

Converting to Chloramines

Tom O' Connor, PE

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Outline

System Operations
Public Notification
Utilities' Experiences



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Change = Opportunity

Improve Public Relations

with honest, clear, accurate, readily-available information

OR

Lose Public Trust and Confidence

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Informational Materials

General Info

- timing, reasons for, effects of change
- basic FAQ
- contacts within utility for further information

Detailed Info

- specific issues - fish, dialysis
- contacts outside utility for further information

General

CHLORAMINES

Kentucky-
American
Water
Company
Answers
Your
Questions
About
Chloramines



KENTUCKY-AMERICAN WATER COMPANY
2300 Richmond Rd. (Across from Lexington Mall)
(606) 268-6300 (8:00 a.m.-4:30 p.m. Monday-Friday)
(606) 269-2395 (Emergency night number)

Beginning in the fall of 1988, Kentucky-American Water Company will use chloramines instead of chlorine to disinfect water.

Many cities in the United States, including Louisville and Frankfort, Kentucky, use chloramines as a disinfectant. Chloraminated water is the same as chlorinated water for all of the normal uses we have for water.

However, there are two groups of people who need to take special care with chloraminated water: **kidney dialysis patients and fish owners**. Chloramines must be removed from water used in the kidney dialysis process and from water that is used in fish tanks or ponds.

This brochure will help you understand chloramines. If you think you might be affected by this change, we urge you to seek professional assistance.

Communication Methods

- **bill stuffers**
- **Consumer Confidence Report**
- **website**
- **press releases**
- **email**
- **sign, countdown, party (opportunity)**

City Prepares for Water Supply Changes

Residents should be aware of an impending change to the post's water supply come Nov. 1. On that date officials will be changing the chemical composition of the water it provides, substituting the disinfectant chloramine for the previously used chlorine. Chloramine is a combination of ammonia and chlorine.

The new mix is in response to a new Environmental Protection Agency regulation that seeks to improve drinking water.

The new EPA regulation requires a lower concentration of disinfection byproducts in water. The new regulation, called the Disinfection Byproduct Rule, lowers the permissible concentration of a group of chemicals called trihalomethanes (THMs). The use of chloramine will allow Washington Aqueduct to significantly reduce the quantity of THMs while continuing to have effective disinfection properties and improved taste.

As a chemical, chloramine has slightly different properties than chlorine. Unlike chlorine, chloramine will not dissipate to the atmosphere when left standing, nor will it dissipate into the atmosphere through aeration. The boiling of water will not eliminate it.

Customers may have to prepare themselves for the changeover. Medical centers and hospitals providing kidney dialysis, and individuals, businesses and laboratories maintaining fish tanks will have to ensure their current pretreatment steps remove chloramine instead of just chlorine.

For dialysis centers, health department officials will confirm that proper pretreatment equipment is in place and working properly.

Fish tank and fish pond owners, including hobbyists, restaurants and fish markets -- both salt and fresh water -- will have to make sure they have appropriate equipment to neutralize chloramine. These products are readily available...

Frequently Asked Questions

The following are answers to commonly asked questions about the upcoming chloramine conversion. This is the first fact sheet of several that will be distributed over the next two years. In addition, fact sheets for specific sensitive users will be provided in the future.

1) What are chloramines?

Chloramines are chemical compounds used to disinfect drinking water and consist of chlorine and ammonia.

2) Why does water need to be disinfected?

Disinfectants are required because they prevent the spread of germs that cause diseases. Years ago, before disinfectants were used for drinking water, diseases such as cholera, typhoid fever, and dysentery were common. Drinking water disinfection has vastly improved the quality and safety of drinking water.

3) What are the benefits of converting from chlorine to chloramine?

For many reasons, chloramine is a better choice as a final disinfectant than chlorine alone. The main benefit of the conversion is that chloramine will lower the level of by-products that form when water is chlorinated. Some chlorinated water by-products are suspected carcinogens. The conversion will allow the SFPUC to stop the formation of these chemicals and meet stricter drinking water regulations that will become effective within the next several years. Additionally, because chloramine is more stable than chlorine, it lasts longer in the distribution system, providing increased protection from bacterial contamination.

4) Will the water taste differently after the conversion to chloramine?

Possibly. Some consumers may not notice the change. Consumers for other utilities report that chloramines improve the taste and odor of drinking water.

Notification

Goal: To Reach All Customers

Focus: Special Needs Groups

- kidney dialysis treatment centers
- fish—owners, pet shops, aquaculture
- schools and universities
- specialized manufacturing plants
- academic and commercial laboratories

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Kidney Dialysis

Groups

- kidney dialysis treatment centers
- doctors, hospitals, nursing homes
- health department, other state & local agencies

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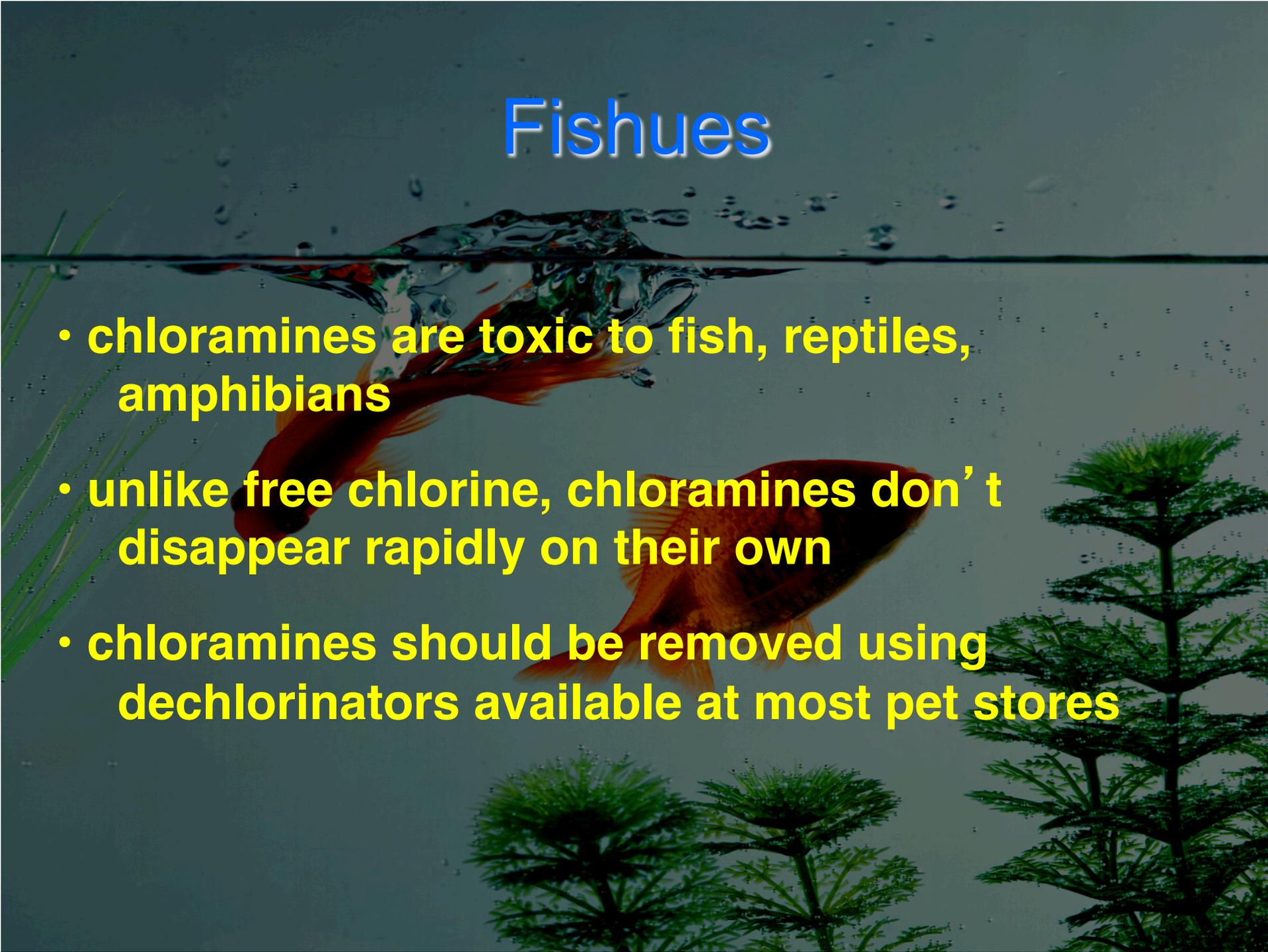
The Deal with Dialysis

- chloramines are harmful in the human bloodstream
- dialysis systems pre-treat process water to remove chlorine, but modifications may be necessary to remove chloramines (ascorbic acid, GAC adsorption)

Fishues



Fishies

A goldfish is shown swimming in an aquarium. The image is split horizontally by a water splash effect, with the top half showing the fish above the surface and the bottom half showing it below. The background is a dark, slightly blue-grey color, and there are some green artificial plants visible in the lower right corner.

- chloramines are toxic to fish, reptiles, amphibians
- unlike free chlorine, chloramines don't disappear rapidly on their own
- chloramines should be removed using dechlorinators available at most pet stores

Fishies



Pet Shops, Bait Shops, Aquarium Supply

- **Use them to disseminate information**
- **Provide them with posters, brochures**
- **They sell test kits, dechloramination supplies**

Dechloramination

Sodium Hydroxymethanesulfonate

Sodium Thiosulfate* (~2:1)

Ascorbic Acid (Vitamin C)*

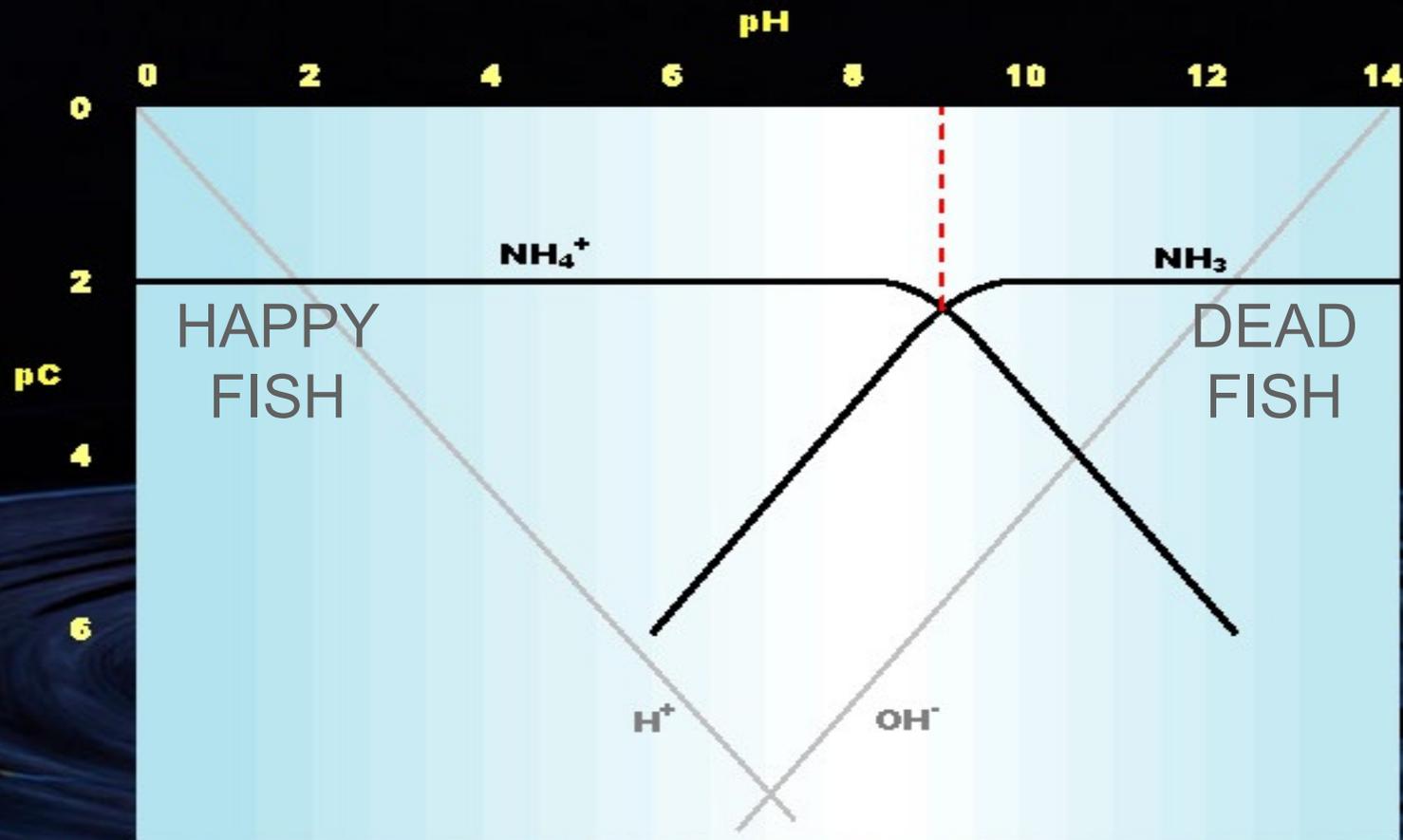
- Amquel
- Ammo-Lock
- NovAqua
- StartRight
- Aqua-Coat

Some products have additional functionalities

- detoxifying heavy metals
- increasing fish sliminess (that's a good thing if you're a fish)

***NOTE: destruction of chloramines liberates ammonia, which is also toxic to fish at high pH**

Ammonium Ion and Ammonia

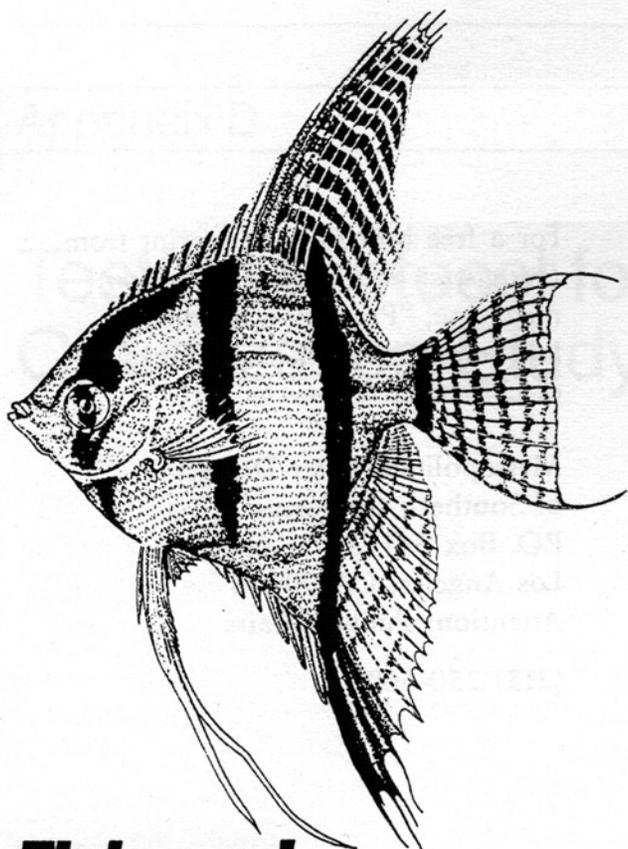


Zeolite (ion exchange)

Biofiltration (nitrification)

Sodium Hydroxymethanesulfonate (Amquel, Ammo-Lock)

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**Fish and
chloramines
don't mix**

Fish Fact Sheet

Metropolitan Water District provides more than half of the water used in Los Angeles, Ventura, Riverside, Orange, San Bernardino and San Diego counties. Before this water reaches your tap, Metropolitan adds a disinfectant to kill bacteria. Then the water is mixed with local supplies and sent on its way to you and nearly 13 million other Southern Californians.

The disinfectant Metropolitan is using is called chloramines, a combination of chlorine and ammonia.

Chloramines are toxic to fish. They must be removed from water

before it is placed into aquariums and fish ponds.

Basically, two methods can be used:

1. *Add specific chemicals which will destroy chloramines.*
2. *Use activated carbon filters to remove chloramines.*

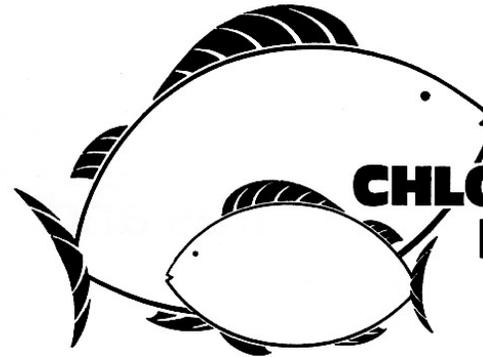
Your local pet supply dealer has more information and the necessary chemicals to remove chloramines from aquariums and fish ponds. Treatment of large volumes of water with activated carbon filters is more involved and professional assistance should be sought.

For a free brochure—a reprint from *Freshwater and Marine Aquarium* magazine, “Protecting aquarium and pond fish from the danger of chloramines”—write to:

Metropolitan Water District
of Southern California
P.O. Box 54153
Los Angeles, CA 90054
Attention: Public Affairs

(213) 250-6000

Further Fish Fact Flyers



FISH AND CHLORAMINES DON'T MIX

A Change in Lexington's Water Treatment Will Affect Your Aquarium Treatment Procedures

Beginning in the fall of 1988, Kentucky-American Water Company will use chloramines instead of chlorine to disinfect water. Chloramines are a combination of chlorine and ammonia.

Many cities, including Louisville and Frankfort, Kentucky, use chloramines as a disinfectant. Chloraminated water is no different than chlorinated water for most of the normal uses we have for water.

However, chloramines are toxic to fish, reptiles, turtles and amphibians and must be removed from water, just as chlorine is toxic and must be removed.

You may not have had to remove chlorine from your aquarium water, because it disappears rapidly on its own. This is not the case with chloramines and steps should be taken to remove chloramines.

You can use two methods to remove chloramines from water: add specific agents which will remove chloramines and ammonia, or use a high grade of granular activated carbon. In either case, you should purchase a home test kit to test your aquarium water for total chlorine and ammonia.

Dechlorinating Agents Most pet stores have sold dechlorinating agents for years and, generally, have recommended using them. The chemicals used to remove chlorine will also

remove the chlorine part of the chloramines. It may take more dechlorinating agent and it may take more time. Ammonia is released when you use dechlorinating agents to remove chloramines from the water and additional steps should be taken to also remove the ammonia.

Removal of Ammonia Ammonia can be toxic to fish, although all fish produce some ammonia as a natural by-product. Commercial products are available at pet supply stores to remove excess ammonia. Also, biological filters, natural zeolites and pH control methods are effective in reducing the toxic effects of ammonia. Ammonia removal is particularly important in water with a high pH, because at a higher pH, ammonia is more toxic to fish. Kentucky-American's water is in the 7.8-8.2 pH range, which is considered moderately high.

Activated Carbon Filters Chloramines can also be removed by using a high grade of granular activated carbon. It is important that you allow the appropriate amount of contact time for chloramine removal using this method. Treatment of large volumes of water with activated carbon filters is very involved and you should seek professional assistance.

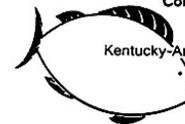
Home Test Kits It is essential that you test the water in your aquarium or fish pond to be sure the chloramines and ammonia have been reduced to acceptable levels. Home test kits are available at most pet stores.

Remember, you can use two methods to remove chloramines from water:

1. Add specific agents which will remove chloramines and ammonia.
2. Use a high grade of granular activated carbon to remove chloramines.

Contact your pet store for home test kits and other supplies.

For additional information on chloramines, contact Kentucky-American Water Company's Water Quality Department at 268-6348



2300 Richmond Road
Lexington, KY 40502

Converted to Chloramine in 1998

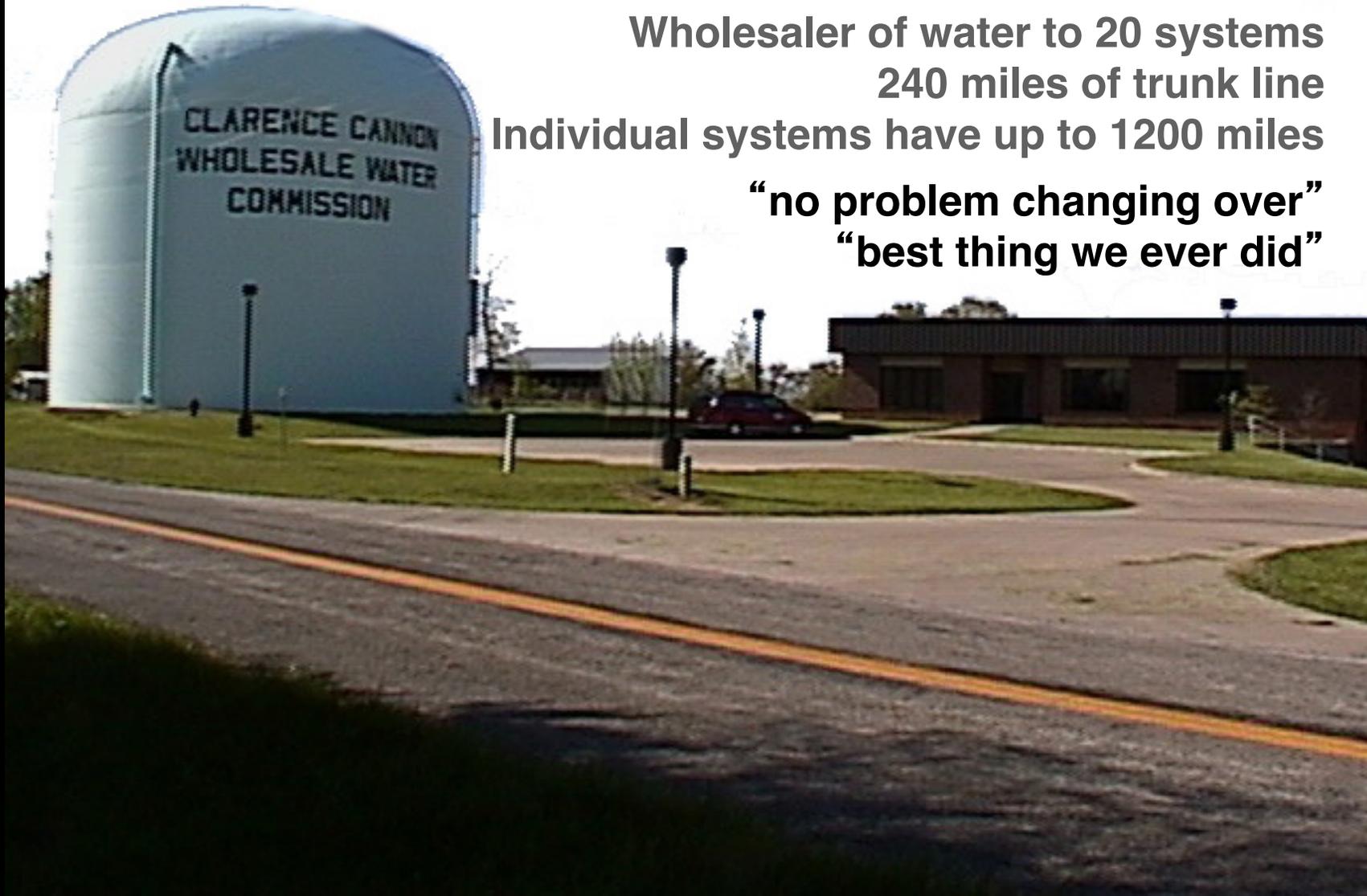
Wholesaler of water to 20 systems

240 miles of trunk line

Individual systems have up to 1200 miles

“no problem changing over”

“best thing we ever did”



System Preparation

One-and-a-half-year distribution system pre-implementation monitoring program prior to switch to chloramine

- Free and Total Chlorine
- Dissolved Oxygen
- Ammonium Ion
- Threshold Odor Number
- pH
- HPC
- Nitrite
- Temperature
- Total Coliform
- Nitrate

Continued with post-implementation monitoring program after the switch to chloramine

Chloramination Protocol

- **Anhydrous Ammonia**
 - tough to store aqueous ammonia, particularly at higher temps
- **Ammonia is added after 0.3 MG clearwell to meet CT reqts**
 - 40 μg TTHM/l, 20 μg HAA/l
- **Chlorine to ammonia ratio between 4:1 and 5:1**
- **Twin-tank ion exchange system—zero hardness is key**
- **Plant Effluent: 3.0 mg chloramine/l, no free ammonia**
- **Distribution System: >2.0 mg chloramine/l, 45 μg TTHM/l**
- **Free chlorine for three weeks in October**

Public Notification Efforts

- Intense Training—Operators, Clerks
- No dialysis clinics in service area
- “Certified mailing” to nursing homes, doctors’ offices
- Aquaculture = Bait Shops



Effects of Changeover

- More persistent disinfectant residual, lower DBP

TYPICAL VALUES	CHLORINE	CHLORAMINE
TTHM	130	45
HAA	110	20
chlorine/-amine	0	2

- Systems with chlorine booster stations discontinued their use
- Extensive distribution monitoring revealed no adverse effects

Public Response

- **Fewer Taste and Odor Complaints**
- **Two or Three Calls about Dead Fish**

Did you receive notification?

Did you read it?

Did you remove the chloramine?

