



DEPARTMENT OF HEALTH
AND HOSPITALS
Public Health

Chloramination

SAFE DRINKING WATER PROGRAM ENGINEERING SERVICES

<http://new.dhh.louisiana.gov/index.cfm/page/549/n/281>

To Report a Water issue: Safe.Water@LA.GOV

By:

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Chloramines

- Chloramines are:
 - used by roughly 52 water systems in the State serving a population of 1,168,939
 - formed by injecting Chlorine and Ammonia at the proper weight ratio (typical 5:1 for $\text{Cl}_2:\text{NH}_3\text{-N}$)
 - weaker but more stable than chlorine
 - used to help reduce regulated disinfection byproducts (TTHM and HAA5)
- Systems wanting to start using chloramines:
 - Require DHH approval (any change in disinfection practices require DHH approval)
 - Require special public notification due to harmful effects on aquaculture and dialysis facilities



Chloramine Requirements

- Maximum Residual Disinfectant Level (MRDL) is 4.0 mg/L (as Cl₂) in the distribution system
- Minimum Residuals are:
 - 0.4 mg/L total chlorine leaving the plant
 - Detectable (0.2 mg/L) in the distribution system
- Daily disinfectant residual monitoring required at entry point to the distribution system
- Monthly disinfectant residual monitoring required at each TCR sample site and during the TCR bacteriological sample collection
- Failure to monitor the disinfectant residual during TCR monitoring is a monitoring violation and requires public notification



Chloramine Concerns

- Chloramine byproducts are not regulated (*i.e.*, nitrosamines, iodoacids), but some are considered more harmful than the regulated byproducts.
 - Nitrosamines - are formed from nitrite reacting with amines and can cause cancer in laboratory animals. They are found in food products (nitrates added as preservative) but levels have been reduced due to regulation.
 - Six were monitored in UCMR2 (2008-2010); five are being researched for regulation.
 - N-nitrosodimethylamine (NDMA): California established a Public Health Goal at 0.003 ug/L (based 10^{-6} cancer risk). Canada proposed a Max Acceptable Concentration at 0.04 ug/L (based 10^{-5} cancer risk)



Chloramine Concerns

- Iodoacids – are formed when chloraminating source water containing iodide. “Some researchers consider them to be potentially the most toxic group of water treatment contaminants”. But due too lack of occurrence data, EPA has not formed a decision on them.
- Improper ratios:
 - Excess chlorine can cause taste and odor problems
 - Excess ammonia can lead to nitrification and increased nitrite levels
- Also, water chemistry changes (*e.g.*, pH) can affect pipe corrosion causing increased levels of lead and copper



Chloramination Recommendations

- Systems should have an approved Chloramine Operational Plan that includes:
 - The chlorine to ammonia ratio
 - Operational targets:
 - free ammonia level leaving the plant; recommended less than 0.10 mg/L; preferably <0.05 mg/L
 - chloramine residual leaving the plant and in the distribution system; recommended 2.0-3.0 mg/L and at least 1.5 mg/L, respectively
 - Procedures for chemical adjustment, monitoring and review of data
 - The monitoring equipment/test kits and/or lab procedures that are approved/acceptable by EPA/DHH



Chloramination Recommendations

- Systems should monitor the following:
 - Before and after feed changes, monitor process control parameters (pH, temperature, free and total chlorine, free ammonia, and monochloramine)
 - Monitor at least weekly for free ammonia, chloramine residual and monochloramine leaving the plant.
 - Increase monitoring and take corrective action if free ammonia exceeds target.
 - Monitor at least monthly for chloramine residual, free ammonia, HPC and/or Nitrite at and during the TCR bacteriological (bacti) sampling and at storage facilities and low-flow pipes.



Note!

"The production and distribution of disinfected water was a profound public health triumph of the twentieth century that significantly reduced infections by waterborne microbial pathogens."

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QUESTIONS?

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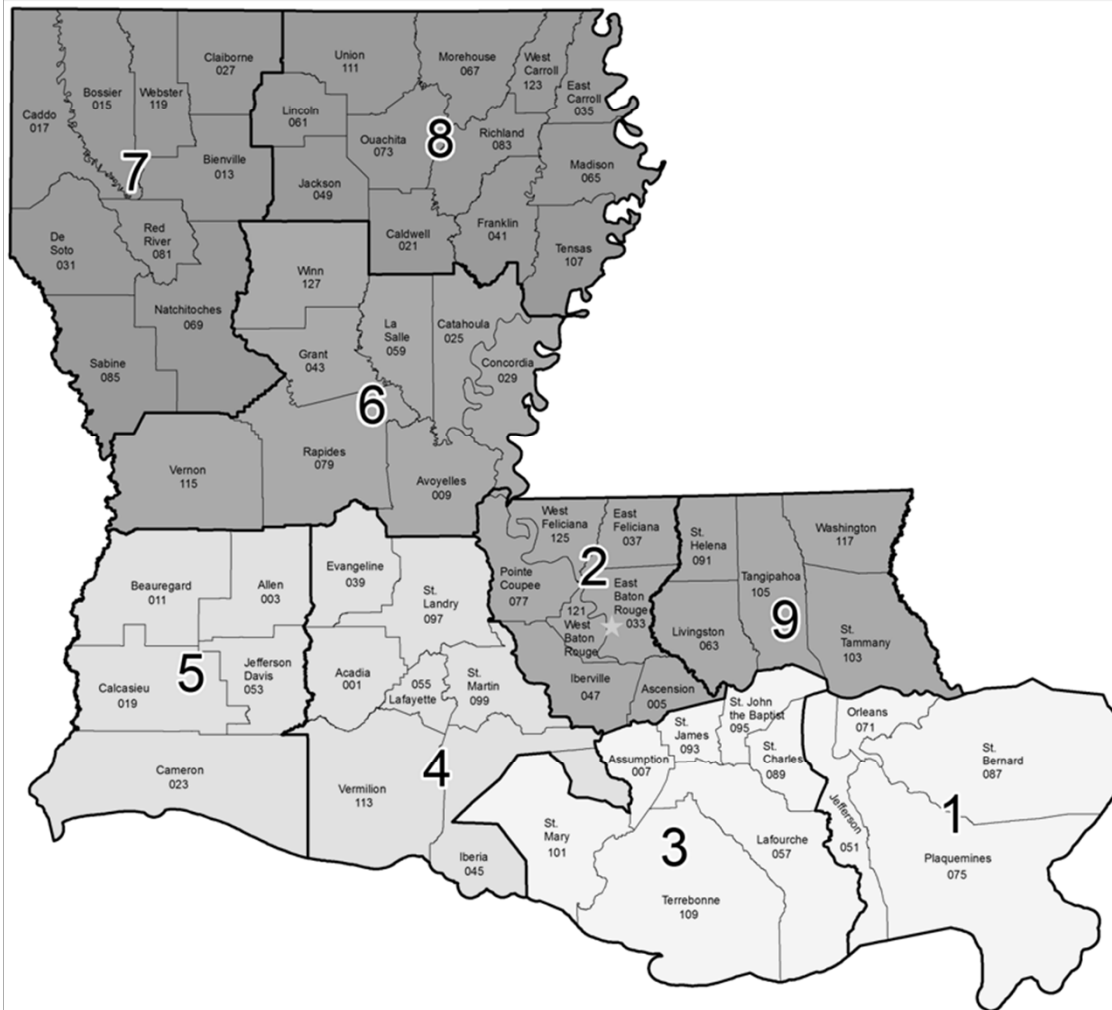
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