



# WATER SUPPLY UPDATE: SAFE WATER – NOW AND INTO THE FUTURE

NEW BRIGHTON OPEN HOUSE MAY 7, 2016

# AGENDA

- The Water Supply Team
- Where we were a year ago
  - The discovery of 1,4-dioxane (DX)
  - The switch to safe wells
- What's happened in the last year?
  - Perfect climate conditions
  - Great response to conservation measures
  - **NO** DX delivered to consumers



# AGENDA - CONTINUED

- Challenges that remain
  - Insufficient supply for a hotter/drier year
- A better interim solution – The Minneapolis Interconnection
  - What it is
  - What it means for you
- Planning for the long-term solution
  - New treatment system to remove DX
  - Return to use of NBCGRS



# OUR TEAM



Mayor  
Valerie Johnson

Council Members (left to right)  
Paul Jacobsen  
Mary Burg  
Gina Bauman  
Brian Strub

City Manager  
Dean Lotter

Army Funding and Relationship

- John Drawz
- Richard Snyder

**Fredrikson**  
& BYRON, P.A.

DCAD Department Water Team

- Craig Schlichting, P.E.
- Scott Boller
- Jesse Hartman



Design & Pilot Testing

- Greg Keil, P.E.
- Julia Macejkovic, P.E.
- Todd DeJournett, PhD, P.E.

**BARR**

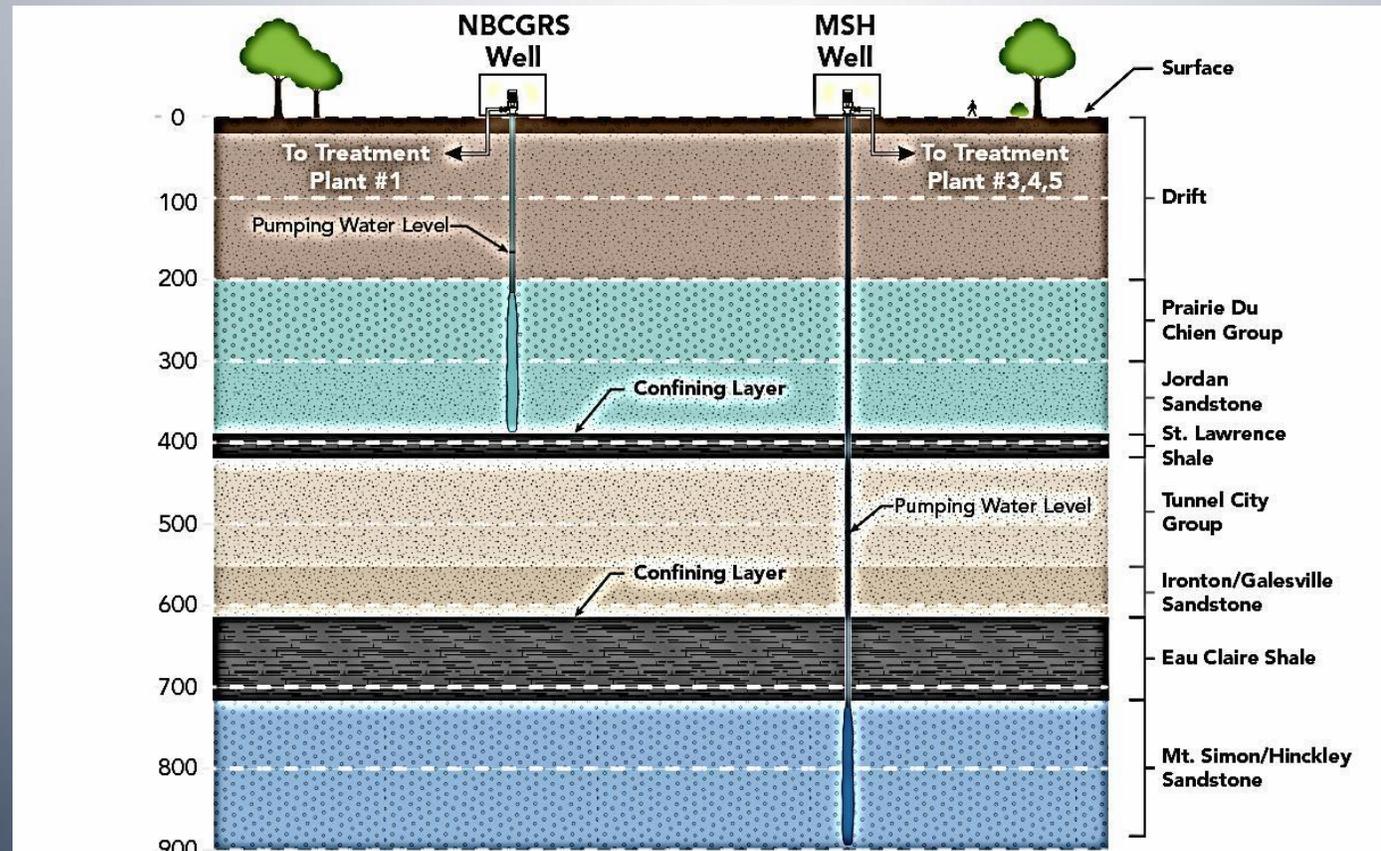
## PARTNERS



Minnesota Pollution  
Control Agency

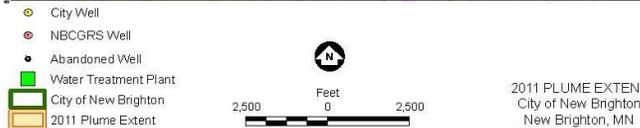
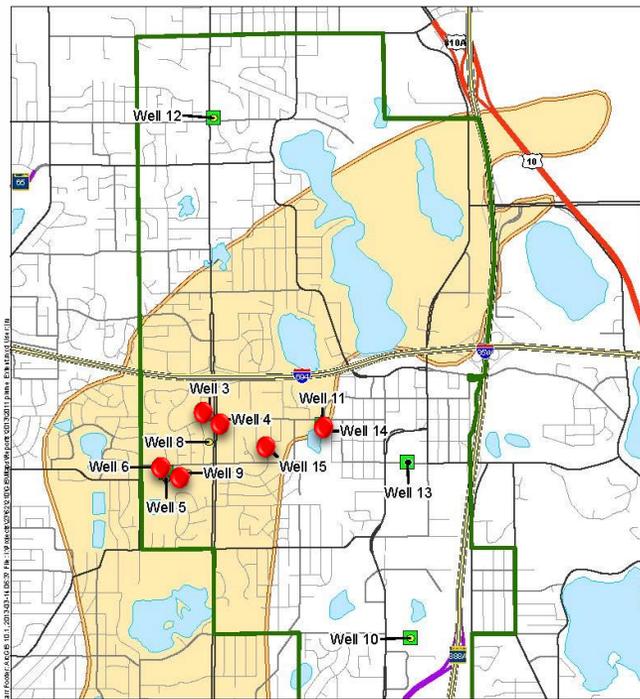


Before the discovery of DX: City had 6 shallow wells that were part of NBCGRS, and 4 Mount Simon/Hinckley (MSH) wells



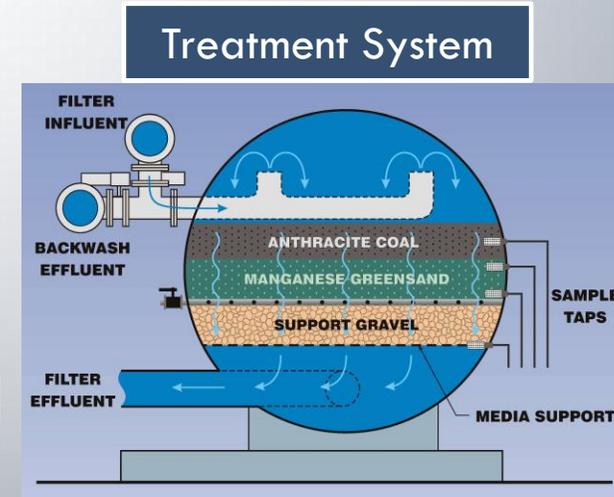
Before the discovery of DX: 6 shallow Prairie du Chien and Jordan aquifer wells pumped water containing TCAAP contaminants to Water Treatment Plant 1 (WTP1)

Plume Map

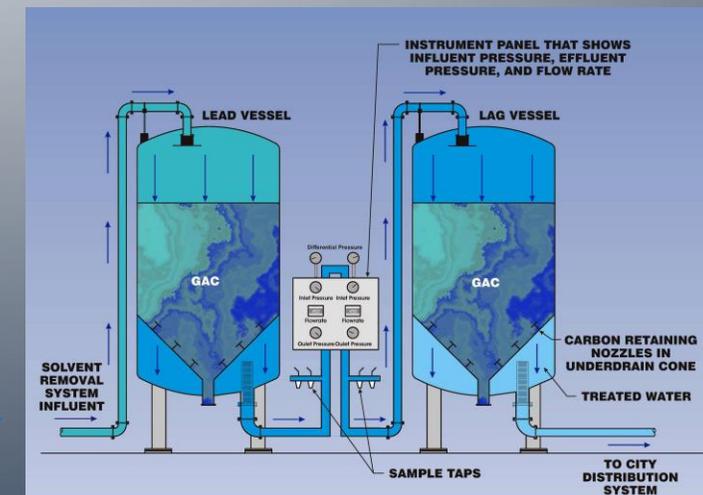


PLUME EXTENT FROM WENCK, FY 2011 ANNUAL PERFORMANCE REPORT

Sand filter removes natural minerals



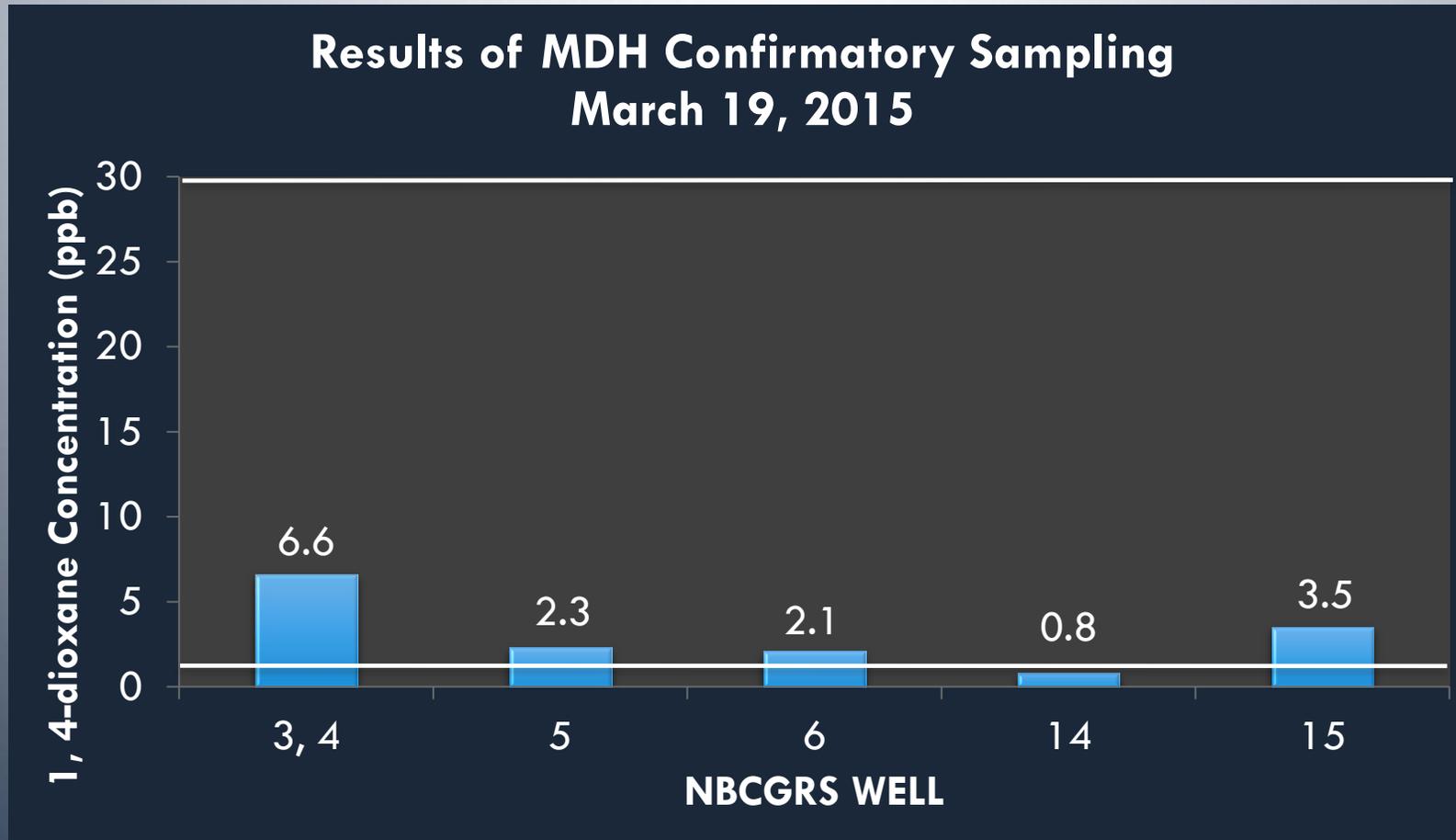
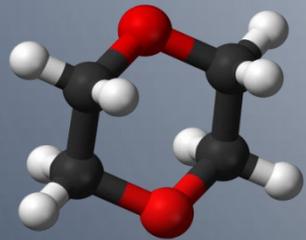
GAC removes known TCAAP contaminants



Before the discovery of DX: Majority of water supply was provided by NBCGRS, even in high demand years

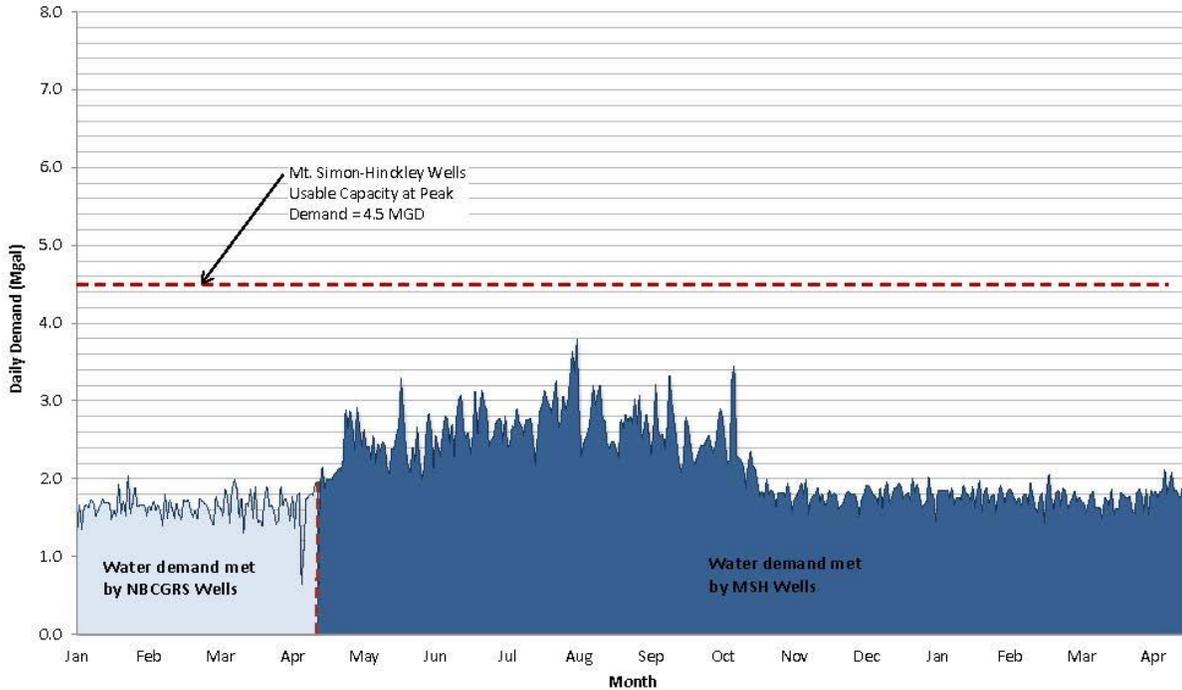


February 3, 2015: MDH meets with City staff and presents results of testing for Contaminants of Emerging Concern



Since April 15, 2015: All water delivered has come from DX free MSH wells. (“Interim Solution” described last year)

New Brighton Daily Demand  
2015 - present



\* Mt. Simon-Hinckley Capacity does not include Well 9

Low 2015 peak demand was the result of:

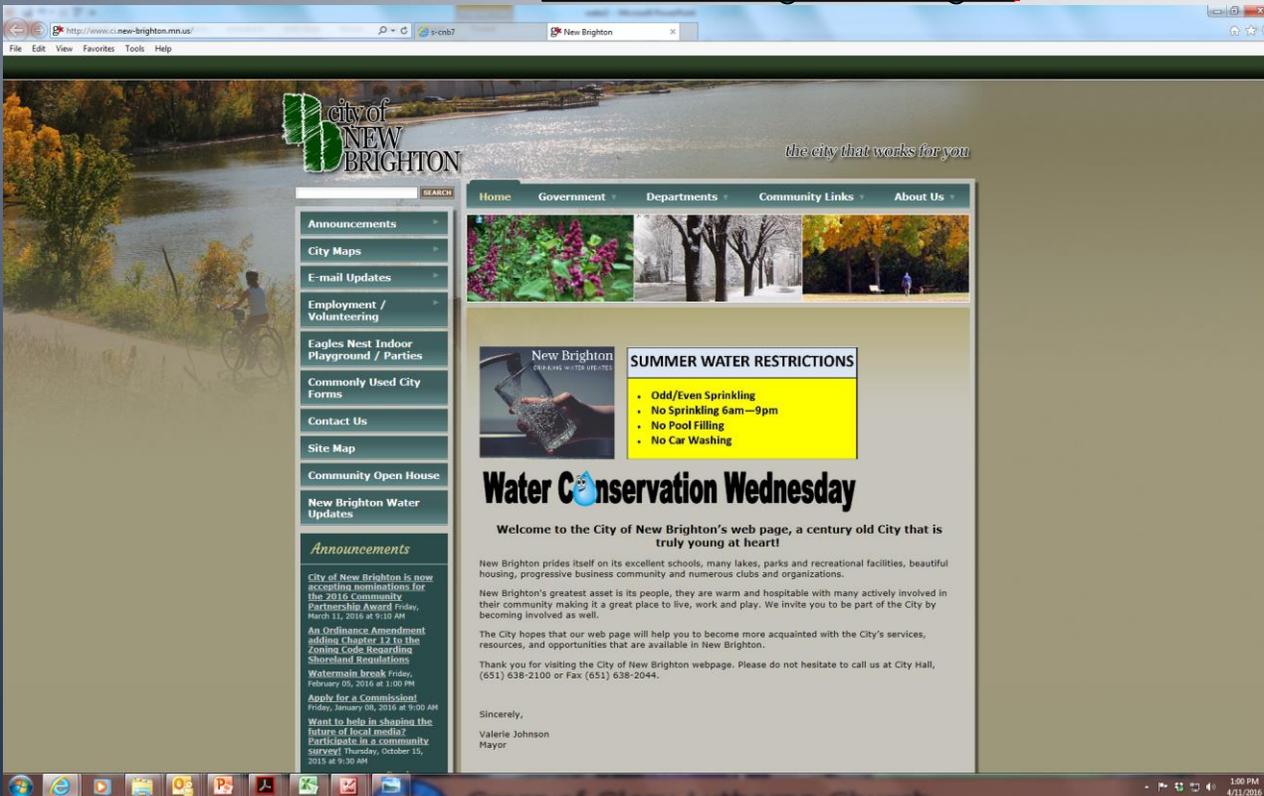
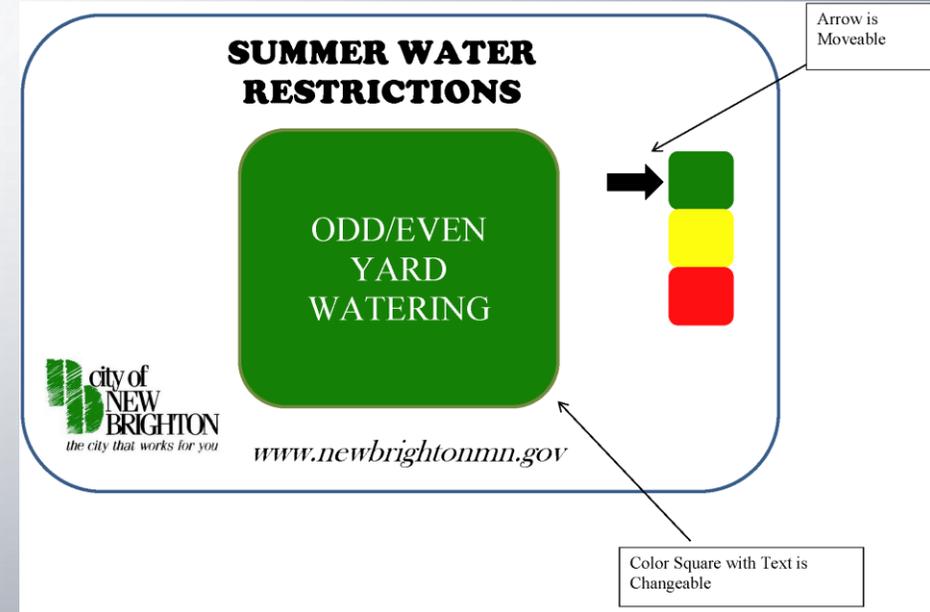
- Cool temperatures
- Perfectly timed rainfall
- Successful conservation efforts by residents

# THANK YOU FOR YOUR CONTRIBUTION TO CONSERVATION

June 29, 2015

Water Restriction Signage (13 locations)  
and Letter to Residents Deployed

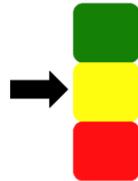
Updated web page and messaging  
[www.newbrightonmn.gov](http://www.newbrightonmn.gov)



# YELLOW AND RED WATER RESTRICTIONS

## SUMMER WATER RESTRICTIONS

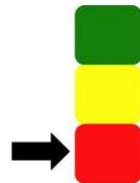
- 6AM-9PM NO YARD WATERING
- ODD/EVEN YARD WATERING 9PM-6AM
- NO POOL FILLING
- NO RESIDENTIAL CAR WASHING



[www.newbrightonmn.gov](http://www.newbrightonmn.gov)

## SUMMER WATER RESTRICTIONS

- NO YARD WATERING
- NO POOL FILLING
- NO RESIDENTIAL CAR WASHING



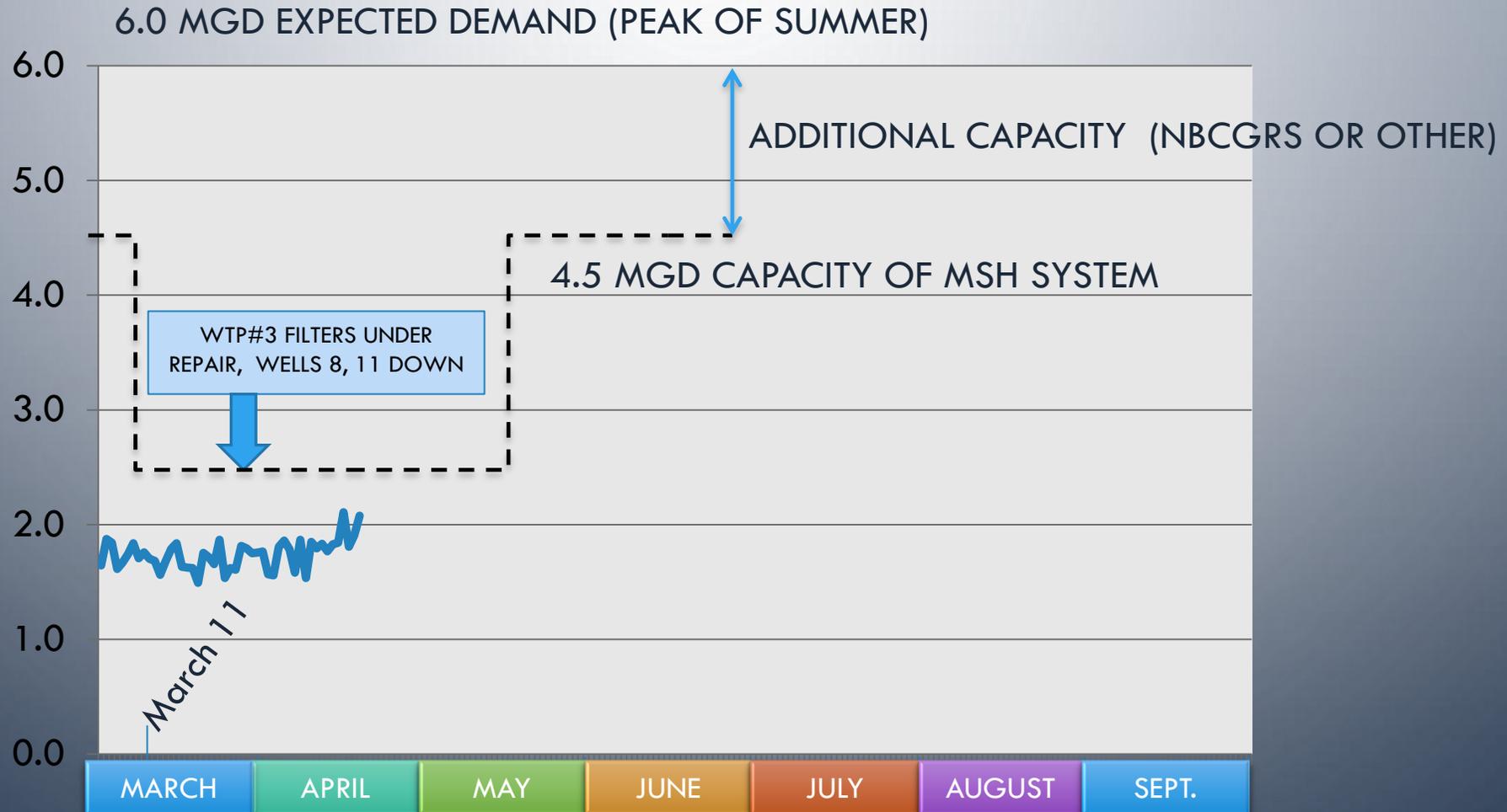
[www.newbrightonmn.gov](http://www.newbrightonmn.gov)

We monitor consumption vs. capacity



## Challenges remain in the short-term:

- March 11 Notice to residents: “Yellow” conservation status
- 2016 expected to be hotter and drier summer



WE NOW HAVE A BETTER INTERIM SOLUTION

CONNECT TO THE MINNEAPOLIS WATER DISTRIBUTION SYSTEM



# WHY MINNEAPOLIS? WHY NOW?

- Safe and reliable supply with capacity to serve New Brighton
- Convenient connection point adjacent to WTP1
- Past year has provided time to get agreements in place
  - New Brighton/Minneapolis
  - New Brighton/Army
  - Minneapolis/Columbia Heights
  - New Brighton and Minneapolis/MDH
- Interconnection will provide full supply until WTP1 is reconstructed
- In the future, interconnection will serve as long-term backup emergency supply.

# WHY DO WE NEED TO SWITCH OVER COMPLETELY TO MINNEAPOLIS WATER SUPPLY?

## New Brighton MSH Supply

Source: Groundwater

Softened: No

Disinfection: Free Chlorine

## Minneapolis Supply

Source: Surface water

Softened: Partially (lime softening)

Disinfection: Chloramines (chlorine and ammonia)



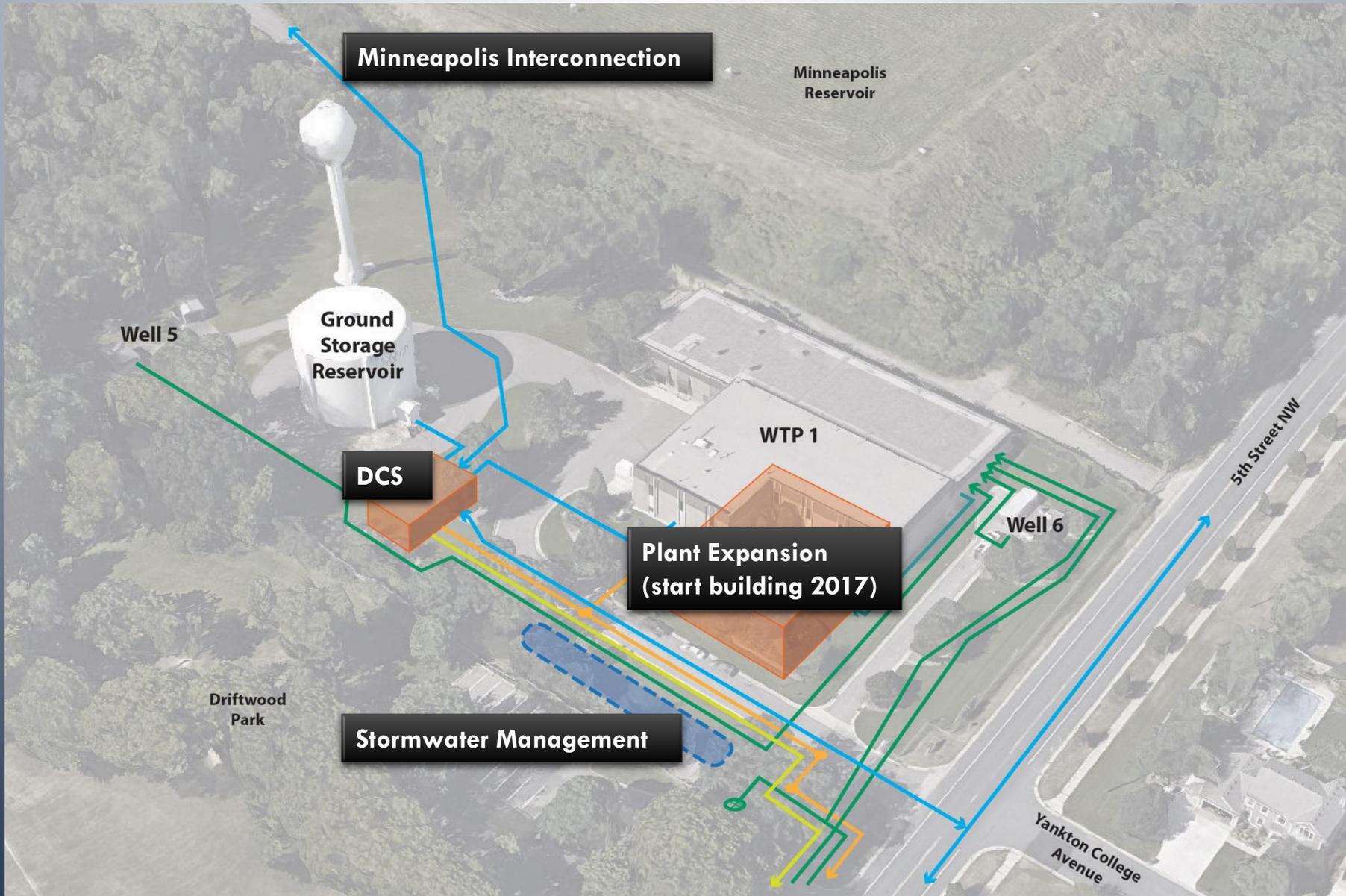
## Result:

- Each is safe high quality supply
- Not suitable for blending or frequent switching back and forth

# MINNEAPOLIS INTERCONNECTION WILL BE PART OF A PROJECT THAT WILL BEGIN THIS MONTH; THAT PROJECT INCLUDES:

- New Distribution Control Station (DCS):
  - Pumps to boost water from Minneapolis pressure to New Brighton pressure
  - Valves to select source (Minneapolis or WTP1) and destination (distribution, storage, or discharge)
- Interconnection Pipeline:
  - From Minneapolis to New Brighton DCS
- Utility relocations and site improvements
- Temporary connection ready for water delivery by mid-July

# WITH UTILITIES REROUTED THROUGH DCS, SPACE IS CLEARED FOR PLANT EXPANSION AND REQUIRED STORMWATER MANAGEMENT FEATURE



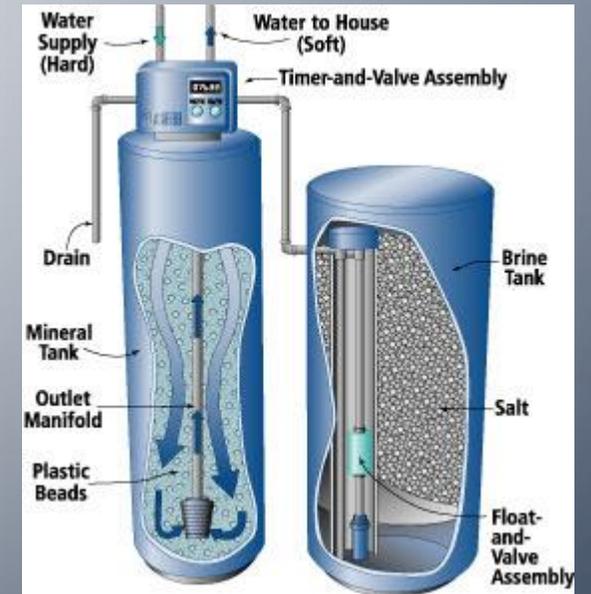
# NEW BRIGHTON TO MINNEAPOLIS TRANSITION PLAN

- Hardness of water varies

New Brighton: 200 mg/L or 12 grains

Minneapolis: 77-86 mg/L or 4.5-5 grains

- Consult your manual for softener controls
- Consult a softening professional



# THE LONG-TERM SOLUTION: OBJECTIVES

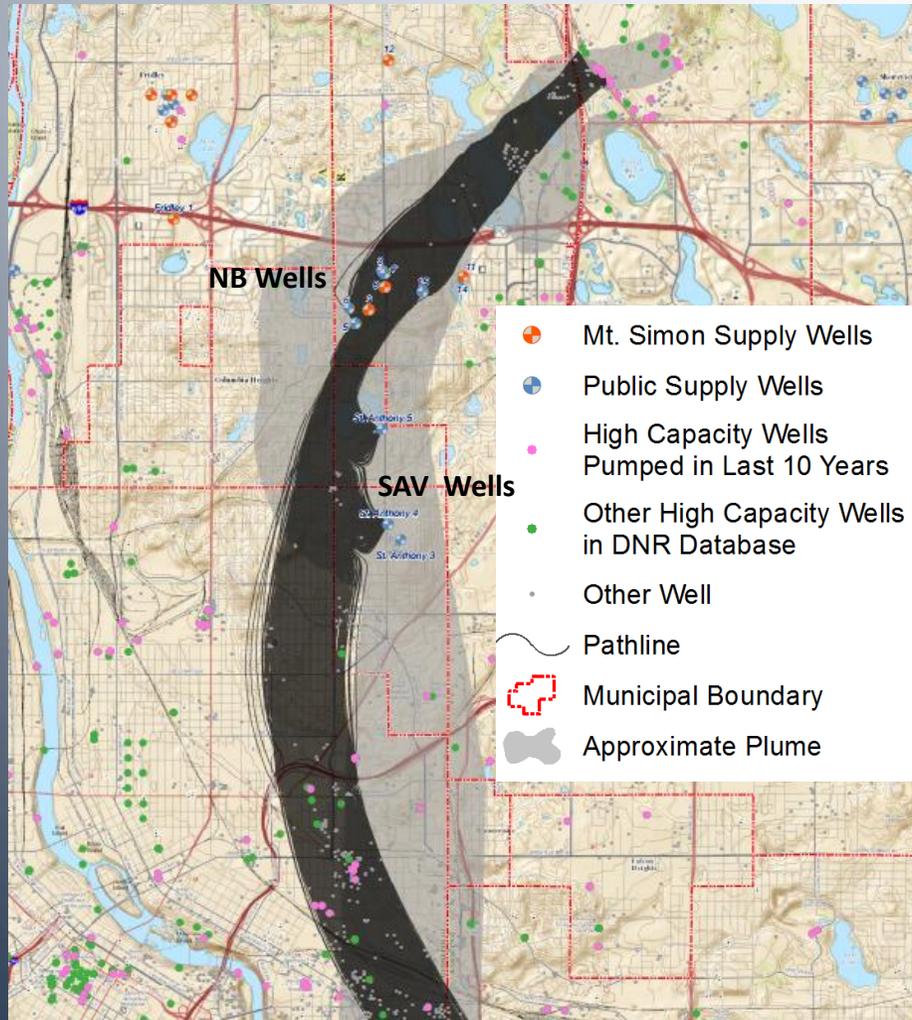
- Supplement the current WTP1 treatment system in order to:
  - Assure removal of all currently known TCAAP contaminants to levels well below current and anticipated regulatory standards
  - Provide broad spectrum contaminant removal and destruction capability to protect against potential unknown compounds
- Restore NBCGRS operation for water supply and aquifer restoration



## THE LONG-TERM SOLUTION: BENEFITS

- Preserves, restores, and makes beneficial use of a valuable groundwater resource – the Prairie du Chien/Jordan aquifers
  - Ensures adequate safe drinking water supplies for future generations
  - Provides financial benefits to New Brighton water consumers and taxpayers
- 

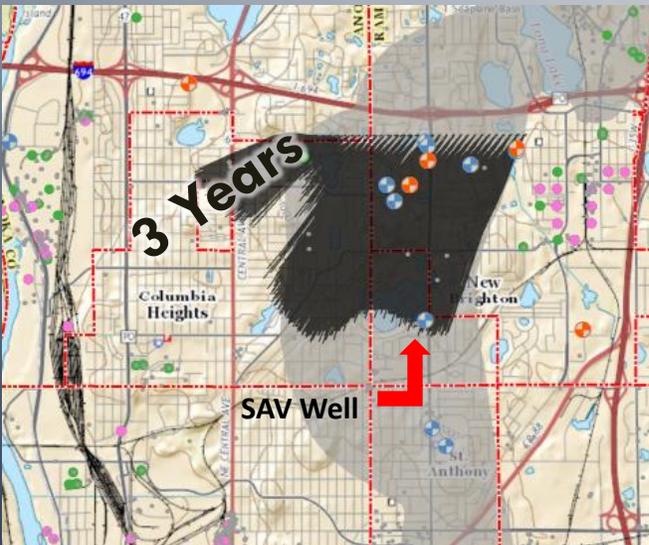
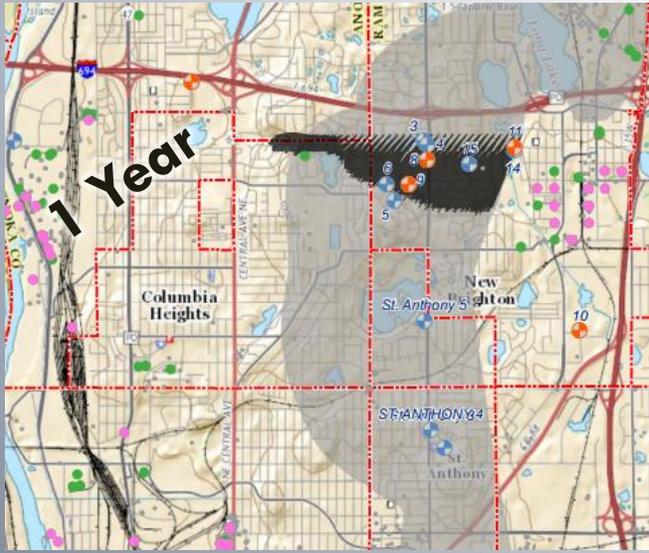
# NBCGRS HELPS CONTAIN THE SPREAD OF CONTAMINANTS EMANATING FROM TCAAP



## “Take Away” Points

- Figure shows modeled (expected) flow paths from TCAAP with the NBCGRS operating normally.
- NBCGRS captures much, but not all, of the contaminants emanating from TCAAP.
- St. Anthony Village (SAV) wells are exposed to TCAAP contaminants even with NBCGRS running normally.

# MODEL ESTIMATES IT WOULD TAKE 3 YEARS FOR CONTAMINANTS AT NBCGRS WELLS TO REACH FIRST SAV WELL AFTER NBCGRS SHUT DOWN



## “Take Away” Points

- Has only been 1 year since NBCGRS was shut down.
- Contaminants found today in SAV wells are contaminants that had already passed the NBCGRS before it was shut down.
- Expect the NBCGRS and SAV water treatment plant expansion to be operational by 2018.

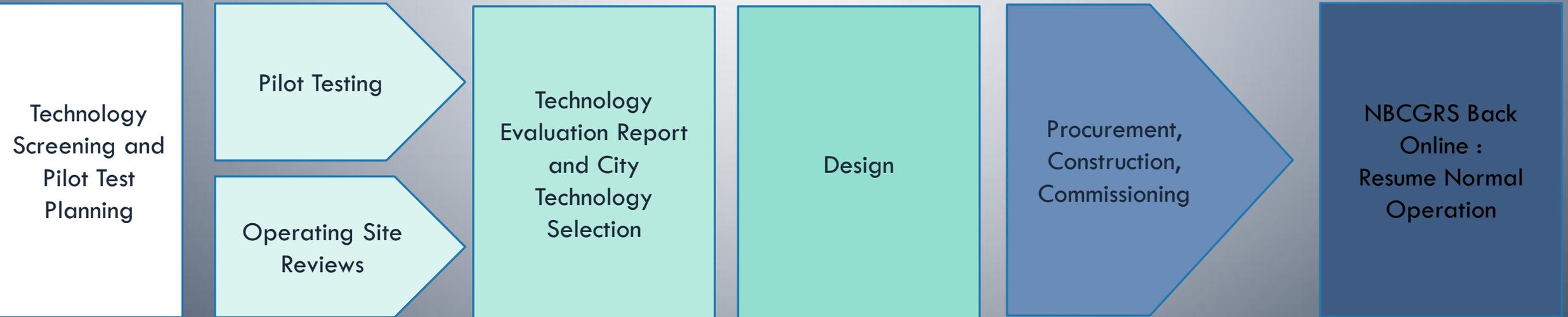
Technology  
Screening and  
Pilot Test  
Planning

# THE PATH TO A LONG-TERM SOLUTION

February –  
October 2015

Mitigation Technology	Developmental Status and Demonstrated Scale	Ability to Meet Treated Water Quality Goals for Target Contaminant	Scalable Pilot System
Granular Activated Carbon	✓	x	✓
Sorption to Synthetic Media	x	✓	✓
Air Stripping	✓	x	✓
Distillation	x	✓	x
Coagulation	✓	x	✓
Biological media reactor	✓	x	✓
Suspended growth treatment reactor	✓	x	✓
Anaerobic Treatment	✓	x	✓
Chemical Oxidation	✓	x	✓
Photolysis - UV	✓	x	✓
Peroxide/Iron	x	x	x
Persulfate/UV	x	x	x
Photocatalysis	x	x	✓
Sonication	x	x	x
Ozone/Electrolysis	x	x	x
Peroxide/UV MP	✓	x	x
Peroxide/UV LPHO	✓	✓	✓
Peroxide/Ozone	✓	✓	✓

# THE PATH TO A LONG-TERM SOLUTION



February –  
October 2015

June 2015-  
June 2016

In Progress,  
Complete  
Fall 2016

In Progress,  
Complete  
Spring 2017

Spring 2017  
Complete  
Fall 2018



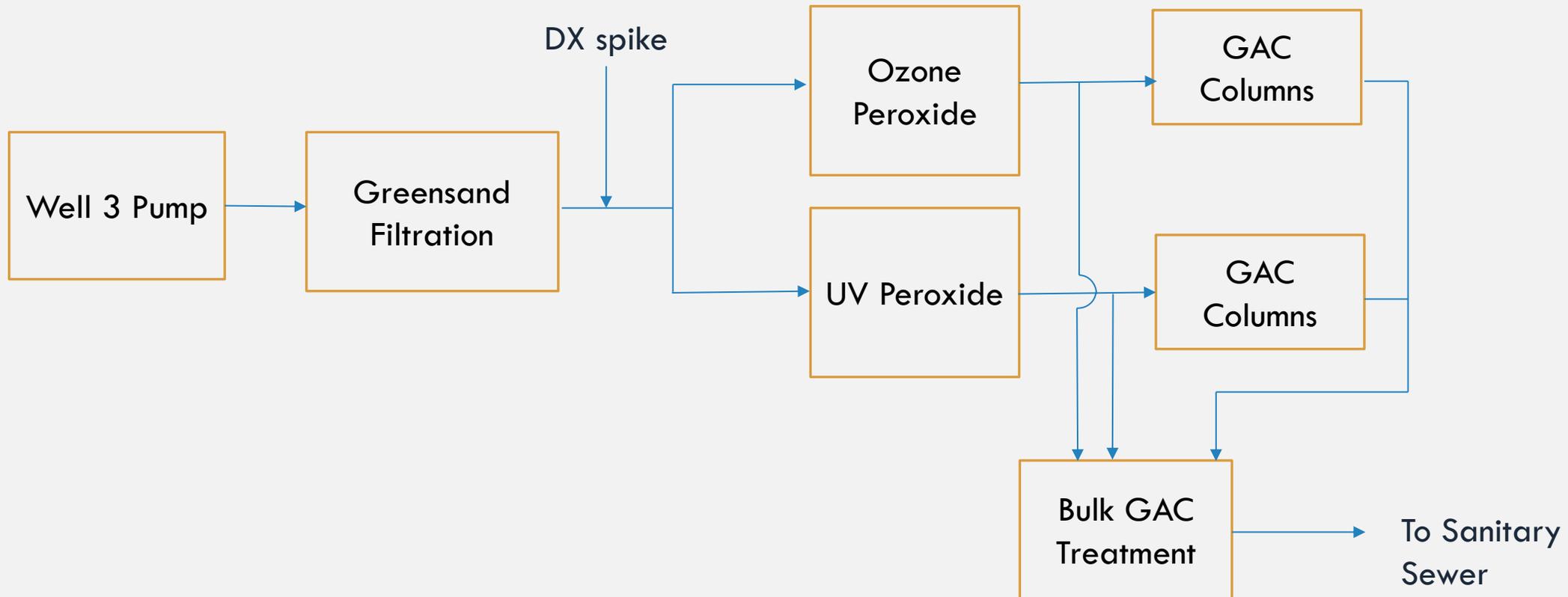
# TECHNOLOGY SCREENING

- Started with large menu of technologies
- Established criteria for screening (selection for piloting) and final selection (post-pilot)
- Screened technologies to focus on
  - Demonstrated effectiveness for DX removal in drinking water at scale
  - Ability to pilot test on New Brighton water
- Result – two AOP technologies carried to pilot testing (AOP is Advanced Oxidation Process)
  - Low-Pressure UV + Peroxide
  - Ozone + Peroxide

# PILOT TESTING – WHAT ARE OUR QUESTIONS?

- What level of DX removal is achievable?
- What operating parameter combinations are effective?
- How do the technologies respond to variable feed conditions?
  - Water quality variations over time
  - Variations in operation of other existing equipment
  - Higher concentrations of DX
- How do technologies perform over time?
  - Fouling
  - Failure of critical components
- What other changes to water quality may occur as a result of treatment?

## PILOT TESTING – WHAT IS THE EQUIPMENT?



# OZONE-PEROXIDE FULL SCALE



# OZONE-PEROXIDE PILOT



Ozone  
Separator

Ozone  
Injectors

Peroxide  
Injector

photo courtesy of APT

# UV-PEROXIDE FULL-SCALE

Tucson AZ Water Department



# UV-PEROXIDE PILOT



Peroxide  
Injector

UV Lamps

photo courtesy of Trojan

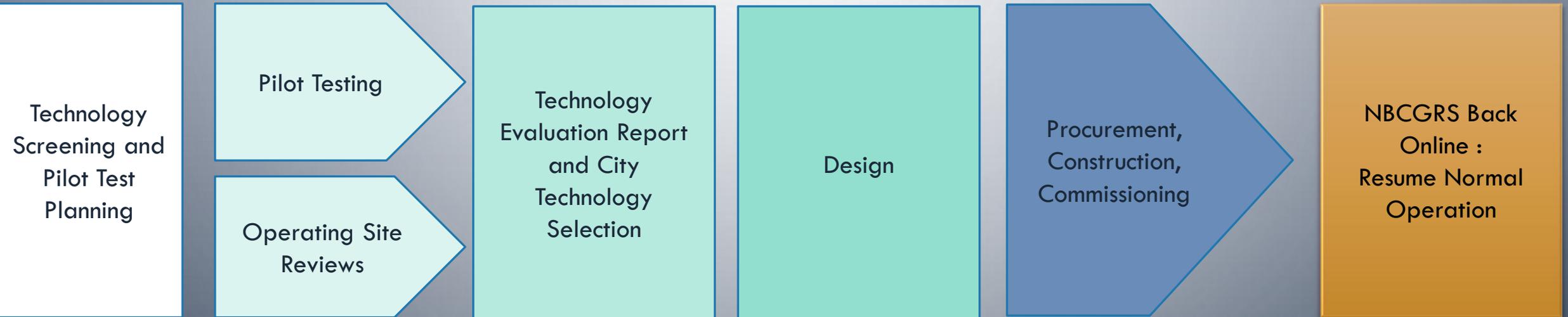
## RESULTS – WHAT HAVE WE LEARNED?

- Both technologies capable of achieving DX target (0.1 ppb), which is 1/10th of MDH health based guidance (1.0 ppb)
  - We have achieved treatment down to 0.03 ppb range
- Both technologies are capable of meeting all other current drinking water standards
- Both technologies require GAC for post-treatment
- The technologies have different maintenance and safety requirements
- The technologies have different cost components (power, chemical use)

# RESULTS AND RECOMMENDATIONS REPORT

- Present data, evaluation results, and conclusions
- Compare technologies based on criteria established during screening
- Recommend a technology for the long-term solution
- Final report and decision process: Fall 2016

# THE PATH TO A LONG-TERM SOLUTION



February –  
October 2015

June 2015-  
June 2016

In Progress,  
Complete  
Fall 2016

In Progress,  
Complete  
Spring 2017

Spring 2017  
Complete  
Fall 2018

NBCGRS Back  
Online :  
Resume Normal  
Operation

# QUESTIONS?



Mayor  
Valerie Johnson

Council Members (left to right)  
Paul Jacobsen  
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City Manager  
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Army Funding and Relationship

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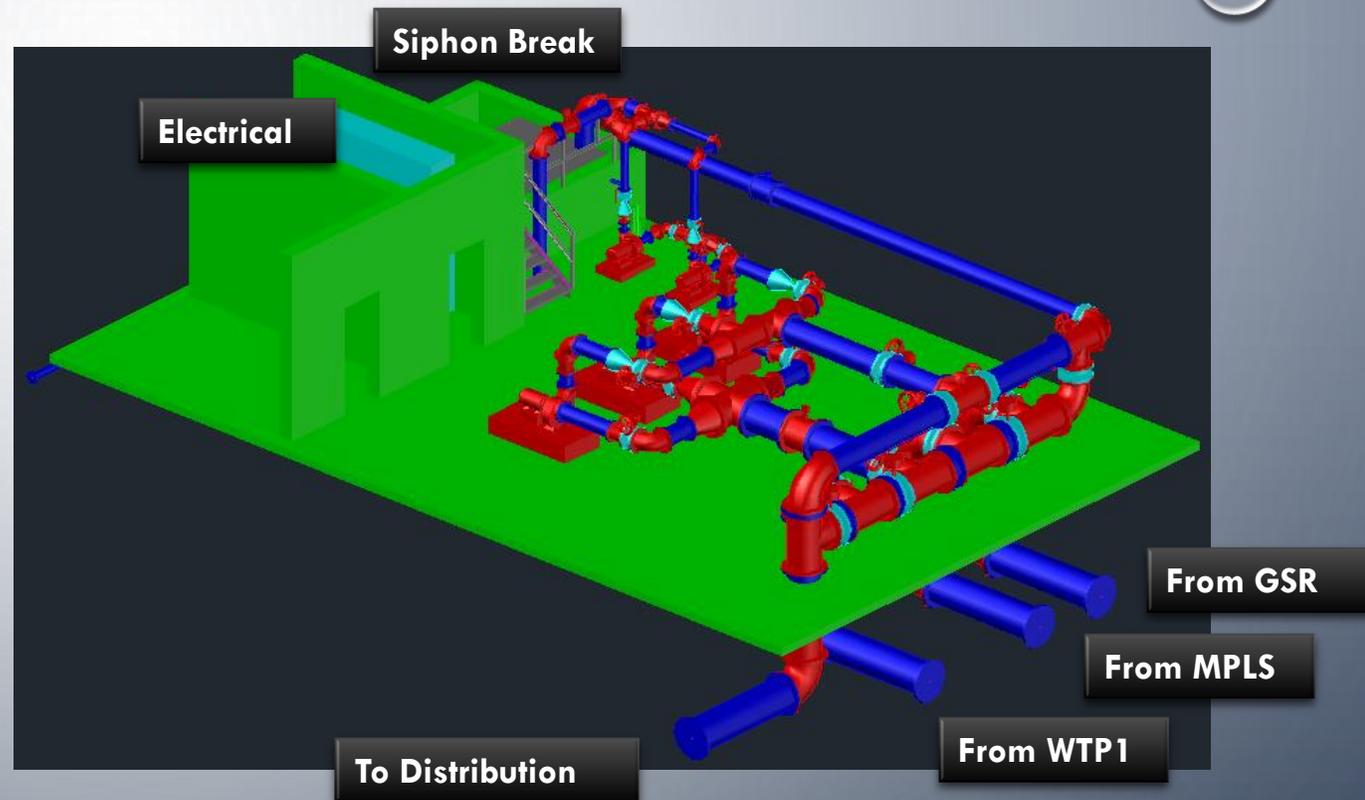
**PARTNERS**



**Minnesota Pollution Control Agency**



# WHAT IS THE DCS?



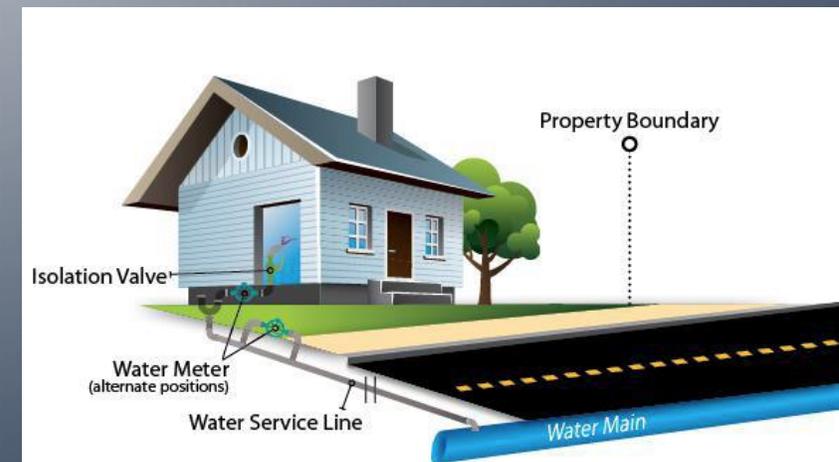
- Pumps boost water from Minneapolis to New Brighton
- Valves select source (Minneapolis or WTP1)
- Valves select destination (distribution, storage, discharge)

# NEW BRIGHTON TO MINNEAPOLIS TRANSITION PLAN

- MDH reviewed/approved chemical feed plan
- New Brighton now feeding corrosion control chemicals (poly/ortho phosphate) into New Brighton's distribution system
  - (PROCESS WAS NOT DONE IN FLINT, MI)**
  - 3 locations (WTP 3, 4, 5)
  - Feed the same 50 polyphosphate / 50 orthophosphate blend that Minneapolis uses
  - Increased feed of ortho phosphate
    - Coats pipe to inhibit corrosion

# NEW BRIGHTON TO MINNEAPOLIS TRANSITION PLAN

- In the late 80's New Brighton removed/replaced all known lead/galvanized services to the curb stop.
- New Brighton services mainly copper, with more recent homes using HDPE (Endopure)
- Corrosion control will also coat water meters, and in home fixtures as they can contain brass (which is a metal alloy, mainly copper and zinc, with pre 1997 faucets having as much as 8% lead)
- Transition of water feed points will change aesthetics
  - City will systematically flush hydrants
  - Discolored water is safe (stemming from naturally occurring iron/manganese in our water supply)

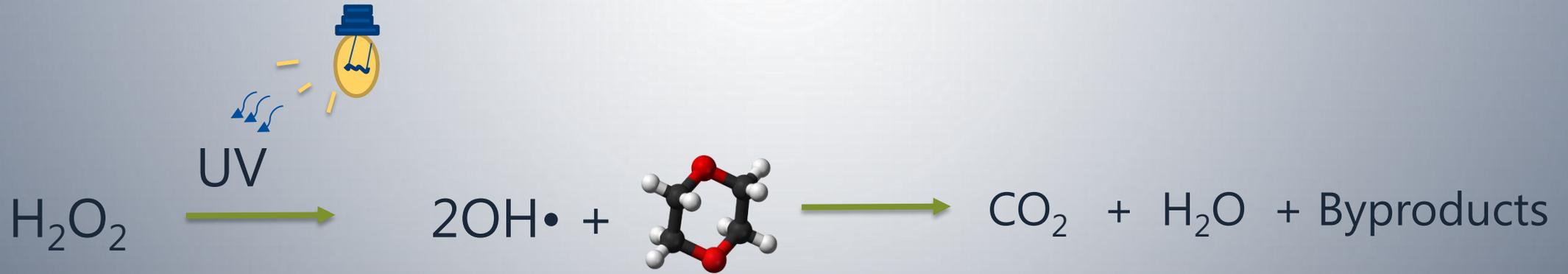


# NEW BRIGHTON PIPE MATERIALS

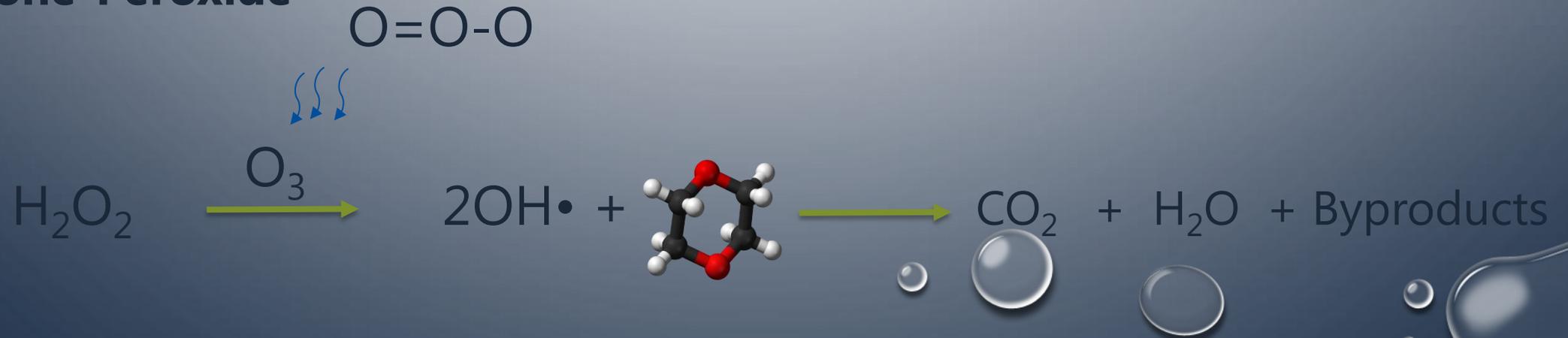
- New Brighton watermain pipes
  - 333,889 feet of cast iron (cement lined)
  - 143,451 feet of ductile iron (cement lined)
  - 16,593 feet of PVC
  - 13,203 feet of concrete
  - 1,502 feet of steel

# CHEMICAL TREATMENT OF DX BY ADVANCED OXIDATION

## UV-Peroxide



## Ozone-Peroxide

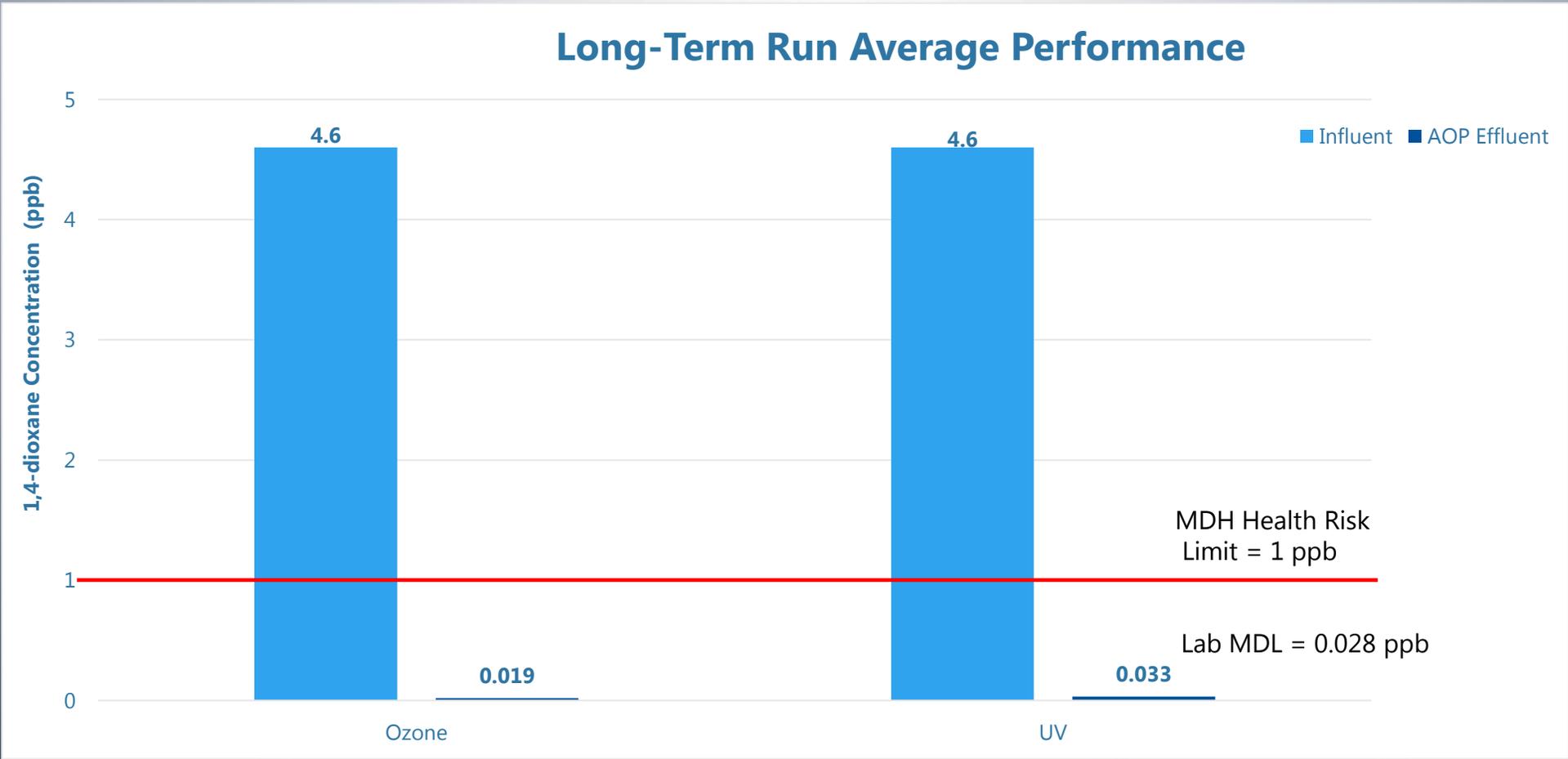


## PILOT TESTING – WHAT ARE THE TESTS BEING RUN?

Phase	Description	Duration (6 months total)
0	Pilot Start-Up and Training	1 month
1	AOP Optimization	3 months
2	Continuous Run	2 months
3	GAC Optimization	5 months (concurrent with Phases 1 and 2)
4	Hydroxyl Scavenger Testing	Short; conducted when convenient
5	Wiper/Fouling Test	1 month



# DX REMOVAL SUMMARY



Half the MDL assumed for measurements < MDL

# PILOT TESTING WORK IN PROGRESS – WHAT IS LEFT TO LEARN?

- Finished 2-month continuous run in **April**
  - Verify consistency of treatment
  - Additional observation of GAC performance
  - Additional observation of other water quality **parameters**
    - Will these technologies affect disinfection practices?
    - Will these technologies affect corrosion control practices?
- Extended run in *May*

# OPERATING SITE REVIEWS – WHAT WILL WE LEARN?

- Compare pilot observations to experiences of operators who are treating DX in drinking water at full scale
  - Explore and vet potential issues beyond vendor claims
- Understand scale-up from pilot to full-scale
  - Equipment
  - Procurement and construction experience
  - Staffing and training experience
  - Control and reliability experience
  - Maintenance requirements
  - Vendor support experience