EHS Rotation for the Emerging Scholars: Water Quality

- Water is essential for Life!

"We know the value of water when the well runs dry."

Benjamin Franklin

Poor Richard’s Almanac - 1732

Grand Challenge
We can think of water as the blood of the earth...

And as with blood we can determine “wellness”
Water Resources

• Drinking Water
• Wastewater
• Water Bodies
• Oceans, Lakes, Ground water, Rivers, Wetlands, Ground water

https://www.epa.gov/learn-issues/water-resources#our-waters
Water Crisis in Flint, Michigan Has Been Unfolding for Two Years

Timeline of the Water Crisis in Flint, Michigan

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 2014</td>
<td>Flint Drinking Water Contaminated To save money, the city temporarily started to</td>
</tr>
<tr>
<td></td>
<td>draw water from the Flint River and treat it at a city water treatment plant while</td>
</tr>
<tr>
<td></td>
<td>a new water pipeline was being built to Lake Huron. Previously, the city was</td>
</tr>
<tr>
<td></td>
<td>bringing in treated water from the Detroit Water and Sewerage Department. The</td>
</tr>
<tr>
<td></td>
<td>water from the Flint River was more corrosive and later it was found that drinking</td>
</tr>
<tr>
<td></td>
<td>water from the Flint River was contaminated with lead.</td>
</tr>
<tr>
<td>Jan 5th 2016</td>
<td>Michigan Governor Declares State of Emergency Governor Rick Snyder (R) declared</td>
</tr>
<tr>
<td></td>
<td>a state of emergency due to the lead in Flint’s drinking water.</td>
</tr>
<tr>
<td>Jan 12th 2016</td>
<td>National Guard Mobilized National Guard was brought in to distribute bottled</td>
</tr>
<tr>
<td></td>
<td>water and water filters.</td>
</tr>
<tr>
<td>Jan 16th 2016</td>
<td>Federal State of Emergency President Obama declared a federal state of emergency.</td>
</tr>
<tr>
<td></td>
<td>Five million dollars of federal aid was set aside for the crisis. FEMA was called</td>
</tr>
<tr>
<td></td>
<td>in to coordinate the responses and cost of safe drinking water.</td>
</tr>
<tr>
<td>Feb 3rd 2016</td>
<td>House Oversight Committee Hearing First congressional testimony delivered on the</td>
</tr>
<tr>
<td></td>
<td>public health crisis. Federal and state regulators disagreed over the share of</td>
</tr>
<tr>
<td></td>
<td>the blame for the events leading up to the high levels of lead in the water.</td>
</tr>
</tbody>
</table>

Residents in Flint complained that the water looked and smelled bad. Some residents complained about rashes developing. A consultant was called in and declared the water was fine, and the city’s website says the water is safe to drink. After complaint emails, lawsuits, and more tests, the city switched back to Detroit's water in the fall of 2015.

What’s Next?

• Technical challenges still exist as water (even from other sources) will travel through contaminated and corroded pipes
• Flint Mayor Karen Weaver estimates that it will cost $1.5 billion to replace water pipes
• A class-action lawsuit has been filed that alleges the Department of Environment Quality is to blame for not adding an agent to the water to make it safe to drink
• Former Flint emergency manager Darnell Earley was absent from the hearing in February. Rep. Jason Chaffetz promises another Flint hearing in February with the missing official

Flint Water Crisis - ongoing

More information:

Waterborne Disease & Outbreak Surveillance Reports

- [http://www.cdc.gov/healthywater/surveillance/surveillance-reports.html](http://www.cdc.gov/healthywater/surveillance/surveillance-reports.html)
Keys to learn

• Due to climate change and population growth, maintaining adequate water quality and quantity is becoming extremely difficult.
• While advances in water treatment have led to safe potable water, emerging contaminants continue to challenge the water supply.
• Man-made or natural disasters - impact on water quality and water supply
EHS Rotation for the Emerging Scholars: Water Quality Parameters

Physical Parameters
- pH
- Temperature
- Turbidity
- Chlorine
- Conductivity
- TOC

Microbial Indicators
- Total coliforms
- *E. coli*
- Heterotrophic plate counts
EHS Rotation for the Emerging Scholars: Water Quality

Outline:

- A Short Lecture (Water Quality Assurance)
- Sample Collection/ Lab Analysis
- Discussion