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US EPA Region 10 CyanoHABs Workshop
and Tabletop Exercise



**City of Norton, Kansas PWS HAB Incident 2018
US EPA Region 10 CyanoHABs Workshop and Tabletop Exercise**

What we will cover today:

- **What can Happen**

Discussion of HAB intrusion into the City of Norton Water Plant

- **Lessons Learned**

Issues encountered dealing with this type emergency

Special thanks to:

Jamie Amlong

Water Plant Supervisor, City of Norton

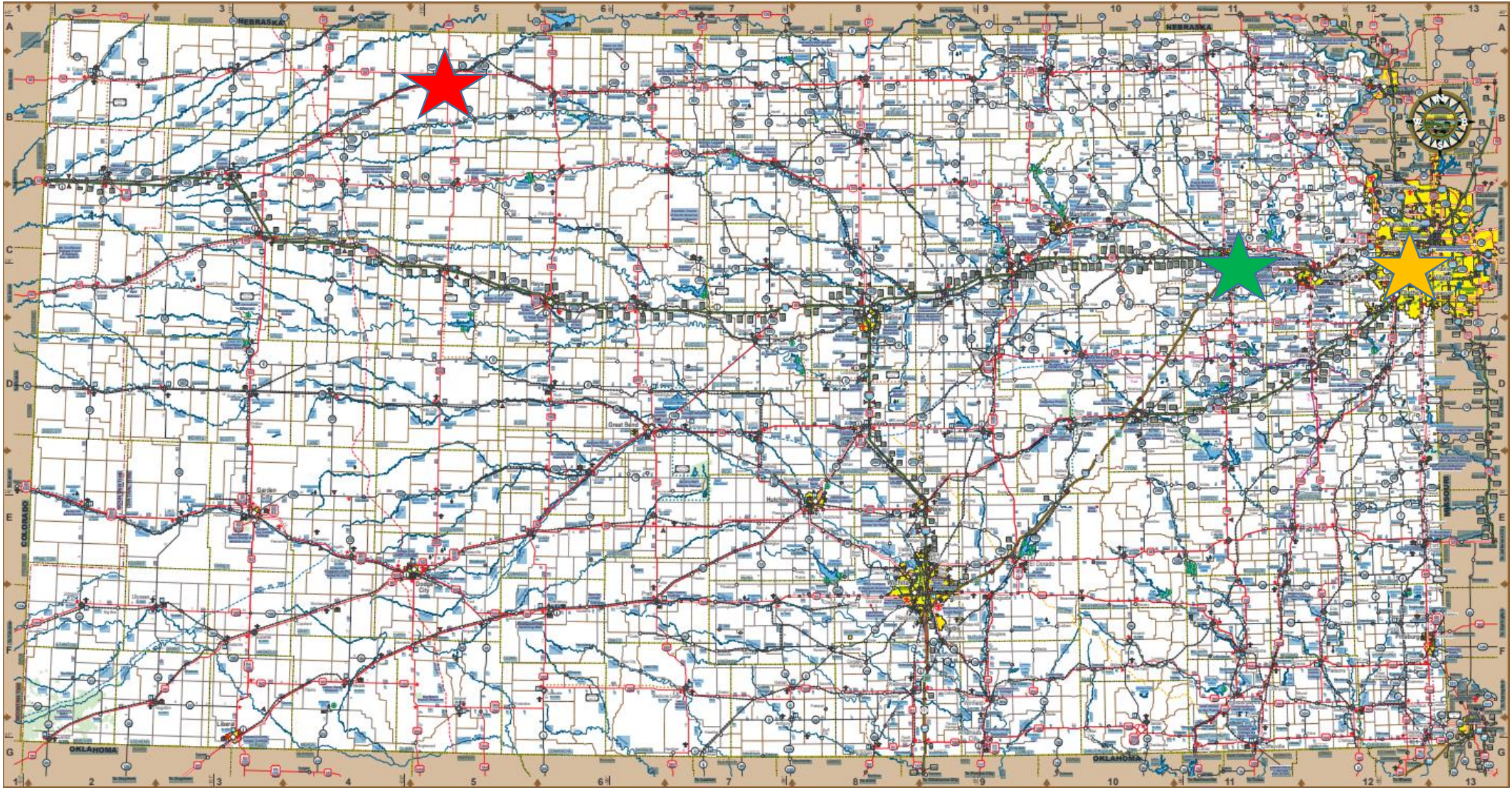
Dan Wells

KDHE Northwest District Environmental Administrator

Darrel Shippy

KDHE Northwest District , Reg. & Compliance Specialist

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Keith Sebelius Reservoir, Norton County

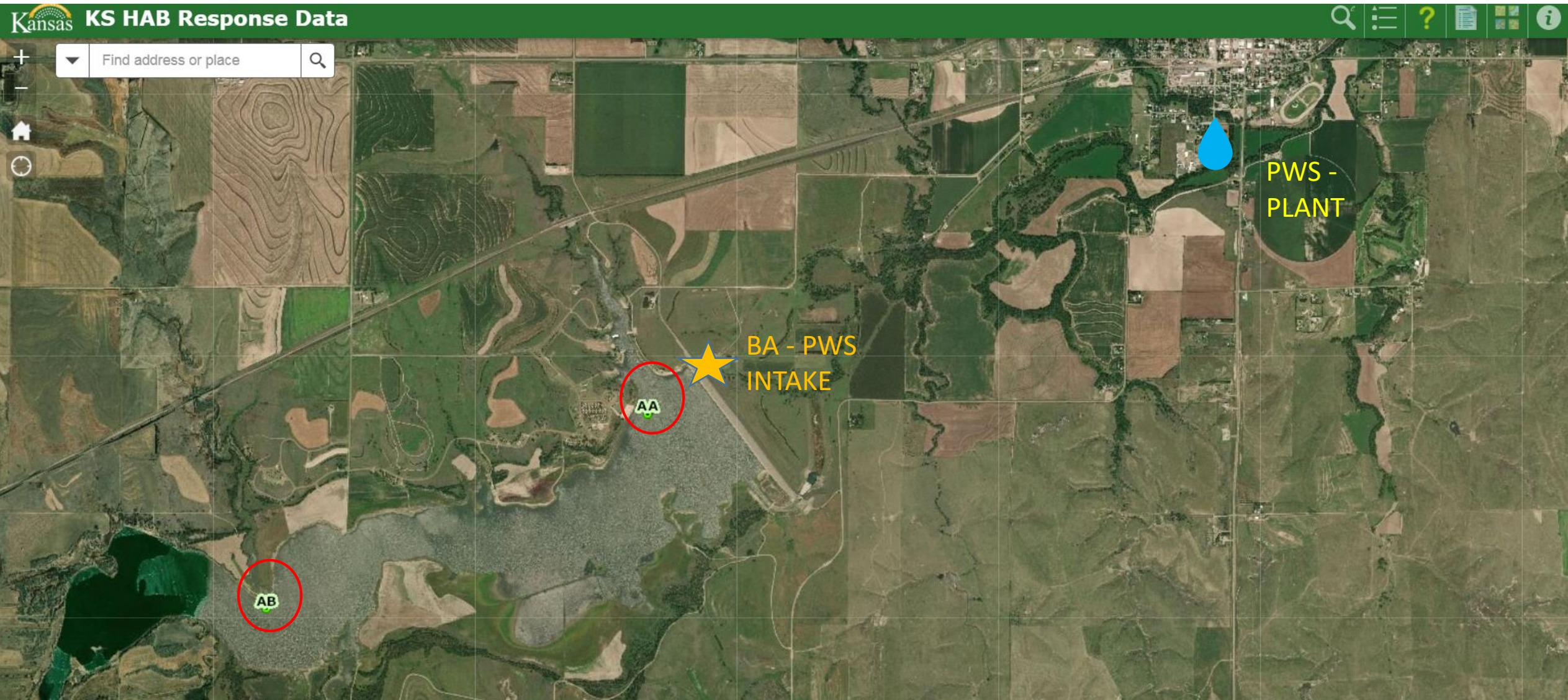
Background Info:

- HABs were first confirmed at Sebelius Reservoir in 2014
- Historically, bloom occurs in June and lasts 2-3 weeks
- Lake is the source water for City of Norton PWS
- KDWPT personnel observed algae bloom on **June 8, 2018** and reported to KDHE
- KDHE sampled lake on **June 11, 2018** and confirmed bloom

June 11, 2018 HAB Sample Data

- Sample Site AA
 - Cyanobacteria = 487,018 cells/ml
 - Aphanizomenon (a.k.a. Phanny) = 466,750 cells/ml
 - Anabaena = 12,915 cells/ml
 - Microcystins = 0.5 ug/l
- Sample Site AB
 - Cyanobacteria = 1,580,977.44 cells/ml
 - Aphanizomenon = 1,417,500 cells/ml
 - Anabaena = 122,850 cells/ml
 - Microcystins = 1.0 ug/l
- Sample Site BA (PWS Intake)
- City of Norton is notified to regularly observe their PWS intake

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2105 EPA Numerical Cyanotoxin Thresholds for 10-Day Drinking Water Health Advisories

Cyanotoxin	Drinking Water Health Advisory (10-day)	Drinking Water Health Advisory (10-day)
	Bottle-fed infants and pre-school children	School-age children and adults
Microcystins	0.3 µg/L	1.6 µg/L
Cylindrospermopsin	0.7 µg/L	3 µg/L
Anatoxin-A	*	*
Saxitoxin	*	*

- Exposure Pathway – Oral Ingestion of Drinking Water
- Health Advisory Value – 10 Day Exposure

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June 18, 2018 HAB Recreation Sample Data

- Sample Site AA
 - Cyanobacteria = 699,300 cells/ml
 - Aphanizomenon = 699,300 cells/ml
 - Anabaena = 0 cells/ml
 - Microcystins = 0.5 ug/l
- Sample Site AB
 - Cyanobacteria = 55,421 cells/ml
 - Aphanizomenon = 55,440 cells/ml
 - Anabaena = 0 cells/ml
 - Microcystins = 1.0 ug/l

City of Norton PWS Plant

- Norton population = 2,775 (2018)
- 60% Surface Water, 40% Groundwater
- Pump an average 700,000 gallons/day in summer

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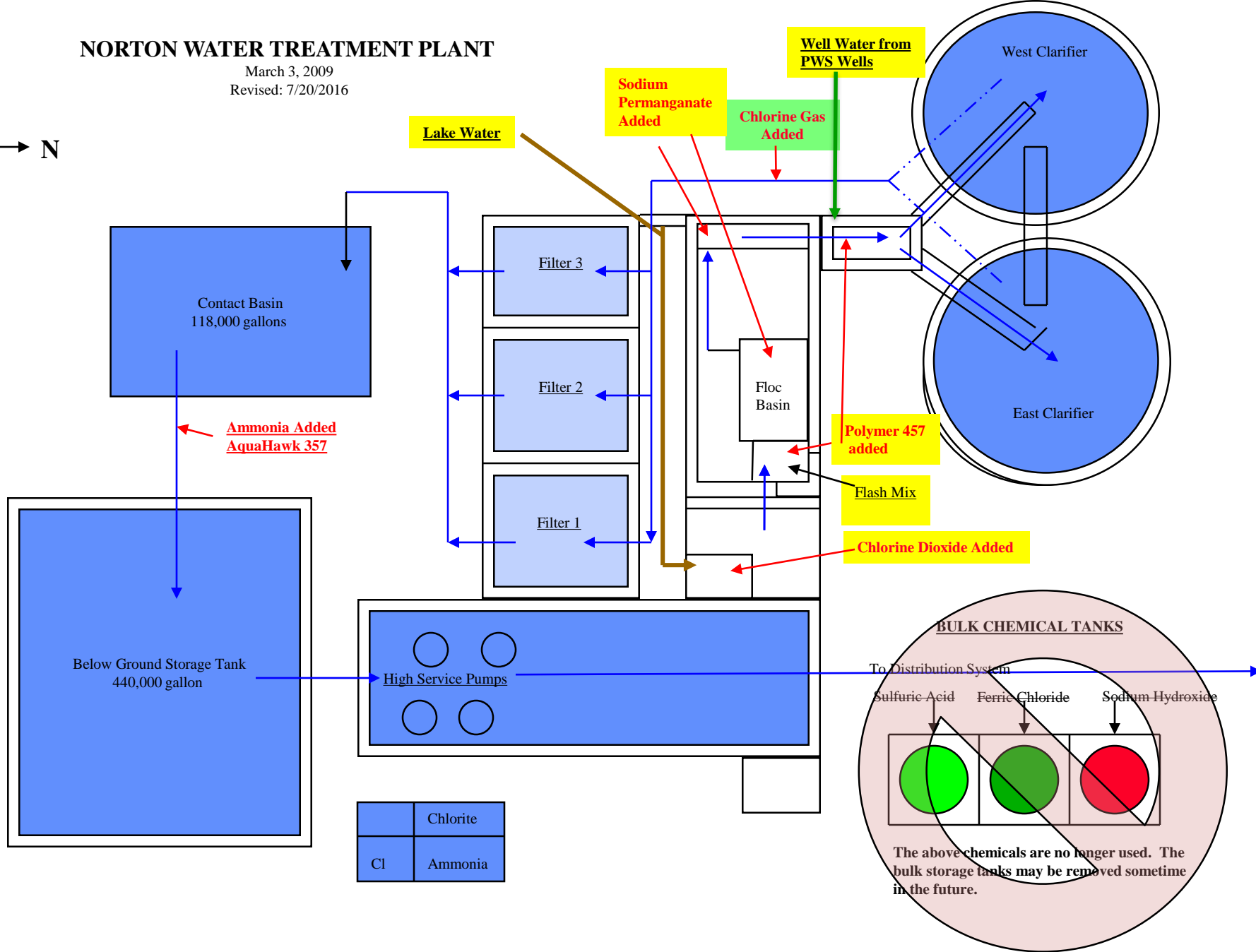


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NORTON WATER TREATMENT PLANT

March 3, 2009
Revised: 7/20/2016

→ N



	Chlorite
Cl	Ammonia

City of Norton PWS Plant – HAB Incident **June 19, 2018**

- Upon arrival, smelled strong algae odor throughout the plant
- Operator noticed an increase in chlorine demand and turbidity readings
- Immediately notified KDHE - NWDO
- Surface water intake was immediately shut off and work began to determine if the plant could be bypassed and use only groundwater
- Later that day, Water in storage began to run low and residents in higher elevations began to lose pressure (< 20psi) and water service
- KDHE issued a boil water advisory after much deliberation
 - Concern boiling water would release and concentrate toxins if in distribution system
- City issued Stage 3 Water Conservation Order

City of Norton PWS Plant – Afternoon **June 19, 2018**

- Staff is unsure if plumbing/valve exists that would allow GW to bypass the plant, be disinfected and go directly to distribution.
- City predicted they would be completely out of water later that night. They notified County Emergency Mgmt. Coordinator to arrange for bottled water
- No evidence algae entered the distribution system but could not be ruled out
- KDHE along with EPA began developing sampling plan for algal toxins in treatment plant and distribution system
- City staff found old plan set which showed by-pass valve which allowed GW to be disinfected and pumped directly into the clear well

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City of Norton PWS Plant – HAB Incident **June 20, 2018**

- Determined PWS wells could not meet water demand
- Consultant was retained and mobilized to install temporary powder activated carbon system (PAC)
- Bottled water was provided by various entities
- Monitoring plan was developed
 - 6 Samples tested by KDHE for Microcystin
 - 6 samples analyzed by EPA for Cylindrospermopsin, Anatoxin-A and Saxitoxin
- City began cleaning flushing plant with groundwater.

City of Norton PWS Plant – HAB Incident **June 21, 2018**

- Activated carbon system was operational consisting of 500 gallon day tank, mixer and then fed into plant rapid mix at 3-7ppm rate
- TOC testing began
- Samples (toxin) were collected late evening
- GW supply was holding steady at 600 gpm (800,000/day)
- Water use was 404,000 gpd

City of Norton PWS Plant – HAB Incident **June 22, 2018**

- Samples relayed across state to KDHE lab and EPA
- Mix up on sample bottles. EPA could not test samples due to the preservative – **Mistakes will occur**
- Well production was dropping significantly
- City wanted to begin pumping surface water. KDHE recommended not to until sample results were received
- Additional samples collected, KDHE Relay team to EPA Lab
- City of Norton held emergency meeting
- **Governor declared State of Emergency.** Truck load of bottled water was provide by KDEM

City of Norton PWS Plant – HAB Incident **June 23, 2018**

- Clarifiers, floc tanks, troughs were drained, hand scrubbed and rinsed
- Filters were back-flushed, media stirred and then flushed again at least 3 times each
- City staff worked 43 hours straight with no leave to clean HABs from plant

City of Norton PWS Plant – HAB Incident **June 23, 2018**

- Sample results for toxins and bacteria were negative in distribution system finished water
- BWA was rescinded by KDHE
- Norton began pumping surface water

June 25, 2018 HAB Sample Data

- Sample Site AA
 - Cyanobacteria = 34,351 cells/ml
 - Microcystins = 0.5 ug/l
- Sample Site AB
 - Cyanobacteria = 3,776 cells/ml
 - Microcystins = 0.5 ug/l
- **BLOOM IN LAKE WAS APPARENTLY OVER!!!**
- Continued visual monitoring by KDWPT Staff

City of Norton PWS Plant – HAB Incident Lessons Learned

- Algae can enter plant very quickly – even with continuous visual monitoring of the lake and intake (HABs can suspend in water column)
- KHEL and EPA Laboratories can test for toxins although no maximum contaminant levels (MCLs) exist...currently only drinking water health advisories (HAs).
- Vulnerable surface water plants should consider installing permanent treatment systems. (activated carbon, Ozone, ?)
- PWS systems should have an emergency plan in case they do have a HAB incident. **BE PREPARED!**

2018 HAB KDHE Logistic Issues

- In heat of the bloom, KDHE resources were stretched to a point that we feel insufficient coverage and attention cannot be given to adequately serve the Public Water Supply Systems.
- Always in reaction mode
- Logistics of getting sample bottle to PWS with bloom in source water timely
- Samples are not attached to the PWS in databases causing errors in data
- Too much KDHE staff time is used in coordinating sampling and delivering bottles and samples to PWS and Lab
- Lab resources and test kits are not utilized efficiently. Test kits not fully realized making testing very expensive per test.

Thank you/Questions



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