NEHA BIA Webinar Series Presents:

Boil Water What?!?
When Good Water Goes Bad

NEHA Business & Industry Affiliate
www.nehabia.org
The goal of NEHA BIA is to maintain and improve the standards of performance in environmental health by fostering and encouraging a mutual exchange of knowledge and experiences; education, research, and the dissemination of information between practitioners in the profession and allied businesses and industries. Members of the BIA aspire to help advance the state of the environmental health profession, and through it, improve the health of our communities.
Boil Water Notices in the U.S.,
2012-2014

Kimberly Redden, MPH
Foundation Relations & Research Manager
The Water Quality Research Foundation (WQRF) was formed in 1949 to serve on behalf of the Water Quality Association (WQA) as a universally recognized, independent research organization.

The long-term goal of WQRF is to conduct and fund scientific research on subjects relating to the water quality improvement industry.

Research agenda: final barrier, emerging contaminants, sustainability, regulatory and international affairs, and public awareness.
What We’ll Cover

- Background
- Purpose of study
- Study findings
- Key takeaways
- Resources
- Q&A
Relevancy to EH Professionals

- **Community Water System (CWS):** A public water system that supplies water to the same population year-round.

- **Non-Transient Non-Community Water System (NTNCWS):** A public water system that regularly supplies water to at least 25 of the same people at least six months per year.
  - Examples: *schools, daycares, office buildings, and hospitals* which have their own water systems.

- **Transient Non-Community Water System (TNCWS):** A public water system that provides water in a place where people do not remain for long periods of time.
  - Examples: gas station, *campground, restaurants*

Source: U.S. EPA, 2017
<table>
<thead>
<tr>
<th>Contaminant</th>
<th>MCLG</th>
<th>MCL</th>
<th>Health effects</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cryptosporidium</td>
<td>zero</td>
<td>TT³</td>
<td>Gastrointestinal illness (such as diarrhea, vomiting, and cramps)</td>
<td>Human and animal fecal waste</td>
</tr>
<tr>
<td>Giardia lamblia</td>
<td>zero</td>
<td>TT³</td>
<td>Gastrointestinal illness (such as diarrhea, vomiting, and cramps)</td>
<td>Human and animal fecal waste</td>
</tr>
<tr>
<td>Heterotrophic plate count (HPC)</td>
<td>n/a</td>
<td>TT³</td>
<td>HPC has no health effects; it is an analytic method used to measure the variety of bacteria that are common in water. The lower the concentration of bacteria in drinking water, the better maintained the water system is.</td>
<td>HPC measures a range of bacteria that are naturally present in the environment</td>
</tr>
<tr>
<td>Legionella</td>
<td>zero</td>
<td>TT³</td>
<td>Legionnaire's Disease, a type of pneumonia</td>
<td>Found naturally in water; multiplies in heating systems</td>
</tr>
<tr>
<td>Total Coliforms (including fecal coliform and E. Coli) • Quick reference guide</td>
<td>zero</td>
<td>5.0%⁴</td>
<td>Not a health threat in itself; it is used to indicate whether other potentially harmful bacteria may be present</td>
<td>Coliforms are naturally present in the environment; as well as feces; fecal coliforms and E. coli only come from human and animal fecal waste.</td>
</tr>
<tr>
<td>Turbidity</td>
<td>n/a</td>
<td>TT³</td>
<td>Turbidity is a measure of the cloudiness of water. It is used to indicate water quality and filtration effectiveness (such as whether disease-causing organisms are present). Higher turbidity levels are often associated with higher levels of disease-causing microorganisms such as viruses, parasites and some bacteria. These organisms can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.</td>
<td>Soil runoff</td>
</tr>
<tr>
<td>Viruses (enteric)</td>
<td>zero</td>
<td>TT³</td>
<td>Gastrointestinal illness (such as diarrhea, vomiting, and cramps)</td>
<td>Human and animal fecal waste</td>
</tr>
</tbody>
</table>

Source: US EPA, 2017
Total Coliform & *E. coli*

- **Total coliforms**
  - Indicator organisms are used to determine presence of absence of a group of pathogenic bacteria
  - Method is quick, accurate and cost-effective

- **E. coli**
  - Fecal coliforms, such as *E. coli*, grow inside animal and human bodies

Source: US EPA, 2012
Total Coliform Rule

- A PWS will receive an MCL violation when there is any combination of an *E. coli* positive (EC+) sample result with a routine/repeat Total Coliform (TC+) or EC+ sample result:

<table>
<thead>
<tr>
<th>Routine</th>
<th>Repeat</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC+</td>
<td>TC+</td>
</tr>
<tr>
<td>EC+</td>
<td>Any missing sample</td>
</tr>
<tr>
<td>EC+</td>
<td>EC+</td>
</tr>
<tr>
<td>TC+</td>
<td>EC+</td>
</tr>
<tr>
<td>TC+</td>
<td>TC+ (but no <em>E. coli</em> analysis)</td>
</tr>
</tbody>
</table>


Public Notification
A boil water notice (BWN) is given by health authorities or water utilities instructing consumers to boil water (and then cool) before using it for cooking, drinking, or any consumption.

- Boil water “advisory” or “notice” are terms used interchangeably
- “Boil water order” is the directive from the health dept. to the water utility requiring public notification

“Do not drink”/ “do not use”

- Non-microbiological contaminants, such as inorganics or other contaminants where boiling could actually concentrate them.
WQRF BWN Study Purpose

- Comprehensive database of Boil Water Notices (BWN) and Do Not Drink/Use using state primacy agency reports and a validated news media search method
- Can news media be a good source of data collection?
  - Yes; validated “boil water”, “limited use of water”, and “do not drink water” were terms most successful in news media searches
- Analysis of the frequency, cause, and location of the BWN’s

When?
Why?
Where?

Source: Reynolds, et al., 2015
Findings

- **20,978** boil water notices from 2012-2014
- 33 state agencies provided data
- 17 states collected through news media search

Source: Reynolds, et al., 2015
Findings

- **20,978** boil water notices from 2012-2014
- 99.5% were boil water notices
- 0.5% were do not drink notices

Source: Reynolds, et al., 2015
Findings: Causes

- 53% due to a water main break or leak (precautionary)
- 14% low pressure events (precautionary)
- **14% microbial contamination**
- 7% scheduled maintenance (precautionary)
- 12% Unknown/Other*

*Other includes: disinfection issues, mechanical issues, power loss, storms/natural disasters, water outage, inorganic contaminants, non-system water, turbidity, groundwater under the direct influence of surface water issues

Source: Reynolds, et al., 2015
Findings: Seasonal Trends

Seasonal Trends in Confirmed Microbial Causes of BWN's from 2012-2014

Source: Reynolds, et al., 2015
Results: Limitations

• Clear reporting differences state by state
  o Kentucky: 7,375
  o Tennessee: 6
  o Missouri: 1,916
  o Kansas: 113
  o There is a need to standardize the approach to document boil water notices

• Potential interpretation bias

Source: Reynolds, et al., 2015
Future Work

- Correlation with system size, location, economic stability, per capita use
- Correlation with specific extreme weather events, infrastructure age, etc.

Source: Reynolds, et al., 2015
Conclusion

• Database compiling boil water and do not drink notices from 2012-2014 was developed
• 20,944 boil water notices in 3 years
• Most notices are precautionary because there is a potential for microbiological contamination from a water main break / leak
• A seasonal trend for E. coli + was observed

Source: Reynolds, et al., 2015
Key Takeaways

• Household water treatment equipment, such as softeners, backwashing filters, etc. should be cleaned and sanitized or disinfected after a BWN is lifted per manufacturer’s instructions

• There is a time delay from when the event occurs and the time it takes to issue a BWN

• Drinking water treatment products certified for microbial reduction
• Point-of-use (POU) or point-of-entry (POE) treatment options:
  o Chlorine, chlorine dioxide, chloramines
  o Ultraviolet light
  o Ozone
  o Reverse Osmosis (RO) / Ultrafiltration (UF) membranes
  o Metals (silver or copper) - usually impregnated on another type of media
  o Distillation – appropriate for limited volumes of water
• After a BWN event, some treatment technologies may require disinfection/sanitization (i.e. RO, UF, and other medias)
3rd Party Certified Products

• BWN situations specifically involving microbiological contamination can be adequately handled by home drinking water treatment products **certified** for microbiological reduction.

• Certification standards covering microbiologicals (cyst, bacteria, virus):
  o NSF/ANSI 53 – Filtration
  o NSF/ANSI 58 – RO
  o NSF/ANSI 55 (Class A) – UV
  o NSF Protocol P231 – microbiological water purifiers
  o USEPA Purifier Guide Standard*
  o WQA ORD0901

*USEPA Purifier Guide intended to validate treatment of unknown water quality
EPA Purifier Guide Standard Test Water

Source: BioVir Laboratories, 2004
To find products certified for microbial reduction claims (bacteria, cyst, virus), visit an ANSI-accredited certification body’s website, such as:

- WQA Gold Seal ([www.wqa.org/Find-Products](http://www.wqa.org/Find-Products))
- CSA Group ([www.csagroup.org](http://www.csagroup.org))
- IAPMO ([www.iapmo.org](http://www.iapmo.org))
- UL ([www.ul.com](http://www.ul.com))
Dr. Kelly A. Reynolds is a Professor at the University of Arizona College of Public Health. She holds a Master of Science Degree in public health (MSPH) from the University of South Florida and a Doctorate in Environmental Science from the University of Arizona.


Peer reviewers: WQA BWN Study Task Force, ASDWA, WQA Technical Affairs
Resources

- Centers for Disease Control and Prevention (CDC) BWN Toolbox
- World Health Organization
- Study Executive Summary (www.wqrf.org/)
Questions?

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Kredden@wqrf.org
630-929-2512

Thank you,
NEHA!
COLORADO RIVER FLOODING AND AUSTIN WATER BOIL WATER NOTICE

CITY OF AUSTIN - AUSTIN PUBLIC HEALTH ENVIRONMENTAL HEALTH SERVICES DIVISION

Don Hastings, Assistant Director
**Timeline**

- **Floodings**
  - 16 Oct: LCRA reported flooding on Llano River and 4 floodgates opened at Mansfield Dam. Austin Water operated Longhorn Dam floodgates. Water treatment plants operating normally.

- **Water Turbidity**
  - 20 Oct: Increased intake water turbidities begin to impact WTP Operations, resulting in reduced output capacity. Water production capability started falling behind system demand.

- **Report to EOC**
  - 21 Oct: 10:30 PM EHSD AD received call to report to EOC. Appraised of the situation. 11:30 PM EHSD AD notified the Greater Austin Restaurant Association (GARA).

- **Boil Water Notice Issued**
  - 22 Oct: 8:00 AM Press Conference by Austin Water, City and County Officials, Austin Public Health and EHSD AD. Notifications to vulnerable populations. EHSD staff called child care centers and DSHS contacted long term care facilities. 9:20 AM Email campaign sent.

- **Revised Guidelines**
  - 25 Oct: Revised boil water notice guidelines for food establishments. Policy based on small scale incident like a pipe break. Changed to reflect system-wide, large scale, unprecedented event.

- **Boil Water Notice Lifted**
  - 28 Oct: TCEQ notified Austin Water that they met all the criteria to rescind the boil water notice. 4:15 PM Press conference to announce end of boil water notice.
FLOODING OF THE COLORADO RIVER

➢ Beginning in mid-October, successive and intense storm systems in the Central Texas region drove flooding of the Colorado River watershed to historic levels.

➢ Record high levels of debris, silt and mud require frequent backwashing of filters, significantly slowing the treatment process.

➢ In spite of a slower treatment process, Austin’s four water treatment plants needed to continue producing as much potable water as possible:
  ▪ To maintain the minimum water pressure needed for fire protection;
  ▪ To avoid water line infiltration.
FLOODING OF THE COLORADO RIVER

➢ The result of this sustained rate of treating highly-silted waters was the production of potable water with a high turbidity factor.

➢ Because highly turbid water is more likely to test positive for pathogens such as bacteria, viruses and protozoa, the City of Austin issued a system-wide water boil alert.

➢ Due to worsening flood conditions, Austin water customers were advised that the water boil alert could last for one to two weeks, or perhaps longer.
AVERAGE TURBIDITY BY WATER TREATMENT PLANT AND MONTH FOR 2018

Data Source: Austin Water – Monthly Water Quality Report Summaries
EMERGENCY OPERATIONS CENTER

SUNDAY 10/21/18

➢ For the first time in Austin’s 100+ year recorded history of water operations, City leadership began planning a system-wide water boil alert.

➢ Key staff notified at 10:30 pm to report to the EOC

➢ APH staff notified the Greater Austin Restaurant Association (GARA) at 11:30 pm that night, and maintained contact several times a day throughout the event.

➢ First press conference held at 6:30 am Monday 10/22 to announce water boil alert: To ensure that water is safe, all Austin water customers are asked to boil water used for drinking, cooking, ice making or medical purposes.

➢ Customers were advised that this alert would last multiple days, and perhaps 1 - 2 weeks or longer
BOIL WATER ALERT

FOOD PREPARATION:

REQUIRED: Effective immediately, all water used for food preparation, cooking, beverages, and ice must be from approved sources of water:

- Commercially bottled water.
- Water that has been heated to a rolling boil for three minutes.
BOIL WATER ALERT

THE DEBATE: HOW LONG TO BOIL WATER?

➢ Austin Water originally advised a rolling boil for three minutes.

➢ Austin Public Health originally advised a rolling boil for two minutes.

  ▪ Centers for Disease Control: One minute
  ▪ Texas Department of State Health Services: Two minutes
  ▪ For consistency with Citywide Austin Water communications, Austin Public Health revised its advisory to three minutes on the second day of the event.
STAKEHOLDERS: TO BE NOTIFIED

➢ Food Establishments
➢ Child Care Centers
➢ Congregate Living Centers
  ▪ Long term care facilities
  ▪ Boarding Homes
  ▪ Group Homes
➢ Medical and Dental Offices
STAKEHOLDERS: HOW TO REACH?

➢ Greater Austin Restaurant Association
➢ Austin Independent Business Alliance
➢ Constant Contact emails
➢ Austin 311 operators
➢ Media/Press Conferences
➢ Social Media
➢ City Council staff
NO PATHOGENS DETECTED

Throughout the boil water notice event, continuous water testing yielded no positive samples for pathogen infiltration.
AMENDING THE REQUIREMENTS

➢ Original boil water notice guidelines for food establishments were written based on a water line break and resulting service interruption—which is nearly always associated with pathogen contamination.

➢ Established CDC-based water boil protocols for food establishments were not geared to address a long term, system-wide turbidity-based water boil notice for which pathogen testing was consistently negative.

➢ After three days of the boil water notice, Austin Water was advising customers that the water boil alert may continue for another week or longer.
AMENDING THE REQUIREMENTS

➢ Due to the burden posed by such long, indefinite water boil alert, APH decided to work with Austin food establishments to amend APH’s boil water notice guidelines for food service.

➢ Accordingly, APH drafted revised, relaxed guidelines for ware washing and handwashing and held a press conference on Thursday 10/25 to inform stakeholders and the public.
WAREWASHING:

PREFERRED: Manual ware washing and sanitizing of utensils and equipment using only approved sources of water (bottled or boiled water).

ACCEPTABLE: Commercial dishwashers providing a hot water rinse (165°F - 180°F) or a chemical sanitizing cycle may be used. Machines must be properly maintained and operating as required by Texas Food Establishment Rules. Air dry all wares after sanitizing.
HANDWASHING:

PREFERRED: Hand washing using only approved sources of water to be dispensed using a container with a spigot, followed by the donning of single use (disposable) gloves.

ACCEPTABLE: All food workers handling or preparing foods are required to wash hands (using existing tap water source) as required by the Texas Food Establishment Rules, then apply an alcohol based hand sanitizer, followed by the donning of single use (disposable) gloves. No bare hand contact with ready-to-eat foods will be allowed under this protocol.
AUSTIN PUBLIC HEALTH MID-WEEK PRESS CONFERENCE

➢ Reconciled 2 minute advisory to food establishments vs. 3 minute advisory to residents.

➢ Explained relaxed requirements for ware washing and handwashing.

➢ Thanked restaurant community for cooperation to-date; asked consumers to be vigilant and ask questions.
BOIL WATER NOTICE RESCINDED

➢ After being in effect one full week, Austin’s water boil alert was rescinded on Sunday 10/28.

➢ No pathogens exceedances occurred throughout this event. Furthermore, syndromic surveillance was conducted throughout the event for hospital visits due to gastrointestinal illness. No spikes or increases in GI were observed.

➢ As a means to conserve water, and in the absence of positive microbial sampling, Austin Water did not advise customers to flush lines at the end of this event.

➢ Nonetheless, to provide a higher margin of safety for the public, APH advised restaurants to cycle two batches of ice and to flush water lines for three-five minutes prior to resuming use of tap water.
TAKEAWAYS

➢ Don’t wait for the media to ask the right questions at the right time: be proactive in getting out the word.

➢ To ensure effective communication, need to know who does what in your partner agencies, and how to contact them 24-7.
  ▪ PIOs can do only so much…need decision makers and subject matter expertise.

➢ Need good communication tools with complete, up-to-date contacts database
  ▪ APH uses Constant Contact with email addresses harvested from permit database; and, a frequently maintained website.
TAKEAWAYS

➢ A close relationship with your stakeholders is invaluable: the Greater Austin Restaurant Association (GARA).

➢ Thanks in part to GARA’s support and APH’s extensive public information outreach, Austin’s food establishment community cooperated throughout this event.
   ▪ APH sanitarians received many questions and provided much guidance in the field, but no water boil violations were observed and no citations were issued during this event.

➢ Need protocols established in advance, addressing needed actions by all parties, not just Public/Environmental Health.
   ➢ Know your CDC and State Health Dept. guidelines and protocols.
   ➢ Communicate adopted protocols to your industry groups—they will have valuable input.

➢ Protocols cannot be one-size-fits-all. So be prepared to be flexible and use judgement, while keeping public health and safety as Priority #1.
THANK YOU!

QUESTIONS?

CONTACT:

don.hastings@austintexas.gov
Boil Water Order Response

Supporting on the ground and from Seattle

DATE
Austin Water Incident: October 2018

“Lady Bird Lake in Downtown Austin, TX, has been described lately as chocolate milk because of the large quantities of silt floating in the water after a historic flood hit the city.”

Picture Source: TANIMA/myclicks atx via Instagram

After unprecedented rain fall around the Austin market, the city’s water filtration became overwhelmed in processing the excess flood waters.

On the morning of October 22, the city notified the community the drinking water was no longer safe to consume without boil water actions. The city then pleaded with the community to reduce water use by 20% to avoid running out of water altogether.

Over the course of the next nine days, we had 63 company operated and 17 licensed stores impacted in various stages.
The Roadmap: ensure food safety and quality are top of mind

<table>
<thead>
<tr>
<th>1 Who was involved?</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Retail Quality Assurance/Food Safety</td>
</tr>
<tr>
<td>• CO Operations</td>
</tr>
<tr>
<td>• LS Operations</td>
</tr>
<tr>
<td>• Facilities</td>
</tr>
<tr>
<td>• Distribution</td>
</tr>
<tr>
<td>• Partner Resources</td>
</tr>
<tr>
<td>• Partner &amp; Asset Protection</td>
</tr>
<tr>
<td>• Store Development</td>
</tr>
<tr>
<td>• Crisis Management</td>
</tr>
<tr>
<td>• Media Relations</td>
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<tr>
<td>• Legal</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>2 Scope</th>
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<tbody>
<tr>
<td>• In any water related incident, after the team is organized on roles and responsibilities, it is imperative to understand who is impacted.</td>
</tr>
<tr>
<td>• Key learnings from Hurricane Harvey: the ability to access records to identify each store’s water source can be difficult depending on the contract. Much more easily navigated as we were supporting Austin.</td>
</tr>
<tr>
<td>• Based on water source, we were able to triage locations into the following categories;</td>
</tr>
<tr>
<td>• Full Operations</td>
</tr>
<tr>
<td>• Restricted Operations</td>
</tr>
<tr>
<td>• Planned Closed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3 Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>• To eliminate drafts, we leveraged a SharePoint Excel document to track the on-going status of each individual location.</td>
</tr>
<tr>
<td>• We created a planned cadence of calls to align actions, address needs for store partners, stores, and the community. Frequency ranged from 5x day to 2 depending on demand.</td>
</tr>
<tr>
<td>• We established our non-negotiables;</td>
</tr>
<tr>
<td>• What source will we use to clear stores and who owns that switch?</td>
</tr>
<tr>
<td>• What must happen before we resume full operations?</td>
</tr>
</tbody>
</table>
Path to All-Clear

**Restricted Ops**
Deploy additional pre-bottled product to meet partner and community needs.

Transport water as needed
Adjust hours as needed.

**Vendor Preparedness**
Stage water-filtration flush for all Restricted Ops or Planned Closed locations.

Planned routes

**Full Ops**
Additional staffing to support increased customer traffic.

Transport water to RO locations via Cambro.

**Restricted Ops**
Increase products available produced outside of the store.

NEW: Nitro!! Let there be coffee.

**All Clear**
RFS confirm BWO was lifted, trigger Facilities to engage vendor for filtration flush, & store partners prepare for Full Operations.
Creating a Water Emergency Response Plan

The worst time to create an emergency plan is during the emergency.

Current response to Boil Water or other water supply contamination incidents may be:

• Modify the operation of the store to only sell packaged food and bottled beverages.
• Supply the store with 5-gallon potable water bottles and pumps on brewing equipment. Requires bringing in bagged ice.
• Connect a potable water tank to the store. Potable water trucked in every other day.*

Response is based on:
• Duration and the contaminant
• Local regulatory jurisdiction

* Only used in a single extreme case so far.
Support

Enabling partners to meet our customers needs and leaders to make decisions.

Provide cross-functional support to stores and field leader to ensure successful execution of the Plan.

- **Operations** – Provides clear and concise communication to stores, and ensures partners have the necessary training and resources to succeed.
- **Facilities** – Dispatches technicians to connect water pumps and flush water lines/equipment. Also resets store to normal during recovery.
- **Sourcing** – Identifies suppliers for potable water and ice, negotiates pricing and delivery.
- **Finance** – Assist the field leaders making financial decisions. Weighing the cost of equipment and bottled water to keep a store open compared to the anticipated sales and duration of the boil water event.
- **QA/Food Safety** – Provide cleaning and handling instructions for water pumps during the response. Act as liaison with the local health departments, aligning on response guardrails and pivots to response plan. Approve potable water and ice suppliers.
- **Crisis Management** – For large scale crises, the Crisis Management team is activated to manage the incident and provide communication of the incident throughout the business.
We try to anticipate when a boil water order might be coming. Some events that may cause biological contamination of a public water system:

• Water line breaks
• Treatment disruptions due to power outages
• Hurricanes, floods, and other disasters.

Non-biological contamination events:

• Cyanotoxin advisories
• Wildfire runoff

This is why we are in the process of developing an All-Hazards Water Emergency Response Plan.
Upcoming NEHA BIA Events

• Mid-Year Membership Meeting
  o When: March 21, 2019 from 1-2pm EST
  o +1(773)2319226,,1496152590#

• NEHA 2019 AEC
  o Exhibit Booth #625
  o Annual Membership Meeting – Thursday, July 11 from 4-5pm in the Belmont A conference room
  o Session – Community in Crisis – Operating within Your Emergency Operation Plan (time/day still TBD)

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Thank You!!

Questions?