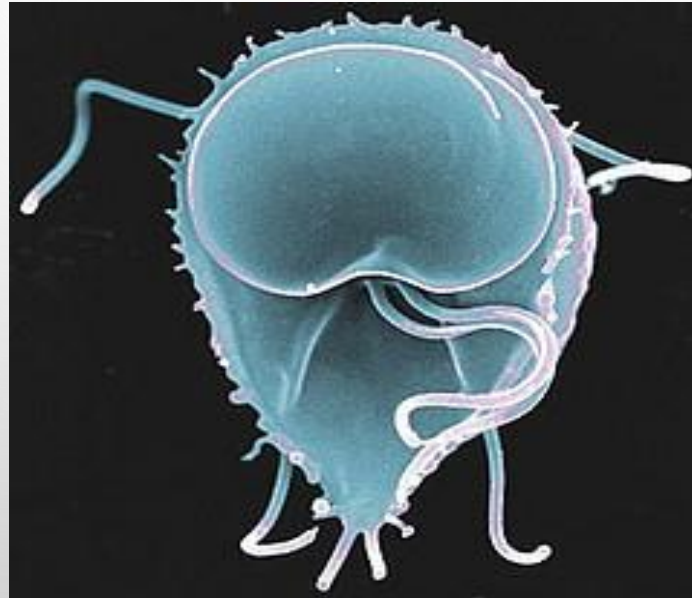
CONVERTING TO CHLORAMINES



IMPORTANCE OF DISINFECTION

DISINFECTION KILLS OR
INACTIVATES ANY
PATHOGENS THAT PASS
THROUGH THE WATER
TREATMENT AND
FILTERING PROCESS

GIARDIA



POSSIBLE PATHOGENS
INCLUDE ENTERIC
VIRUSES AND BACTERIA,
E. COLI, PROTOZOA,
GIARDIA AND
CRYPTOSPORIDIUM

DISINFECTION

- PUBLIC WATER SUPPLIES ARE REQUIRED TO MAINTAIN A RESIDUAL DISINFECTING AGENT THROUGHOUT THE DISTRIBUTION SYSTEM, IN WHICH WATER MAY REMAIN FOR DAYS BEFORE REACHING THE CONSUMER
- THERE ARE TWO KINDS OF DISINFECTIONS
 - PRIMARY DISINFECTION ACHIEVES THE DESIRED LEVEL OF MICROORGANISM KILL OR INACTIVATION
 - SECONDARY DISINFECTION MAINTAINS A DISINFECTANT RESIDUAL IN THE FINISHED WATER THAT PREVENTS THE REGROWTH OF MICROORGANISMS INSIDE THE WATER MAINS.

WHY SWITCH DISINFECTION METHODS

- DISINFECTION BYPRODUCTS (DBP'S)
 - TRIHALOMETHANES (THMS) AND HALOACETIC ACIDS (HAAS)
 - FORMED WHEN CHLORINE REACTS WITH ORGANIC AND INORGANIC COMPOUNDS IN THE WATER
 - SUSPECTED CARCINOGENS
- SAFE DRINKING WATER ACT (SDWA)
 - LOWERED DBP LIMITS FROM 100 MICROGRAM PER LITER FOR THMS
 - NEW LIMITS
 - 80 MICROGRAMS PER LITER FOR THMS
 - 60 MICROGRAMS PER LITER FOR HAAS

Our system must comply with the new rule by the fall of 2015
Chloramines historically are a cost effective solution

HISTORY OF CHLORAMINATION

- Was common in the 1920's – 1940's
- Used in Ottawa, Ontario in 1916
- Used in Denver, CO in 1917
- Used in Greenville, TN in 1926
- Growth in popularity 1929 – 1939
- Free Residual Breakpoint Concept discovered in 1939
- Use of Chloramination decreased during WWII – demand increases for ammonia



HISTORY OF CHLORAMINATION

EXPERIENCED UTILITIES

- ST. LOUIS – 1934
- BOSTON – 1944
- INDIANAPOLIS – 1954
- DALLAS – 1959
- PHILADELPHIA – 1969
- HOUSTON – 1982
- MILWAUKEE - 1962



NORTH CAROLINA UTILITIES USING CHLORAMINES

GREENVILLE
RALEIGH
DURHAM
OWASA
GOLDSBORO
ROCKY MOUNT
CARY
HILLSBOROUGH

FAYETTEVILLE
ASHEBORO
FORT BRAGG
SANFORD
CREEDMOOR
JOHNSTON COUNTY
CHATHAM
PITTSBORO

HIGH POINT
GREENSBORO
REIDSVILLE
ARCHDALE
JAMESTOWN
RANDLEMAN
BURLINGTON
PIEDMONT TRIAD REGIONAL
WATER AUTHORITY

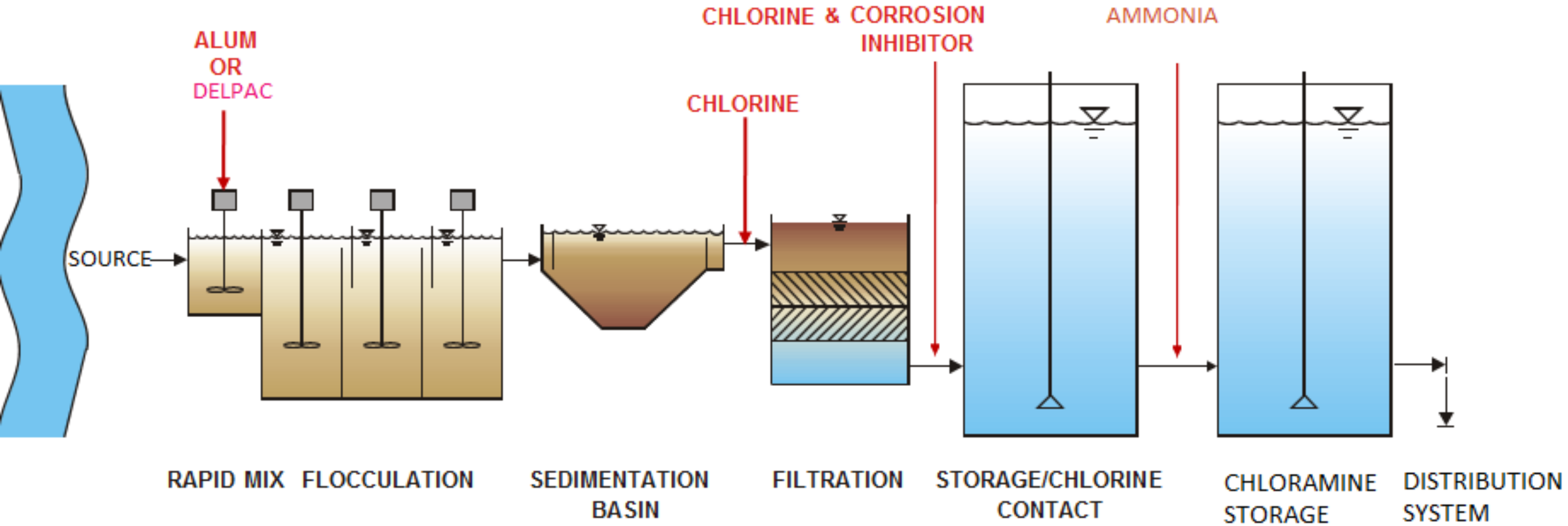
WHY CHLORAMINES?

- POPULARITY INCREASING NOW WITH CONCERNS OF CONTROLLING DISINFECTION BYPRODUCTS FORMATION
- IN 2013 THE CITY OF EDEN HIRED HAZEN AND SAWYER, ENVIRONMENTAL ENGINEERS AND SCIENTIST, TO INVESTIGATE OPTIONS THAT INCLUDED ENHANCED COAGULATION, CHLORAMINATION, MAGNETIC ION EXCHANGE RESIN, GRANULAR ACTIVATED CARBON, POST-FILTER ANION EXCHANGE AND ALTERNATE WATER SOURCES
- THE CITY OF EDEN CHOSE CHLORAMINATION BECAUSE IT WAS THE MOST COST EFFECTIVE SOLUTION
- PERSISTENT DISINFECTANT – MAINTAINS RESIDUAL IN THE DISTRIBUTION SYSTEM LONGER THAN CHLORINE

WHAT ARE CHLORAMINES?

CHLORAMINES ARE DISINFECTANTS USED TO TREAT DRINKING WATER. CHLORAMINES ARE MOST COMMONLY FORMED WHEN AMMONIA IS ADDED TO CHLORINE TO TREAT DRINKING WATER. THE TYPICAL PURPOSE OF CHLORAMINES IS TO PROVIDE LONGER-LASTING WATER TREATMENT AS THE WATER MOVES THROUGH PIPES TO CONSUMERS. THIS TYPE OF DISINFECTION IS KNOWN AS SECONDARY DISINFECTION.

WATER PLANT SCHEMATIC



ADVANTAGES

- DBP FORMATION SLOWS DRASTICALLY WHEN FREE CHLORINE COMBINES WITH AMMONIA TO FORM CHLORAMINES (FAST REACTION)
- MAINTAINS RESIDUAL IN THE DISTRIBUTION SYSTEM LONGER THAN CHLORINE
- TASTE AND ODOR IMPROVEMENT OVER FREE CHLORINE WHEN PROCESS IS PROPERLY CONTROLLED
- RECENT RESEARCH INDICATES MORE EFFECTIVE ON *LEGIONELLA*
- FAVORABLE ECONOMICALLY OVER OTHER ALTERNATIVES

IS CHLORAMINATION SAFE?

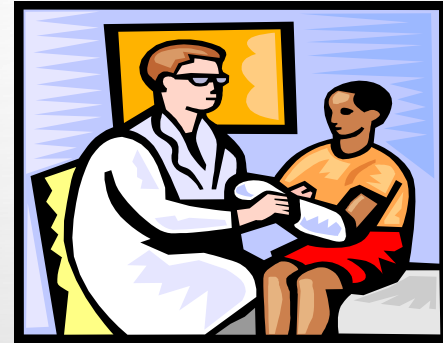
CHLORAMINATION IS SAFE FOR DRINKING, COOKING, BATHING AND OTHER DAILY WATER USES.

HOWEVER, SOME IDENTIFIED GROUPS NEED TO TAKE SPECIAL PRECAUTIONS.

- **MEDICAL AND KIDNEY DIALYSIS**
- **SPECIALIZED INDUSTRIES**
- **FISH, POND, AND AQUARIUM OWNERS**

MEDICAL

- SIMILAR TO CHLORINE, CHLORAMINES CAN HARM KIDNEY DIALYSIS PATIENTS DURING THE DIALYSIS PROCESS IF THEY ARE NOT REMOVED BEFORE ENTERING THE BLOODSTREAM
- MEDICAL GROUPS INCLUDE:
 - **MEDICAL FACILITIES**
 - **PRIVATE MEDICAL LABS**
 - **HOME EQUIPMENT DELIVERY SERVICES**
 - **SOCIAL AGENCIES**



THESE GROUPS SHOULD ALL ASSESS THE POTENTIAL IMPACT OF CHLORAMINES TO STANDARD OPERATION

SPECIALIZED INDUSTRIES

- BUSINESSES AND INDUSTRIES THAT USE WATER IN ANY PROCESS IN WHICH CHARACTERISTICS MUST BE CAREFULLY CONTROLLED NEED TO BE AWARE OF THE CHANGE IN WATER DISINFECTION
- MAY REQUIRE COMPANIES TO ADJUST OR UPGRADE THEIR CURRENT FILTRATION AND TREATMENT SYSTEM
- CONTACT EQUIPMENT SUPPLIERS, EQUIPMENT MANUFACTURERS, OR OTHER SUPPLIERS TO DETERMINE NEEDS
- SPECIALIZED INDUSTRIES INCLUDE:

MANUFACTURING PLANTS

LABORATORIES (ACADEMIC AND COMMERCIAL)

BIOTECH COMPANIES

PHOTOGRAPHY LABS

DAY CARE CENTERS



FISH, POND, AND AQUARIUM OWNERS

- BOTH CHLORINE AND AMMONIA ARE HARMFUL FOR FISH, AMPHIBIANS, AND REPTILES
- CHLORAMINES ENTER DIRECTLY INTO THE BLOODSTREAM THROUGH THE GILLS, WHICH INHIBITS THE RED BLOOD CELLS ABILITY TO CARRY OXYGEN
- CONTACT KNOWLEDGEABLE SUPPLIERS OR VETERINARIANS FOR INFORMATION ON THE NEUTRALIZATION OR REMOVAL OF CHLORAMINES



THE EXPECTED TIME FOR THE CONVERSION IS ON OR ABOUT
SEPTEMBER 1, 2015

WHAT'S NEXT?

PUBLIC INFORMATION CAMPAIGN

VISIT THE CITY OF EDEN WEBSITE FOR MORE INFORMATION

[HTTP://WWW.EDENNC.US/CHLORAMINECONVERSIONOVERVIEW.CFM](http://www.edennnc.us/chloramineconversionoverview.cfm)

The image features a light gray background with a subtle gradient. In the top-left and bottom-right corners, there are several realistic water droplets of various sizes, rendered with soft shadows and highlights to give them a three-dimensional appearance. The word "QUESTIONS?" is centered in the upper half of the image in a large, bold, black, sans-serif font.

QUESTIONS?