Emergency Disinfection Rule
Safe Drinking Water Program

DEPARTMENT OF HEALTH
AND HOSPITALS

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ACT 573 (SB 75) of 2014 Leg. Session

§4.15. Minimum disinfectant residual level of free or total chlorine throughout public water systems; rules and regulations; reporting

A. The Department of Health and Hospitals, office of public health, shall promulgate rules and regulations pursuant to the Administrative Procedure Act that require a public water system to maintain a minimum disinfectant level of free or total chlorine in the water being delivered to the distribution system, in finished water storage tanks, and in all points of the distribution. Such rules and regulations shall not specify a minimum disinfectant level of less than 0.1 parts per million. This Section shall apply to any water system that provides water for residential consumption and use. However, the provisions of this Section shall not apply to any private water system that supplies water to three or less residences or that is used primarily for agricultural operations as defined in R.S. 3:3602(5).

Background

- In 2011, two people died of Primary Amebic Meningoencephalitis (PAM) caused by *Naegleria fowleri (*brain-eating amoeba) in DeSoto Parish and St. Bernard Parish. (Both cases involved the use of a netti-pot)
- In 2013, there was second death in St. Bernard Parish (4-year old boy) caused by PAM and confirmed to be *Naegleria fowleri* (*Nf*) infection.
- Testing conducted in 2013 by DHH/CDC in both St. Bernard and DeSoto found this amoeba in the water supply.
- Both systems use conventional treatment and chloramine disinfection to treat surface water. Common issue – low to no chlorine residuals in areas where *Nf* was detected.
- PAM/*Naegleria fowleri* infection is rare and the only other documented cases associated with drinking water are Arizona (unchlorinated ground water) and Australia (chlorinated unfiltered surface water). New info: Karachi 4 *Nf* cases in 2013.

Arizona Experience with *Naegleria fowleri*, 2002

- Peoria – 2 deaths caused by PAM-*Naegleria fowleri* (*Nf)* in 2002
- Water system investigation - water samples tested positive for *Nf* from the water system's well water and storage tank and from a refrigerator filter
- Boil water order issued and emergency connection made to another water supply
- 2004 Study – sampled 14 surface waters and 58 PWS wells
  - 8.6% of the wells and 1 surface water positive for *Nf*
- 2006 Study – 188 well samples
  - 16% of the samples and 8.3% of the wells positive for *Nf*
  - no statistical correlation between *Nf* and other parameters (temp, pH, conductance, turbidity, depth to groundwater, or HPC)
- Results from a study by Biyela et al (2012) support that biofilms can play a significant role in harboring *Nf* if it finds its way across the treatment barrier or is introduced to a distribution system downstream of treatment processes.

Australia Experience with *Naegleria fowleri*

- Two States - Southern and Western Australia had several deaths caused by PAM/*Naegleria fowleri (Nf)* associated with drinking water
- South Australia:
  - Drinking water was mostly from chlorinated unfiltered surface water
  - 13 cases of PAM (1972 - 81) occurred mostly in hotter weather >37^{o}C
  - Trouble maintaining chlorine residual in long (300^{+} miles) above-ground pipelines with water temperatures reaching 49^{o}C (120^{o}F)
  - Increased sampling, testing, disinfection and public awareness
  - Chloramination introduced in 1983 with minimum residual of 1 mg/L
    - Within 18 month period – *Nf* detections fell from 5.7% to 0.2%
  - Filtration introduced in 1986
  - Last *Nf* detection in 1998 in storage tank sludge
  - Source water (River), storage tanks and customers taps are sampled if residual < 1 mg/L
  - *Nf* only detected in the water supply system, but not detected in the source

Australia Experience with *Naegleria fowleri*

- Western Australia:
  - Drinking water is from surface and groundwater sources; *Nf* has been found in both.
  - Four recorded PAM cases in 1985
  - Sources with *Nf* detections where water temperature is consistently >25^{o}C for 4 months are classified as high risk for *Nf* contamination
  - Conduct routine monitoring for thermophilic amoeba during warm water temperature (<20^{o}C) months
  - Employed operational control and management of *Nf* in drinking water:
    - Water treatment to reduce chlorine demand and improve residuals
    - Disinfectant contact time > 30 mg/L-min and DS residual target of 0.5 mg/L
    - Continuous on-line chlorine, pH and flow meters with alarms for high risk facilities
    - Storage tank cleaning and operation to reduce sediment and water age
    - “Water Safety Plans” to specify sample points, residual targets and corrective actions
  - Established a chlorinator design standard to have residual trim, flow pace control and auto-shut off
  - *Nf* detections dropped from >2.5% in 1997 to 0.5% in 2001

Emergency Rule

- In response to the 3 PAM deaths and the *Naegleria fowleri* amoeba detections in two public water systems in LA, LDHH issued an Emergency Rule (ER) on November 6, 2013.
  - The intent is to ensure that all points in the distribution system maintain a disinfectant residual concentration to control the *Naegleria fowleri* amoeba and to ensure adequate monitoring by public water systems for total coliform and disinfectant residual concentration.
  - Effective November 6, 2013, 25% more monitoring required for disinfectant residual concentration (chlorine or chloramine).
  - Effective February 1, 2014, 50% more sites required for total coliform and chlorine monitoring and the new minimum chlorine level is:
    - 0.5 mg/l of free chlorine; or
    - 0.5 mg/l of chloramine residual (measured as total chlorine) for systems that feed ammonia.

What does the Emergency Rule require?

- All systems were required to increase residual monitoring by 25% of what is required by Total Coliform Rule, Surface Water Treatment Rule & Disinfectants/Disinfection Byproduct Rule. These additional chlorine residual (ACR) samples must be taken at sites in extremities or low flow areas in the distribution system.
- All systems are required to have TCR sites equal to at least 1.5 times the required number of total coliform samples (see next slide for examples).
- Monitoring Requirements:

Sample Location/Site	Sample for	Monitoring Frequency	Increased Monitoring
Point of Entry (POE) – water delivered to the distribution	Chlorine	Continuously*/Daily	n/a
Total Coliform Rule (TCR) – distribution system lines	Total Coliform and Chlorine	Monthly - at regular intervals	Daily if site < 0.5 mg/L
Additional Chlorine Residual (ACR) – distribution system lines	Chlorine	Monthly – at regular intervals	Daily if site < 0.5 mg/L
Maximum Residence time (MRT) – oldest water in distribution system	Chlorine	Daily	n/a
	Total Coliform	Monthly	n/a

* Surface water systems serving 3,300 or greater shall monitor continuously for chlorine.

What does the Emergency Rule require?

Examples of required sites based on the ER and Total Coliform Rule:

System Population Served	Monthly Routine TCR samples[1]	Number of sites required for TCR & chlorine (1.5xTCR samples)[2]	Additional sites for Chlorine monitoring (0.25xTCR samples)[2]	Total number of sites[3]
25 - 1,000[4]	1	2	1	5[3]
1,001 - 2,500	2	3	1	5[3]
2,501 - 3,300	3	5	1	6
4,101 - 4,900	5	8	2	10
8,501 - 12,900	10	15	3	18
25,001 – 33,000	30	45	8	53
50,001 – 59,000	60	90	15	105
96,001 - 130,000	100	150	25	175
220,001 – 320,000	150	225	38	263

[1] Minimum number of samples required per month per Total Coliform Rule (LAC 51:XII.903.C).
[2] Round any mixed (fractional) number product up to the next whole number.
[3] The minimum number of sites required for TCR is five (5).
[4] Non-community ground water system serving 1,000 or less individuals may monitor quarterly.

What does the Emergency Rule require?

- All disinfecting systems* must achieve and maintain the following minimum chlorine levels starting February 1, 2014 at the POE, in finished water storage tanks and at all points in the distribution system:
  - 0.5 mg/l of free chlorine (POE may be higher based on pH); or
  - 0.5 mg/l of chloramine residual (measured as total chlorine) for systems that feed ammonia.

  *Unless system was granted additional time for significant infrastructure improvements.

  *Unless industrial system holding a disinfection waiver opted to notify users of the risks on a quarterly basis in lieu of adding disinfection.
- Chlorine residuals collected at total coliform sample sites shall be reported on the Lab-8 forms or other approved form (for systems that analyzes their own TCR samples).

What does the Emergency Rule require?

- TCR/ACR Monitoring Sites must be representative of the distribution system and not clustered together.
  - Mandatory sites for TCR compliance monitoring include:
    1. Maximum Residence Time (MRT) - is where the water has been in the system the longest. Typically this is the furthest point in the distribution system.
    2. Midpoint – midway between the MRT and POE.
    3. Opposite from the MRT – other long distance site.
    4. Midpoint of site 3 and POE.
  - Prohibited sites for TCR compliance monitoring:
    1. At or near the POE
    2. At Storage tanks
- Routine TCR samples shall not be taken at the same site more than once per month.
- Systems must rotate through all approved TCR sample sites.
- The additional chlorine residual (ACR) samples must be taken at sites in extremities or low flow areas in the distribution system.

What else does the Emergency Rule require?

- All systems must submit and maintain a monitoring plan with all total coliform and chlorine residual sample sites (POE, TCR, ACR, and MRT) by January 1, 2014.
  - The monitoring plan shall be entered and submitted via the Monitoring Plan Portal (MPP) - https://www.ldhh-mpp.org/ with valid 911 street addresses or latitude/longitude coordinates for each sample site.
- Systems (GW and SW) that chloraminate (chlorine with ammonia addition) must develop and submit a Nitrification Control Plan by March 1, 2014.
- Chlorine residuals must be measured using EPA-approved analytical methods. New analytical methods added to Table 1 of LAC 51:XII.1105.C. But this means that color wheels are no longer acceptable for measuring the disinfectant residual concentration (free or total chlorine).
- Clarifies that records of chemical tests/measurements shall be kept and maintained as prescribed by federal regulations (*i.e.*, 10 years for chlorine residuals).

Frequently Asked Questions:

- How long will the 0.5 mg/L be effective?

DHH plans to make the 0.5 mg/l permanent via regular rulemaking.

- If I collect TCR samples quarterly, do I collect ACR samples monthly or quarterly?

In this case, quarterly. ACRs are collected on the TCR sample frequency.

- Where are the ACR recorded and stored?

ACR should be recorded on the DHH Report #3 and stored at the water system for at least 10 years.

- Do I send in the ACRs along with my TCR samples?

Only surface water systems are required to report ACRs in their Monthly Operating Reports.

- What do I do if my chlorine residual is below 0.5 mg/L? Do I notify DHH?

You take action to increase the residual and monitor daily until the site reaches 0.5 mg/L or greater. DHH notification is only required for surface water systems that drop below the 0.5 mg/L at the POE.

Frequently Asked Questions:

- Can I release a boil water advisory if my TC sample is negative but the residual is below 0.5 mg/L?

No, you must have a clear sample and a residual of 0.5 mg/L or greater to release the boil water advisory. Total coliform samples for boil water advisories should not be taken until the residuals are 0.5 mg/l or greater.

- My source water has naturally occurring ammonia. Can I continue to test for Total Chlorine?

Only systems that have been permitted to use Chloramines (chlorine with ammonia addition) can measure total chlorine for compliance with the minimum disinfectant residual (0.5 mg/L). Systems that have naturally occurring ammonia need to evaluate the disinfection performance and submit a permit request for chloramines or measure free chlorine for compliance.

- My system is having trouble maintaining the 0.5 mg/l throughout the system. What can I do?

Depending on the type of disinfectant, systems should evaluate: chlorinator for consistent adequate flow-paced dosing, flushing/scouring low residual areas, storage tank turnover and cleaning, sediment removal/reduction, booster chlorination and check for nitrification if using chloramines.

Questions

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Engineering Services website: www.dhh.la.gov/engineering
Safe Drinking Water Program website: www.dhh.la.gov/SafeDrinkingWater
Drinking Water Watch website: www.dhh.la.gov/drinkingwaterwatch

DHH contracts in place to provide one-on-one technical assistance for implementing the Emergency Rule:

- Louisiana Rural Water Association
- Thornton, Musso & Bellemin

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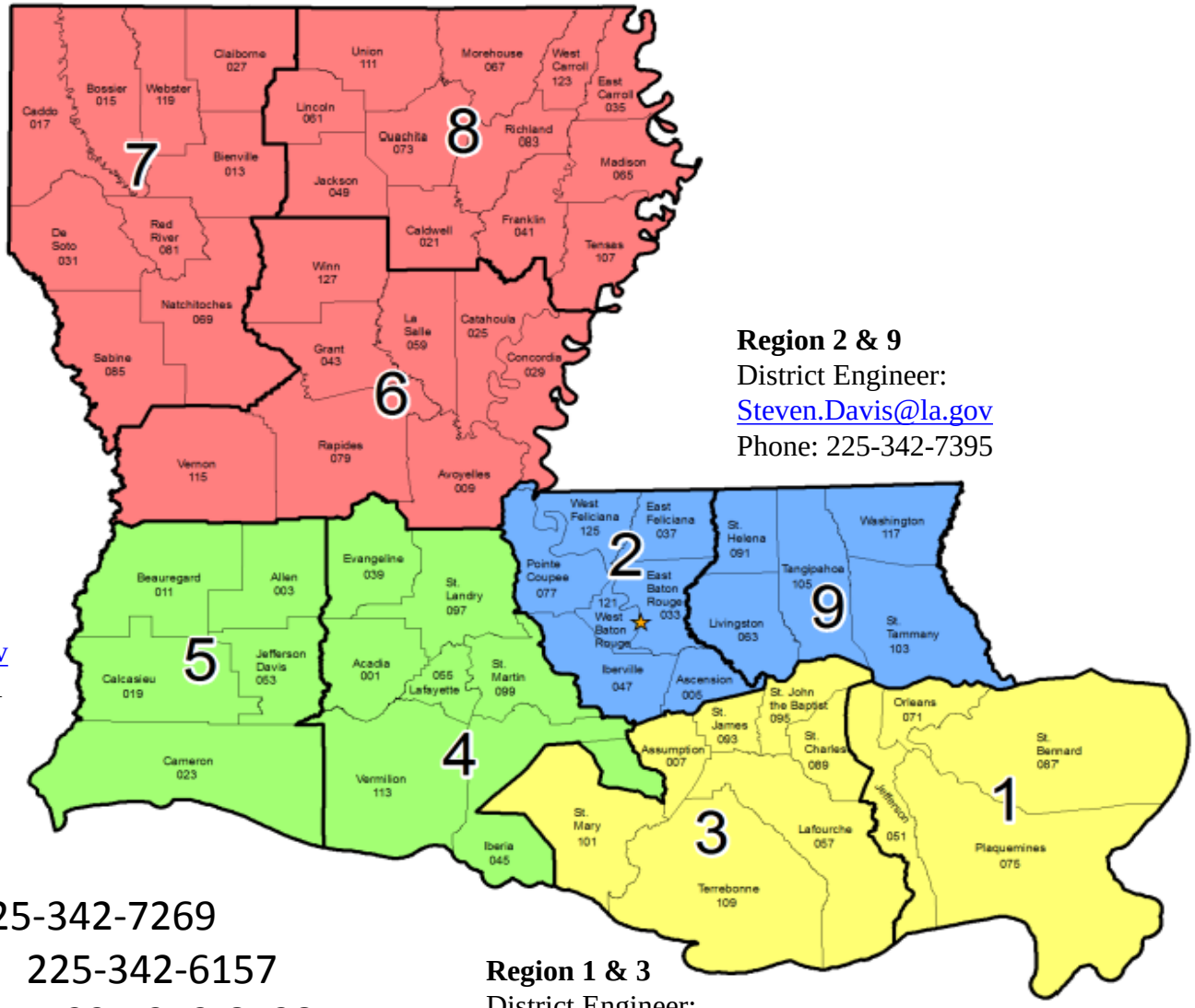

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