

# SODIUM HYPOCHLORITE: Problems in Solution

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City of Akron  
Water Reclamation Facility





- ◎ **City of Akron is 62 sq. mi.**
- ◎ **Service area is 110 sq. mi.**
- ◎ **Population served 330,000**
- ◎ **Avg flow 74.8 MGD**
- ◎ **39 pump stations**
- ◎ **861 miles sewers**
- ◎ **19,449 manholes**
- ◎ **~100 staff**



# Brief History of WRF Disinfection

## Chlorine Gas Disinfection

1960s-Early 90s





# Brief History of WRF Disinfection

## Sodium Hypochlorite Disinfection

Early 1990s - present





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# Brief History of WRF Disinfection

## Sodium Hypochlorite Disinfection

### Replacement of Flash Mixer

2012



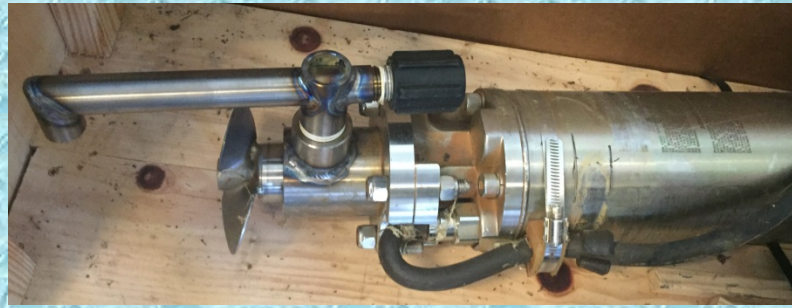
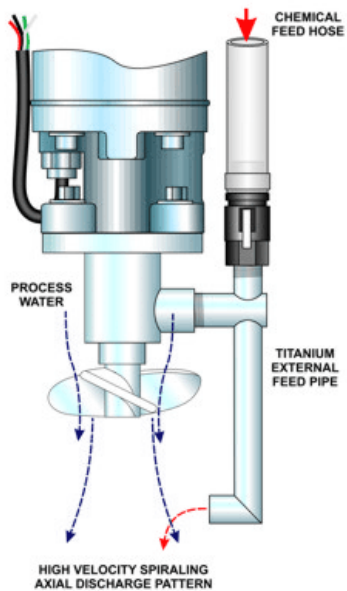


# Brief History of WRF Disinfection

## Sodium Hypochlorite Disinfection

### Replacement of Flash Mixer 2012

**SERIES 32PT  
EXTERNAL CHEMICAL FEED**





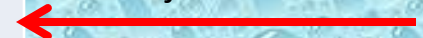
# IF YOU'RE NOT PART OF THE SOLUTION

## YOU ARE PART OF THE PRECIPITATE

- New Masterrr 32PT mixers performed well the first year.
- Pumping rates began to steadily increase each year.
- Scaling (potato chips) in the feed tubing.
- 2015 we constantly “battled” the system

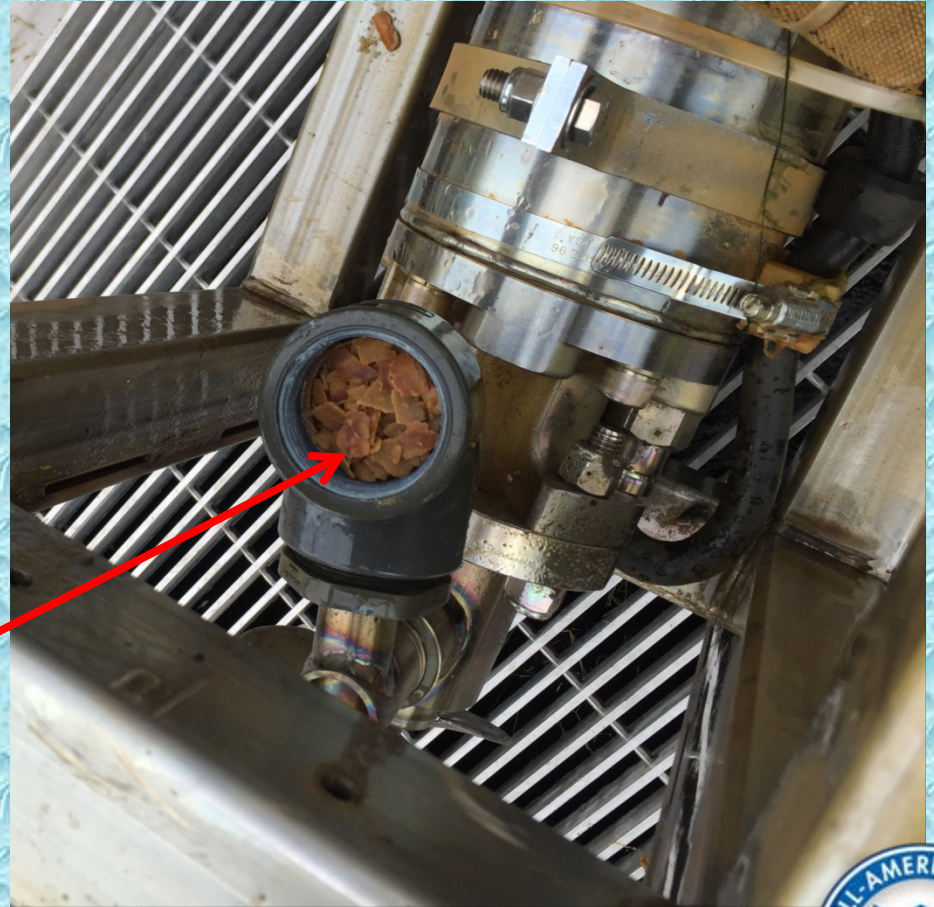
YEAR	Avg. daily Hypo flow Gal	Avg. Daily Cost \$USD	Avg. daily upstream (mg/L)	E. coli Avg. 30 GeoMean
2011	366	\$190.32	0.20	26
2012	406	\$211.12	0.35	30
2013	420	\$218.40	0.43	33
2014	479	\$249.08	0.36	49
2015	517	\$268.84	0.42	50
2016	478	\$248.56	0.48	12.5
2017	556	\$289.12	0.50	

New Injection Mixers





# IF YOU'RE NOT PART OF THE SOLUTION YOU ARE PART OF THE PRECIPITATE



"Potato Chips"



# IF YOU'RE NOT PART OF THE SOLUTION YOU ARE PART OF THE PRECIPITATE

Chemical Line With "Potato Chips"

"Potato Chips"





# IF YOU'RE NOT PART OF THE SOLUTION YOU ARE PART OF THE PRECIPITATE



Before Periodic Cleaning in Dilute HCl



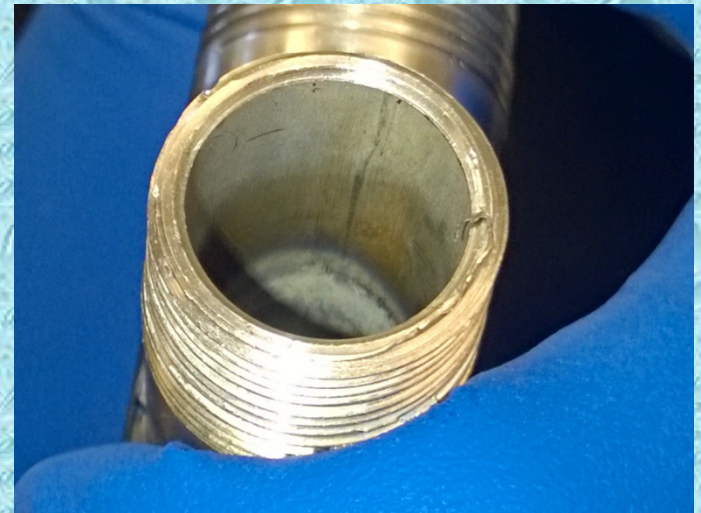
After Cleaning



# IF YOU'RE NOT PART OF THE SOLUTION YOU ARE PART OF THE PRECIPITATE



Before Periodic Cleaning in Dilute HCl



After Cleaning



# IF YOU'RE NOT PART OF THE SOLUTION YOU ARE PART OF THE PRECIPITATE



Most Likely Caused by Fe Reduction



Failed Carry Water Piping





# IF YOU'RE NOT PART OF THE SOLUTION YOU ARE PART OF THE PRECIPITATE

- After 2015 Disinfection season the decision was made to make needed changes to improve system.
- Began researching weak points in system.
  - Carry Water
  - Carry Water system
  - Chemical Pump feed lines
  - Chemical Suppliers (BleachTech very helpful)
  - Evaluated mixer performance.



# GETTING BACK IN SOLUTION

## Decision Made to Eliminate Carry Water and Feed Hypo “Neat”

- Researched Mixer Supply Line Options
- Researched New Chemical Feed Pumps.



# FEEDING HYPO NEAT

(Who needs ice anyways)



Installed two peristaltic feed pumps.

- Watson Marlow Brand 520D
- One pump per mixer



# FEEDING HYPO NEAT



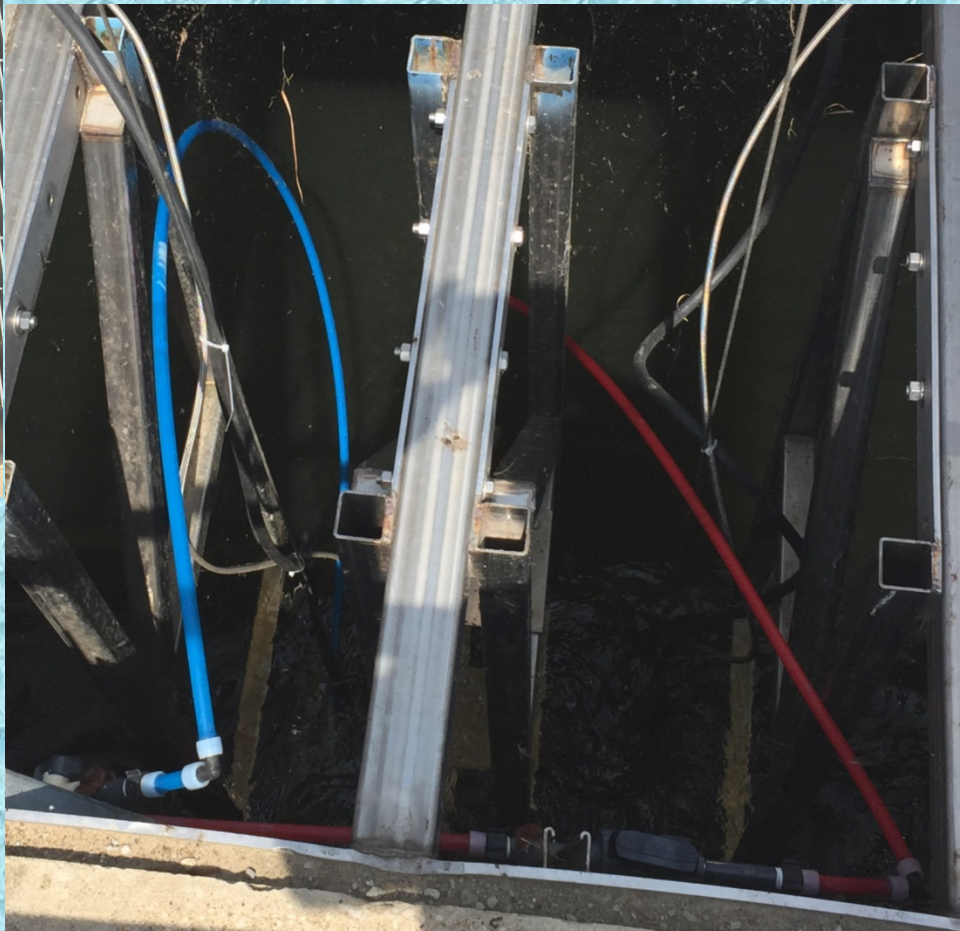
Installed 4" SCH80 PVC.

- For use as carrier pipe
- Installed long sweep elbows





# FEEDING HYPO NEAT





# Summary

- Determined that carry water was the cause of scaling.
  - Had lab run hardness tests
  - Appeared to be due to initial change to injection mixers. Did not account for the chemistry
  - BleachTech was very helpful in helping track down issues.
- Tried NPW and PW. No improvements.
- Determined feeding “neat” was the solution



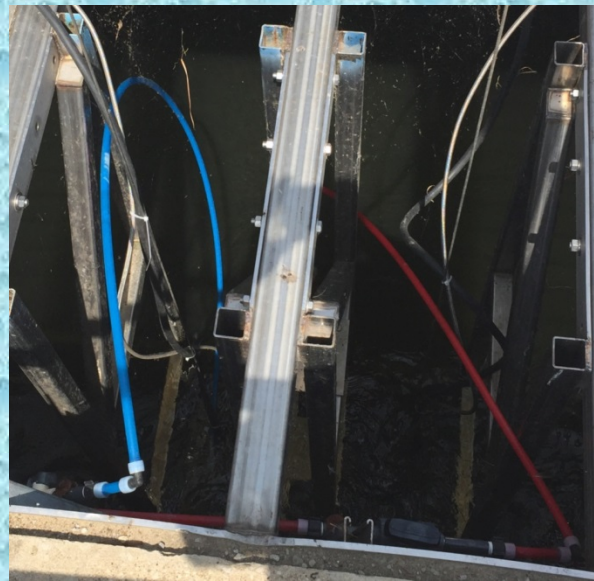
# Summary

- When looking at tubing options, Teflon was the “go to” tubing.
  - Initial quote for \$3,000+ for lengths needed
- Investigated less costly options.
- Decided to try PEX (crosslinked Polyethylene)
  - Three types of PEX.
  - Chose PEX-B



# Summary

- Contracted local plumbing contractor (JTP) to install color coded PEX-B lines.
  - 4" carrier pipe made install easy
  - Cost just over \$1,600 to install
  - For easy removal of mixer, whips were added





# Summary

- New feed system has had few issues since install.
  - Injection point still needs annual cleaning due to pH shock.
- Efficacy has improved
- Pumping rates are more in line with *E. coli* numbers.



QUESTIONS?

