

Compliance with California's Draft DPR Criteria:

Case Study of San Diego's Phase 2 Pure Water Project

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3/30/22



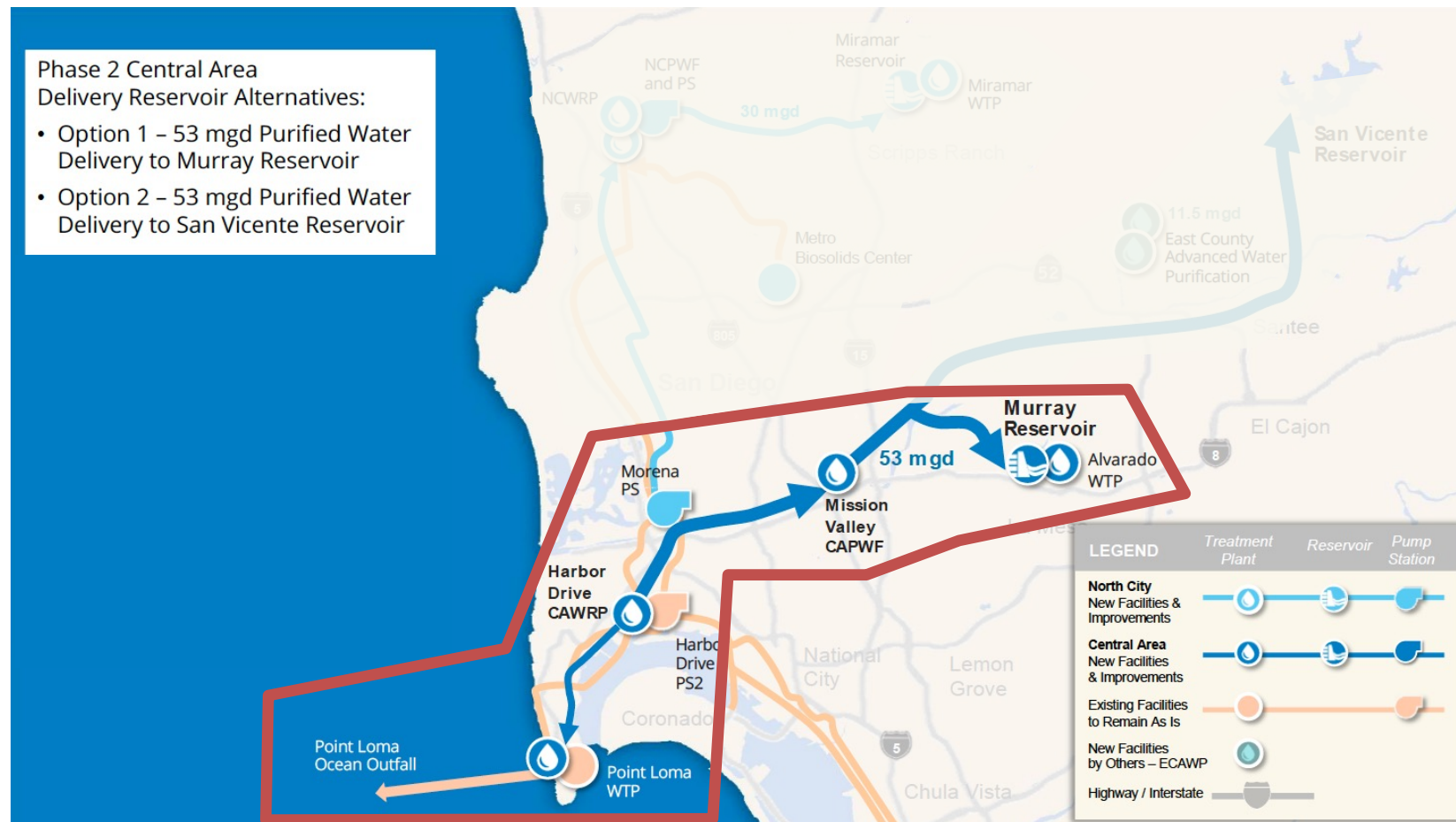
Acknowledgements

- Brian Pecson
- Anya Kaufman
- Douglas Owen
- Amy Dorman
- Jeffery Pasek

Central Area Project to Produce 53 MGD

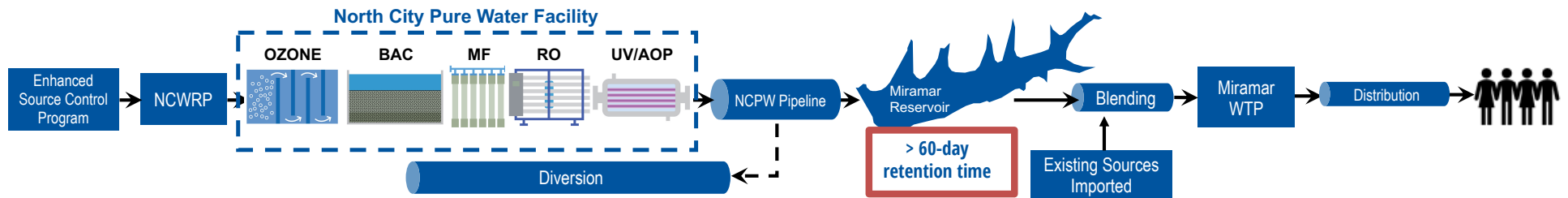


Concept Proposal focuses on Murray Reservoir Option

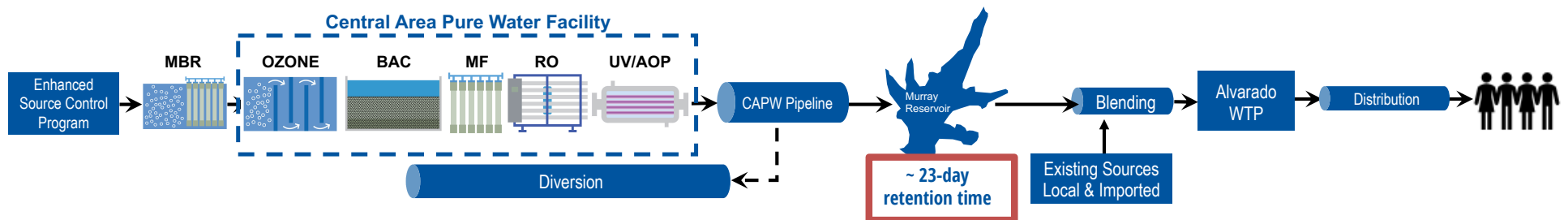


Comparison of Project Types

North City: Surface Water Augmentation (IPR)



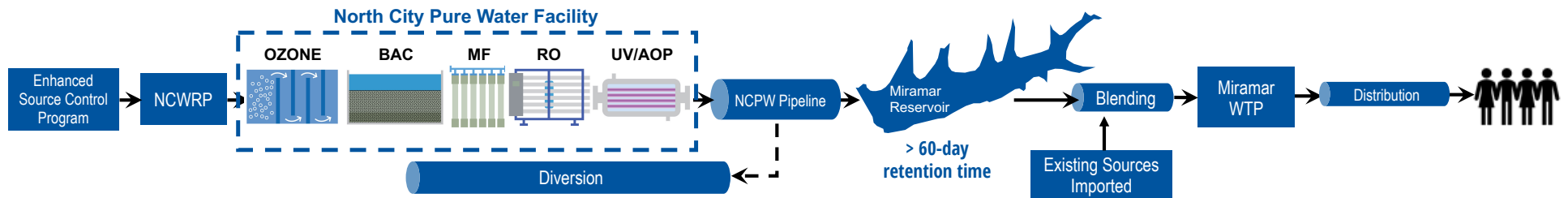
Central Area: Raw Water Augmentation (DPR)



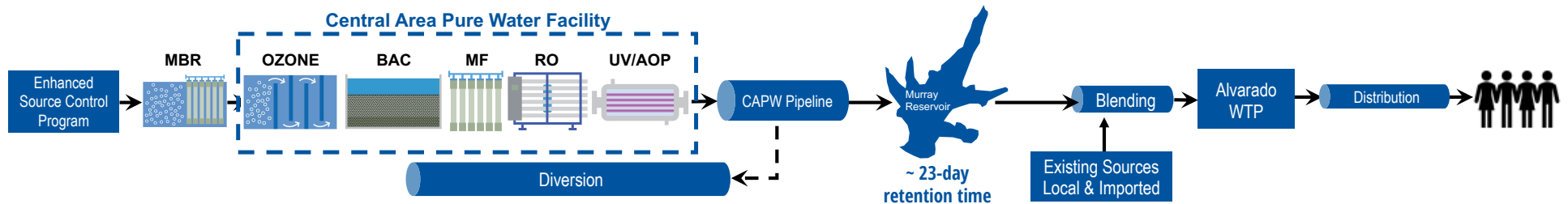
- These projects are very similar, but one is IPR and one is DPR
- The primary difference is the retention time in the reservoir

Comparison of Project Types

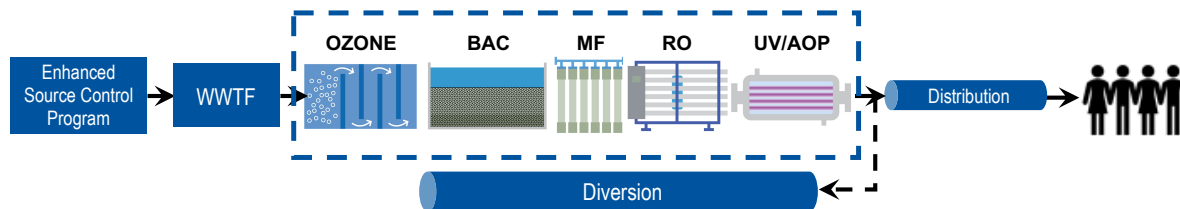
North City: Surface Water Augmentation (IPR)



Central Area: Raw Water Augmentation (DPR)



Treated Water Augmentation (DPR)



These two projects are held to the same regulatory criteria even though they are quite different

Goals of Presentation

- Review DDW's March 2020 draft criteria for DPR
- Compare Phase 2 Murray Reservoir Concept against draft DPR criteria
- Consider adaptations to the requirements for Phase 2 RWA

Major Categories for Discussion

Chemical Control



Pathogen Control



Monitoring & Control



Chemical Control

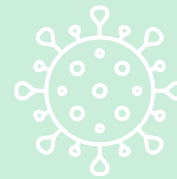
Treatment

Mixing

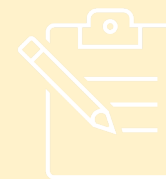
Monitoring

Source Control

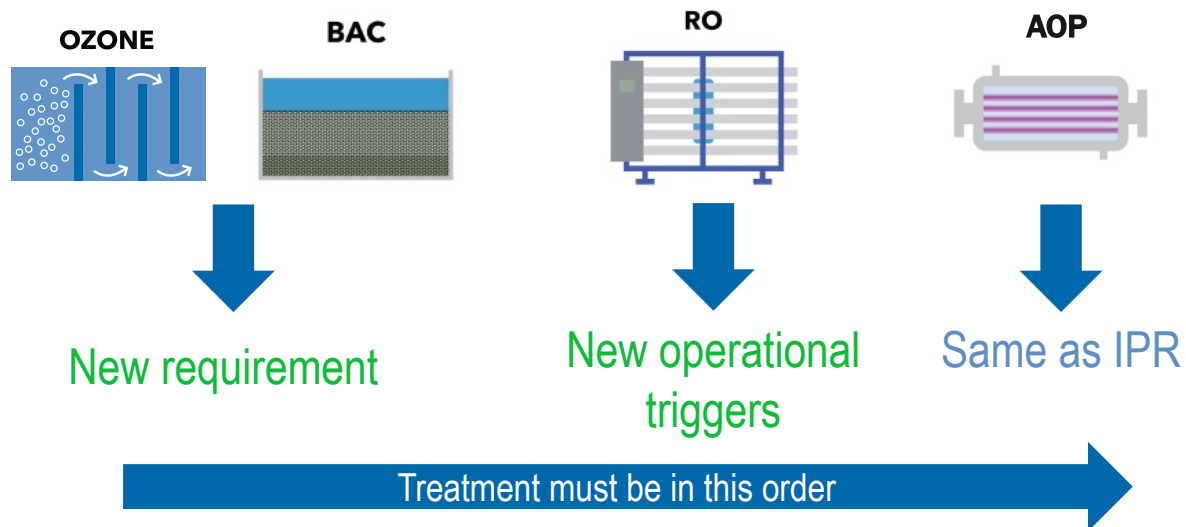
Pathogen Control



Monitoring & Control

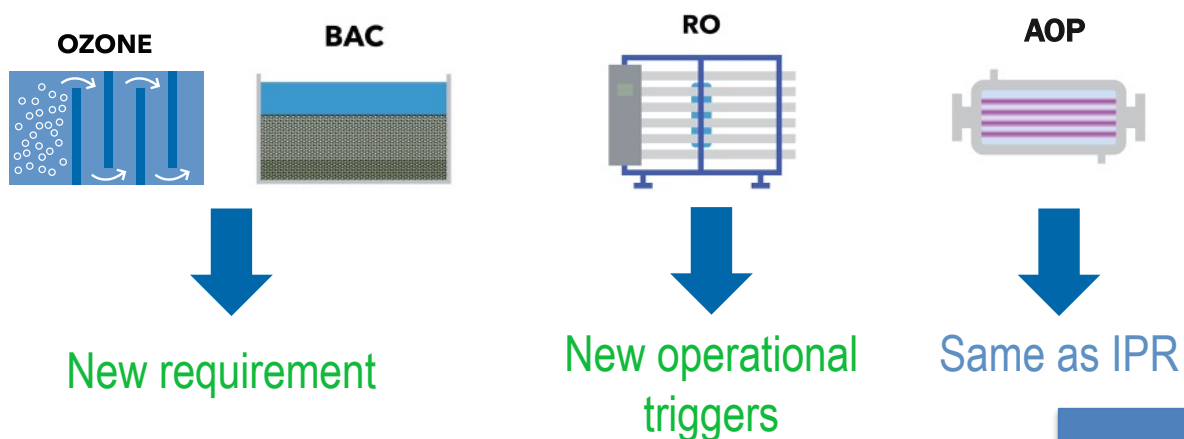


Treatment Requirements



TOC Trigger	Action
> 0.1 mg/L for more than 24 hours	Perform a 5-day total trihalomethane formation potential study
> 0.15 mg/L for more than 5 days at RO permeate	Perform conductivity profile to identify underperforming vessel or element
> 0.25 mg/L at RO permeate	Collect samples to investigate peak
> 0.5 mg/L prior to distribution	Automatically discontinue delivery of water to distribution system

Anticipated Treatment for Phase 2

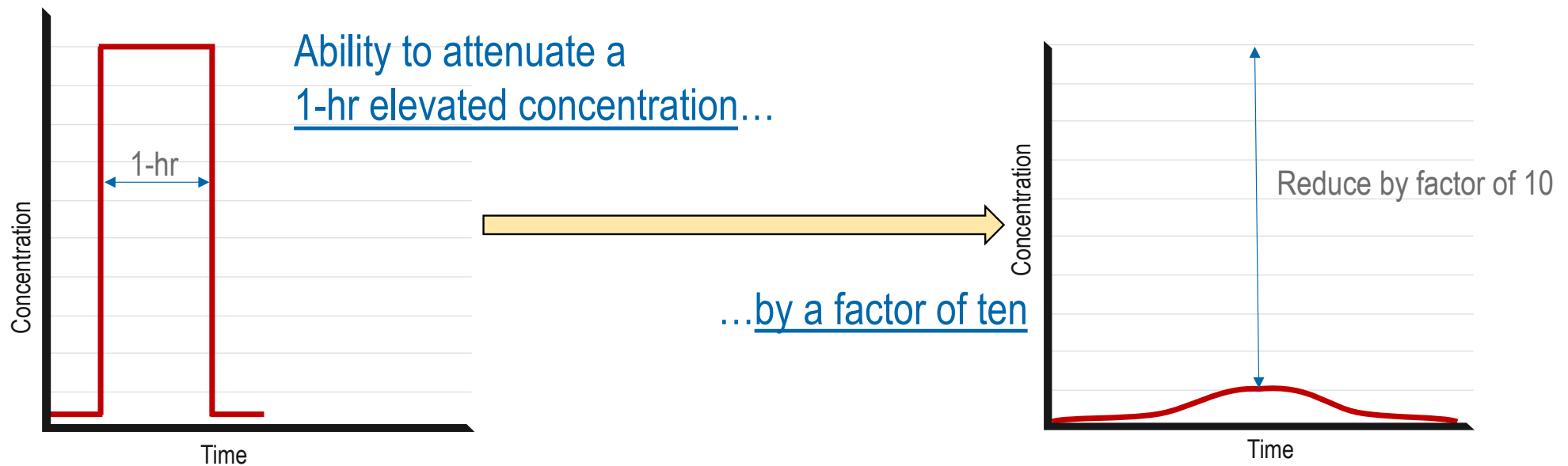


Treatment must be in this order

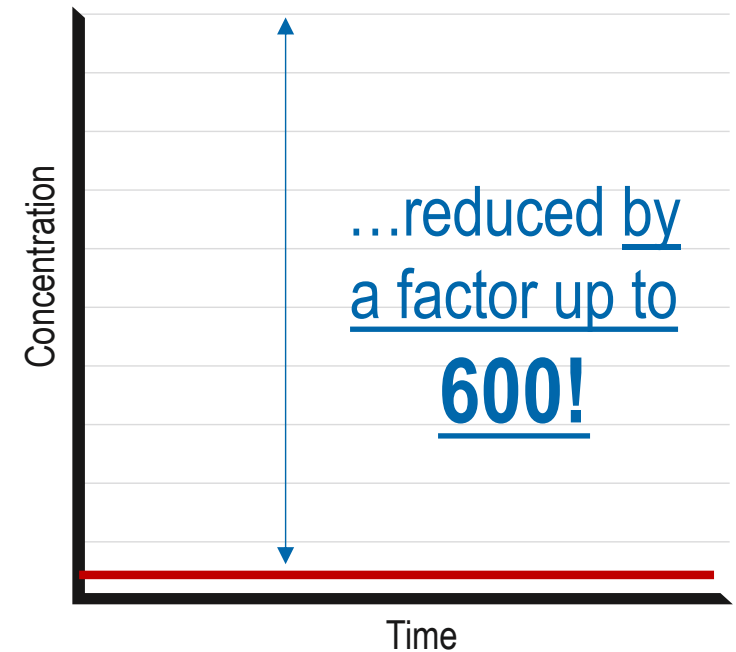
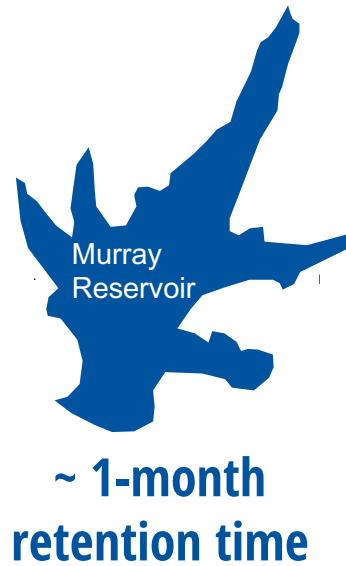
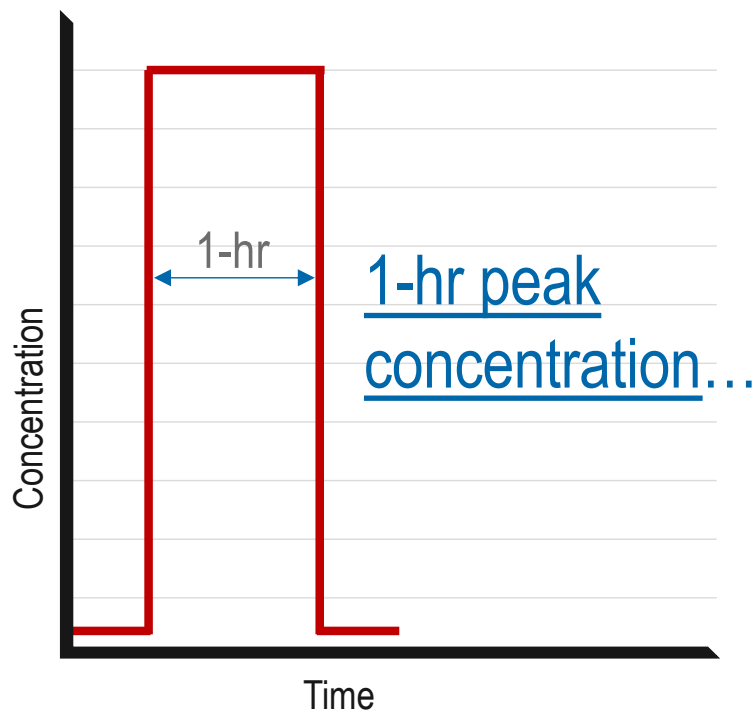
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North City
Pure Water
Demo Facility
Average TOC:
0.03 – 0.04 mg/L

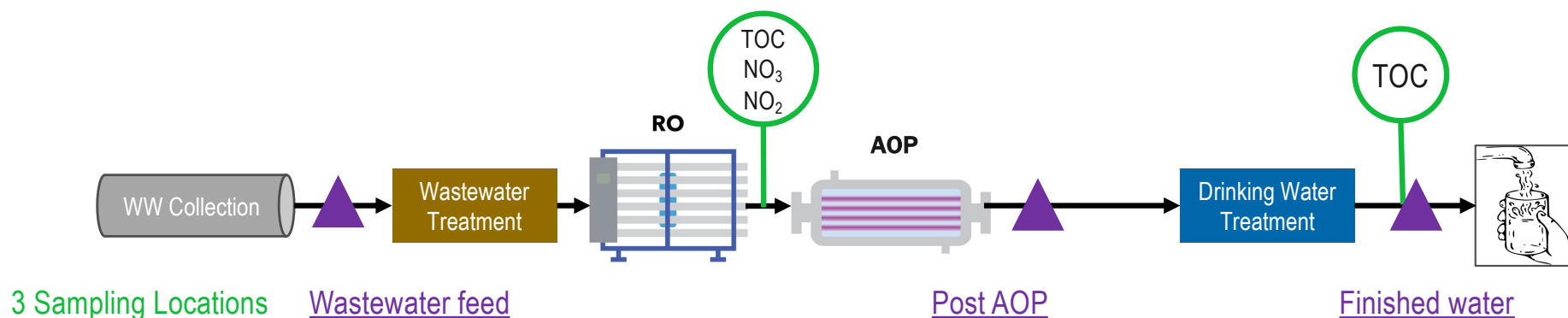
Mixing Requirements



Mixing Provided by Murray Reservoir

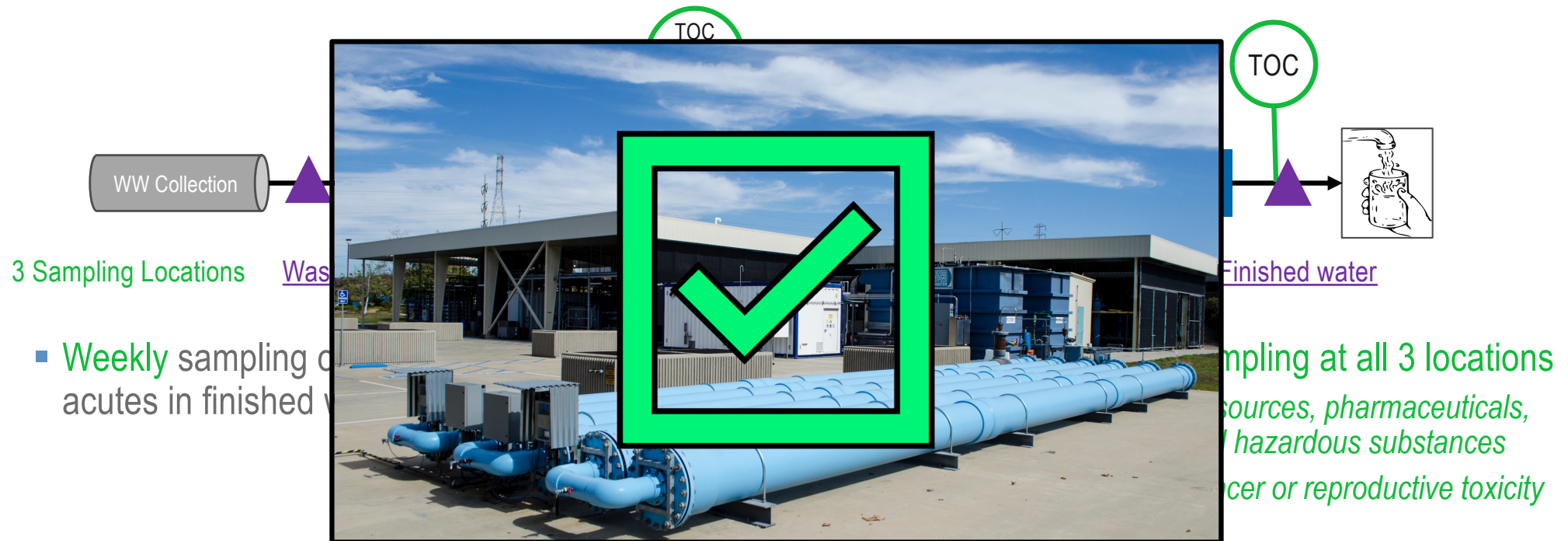


Monitoring Requirements



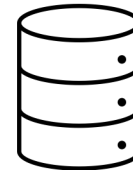
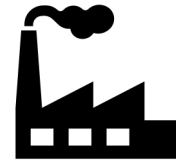
- **Weekly** sampling of acutes in finished water
- **Monthly** sampling at all 3 locations
 - *MCLs, NLs, lead, copper*
 - *Low molecular weight compounds*
 - *Byproducts & precursors*
- **Quarterly** sampling at all 3 locations
 - *Industrial sources, pharmaceuticals, PCPs, and hazardous substances*
 - *Cause cancer or reproductive toxicity*

Monitoring at San Diego Pure Water

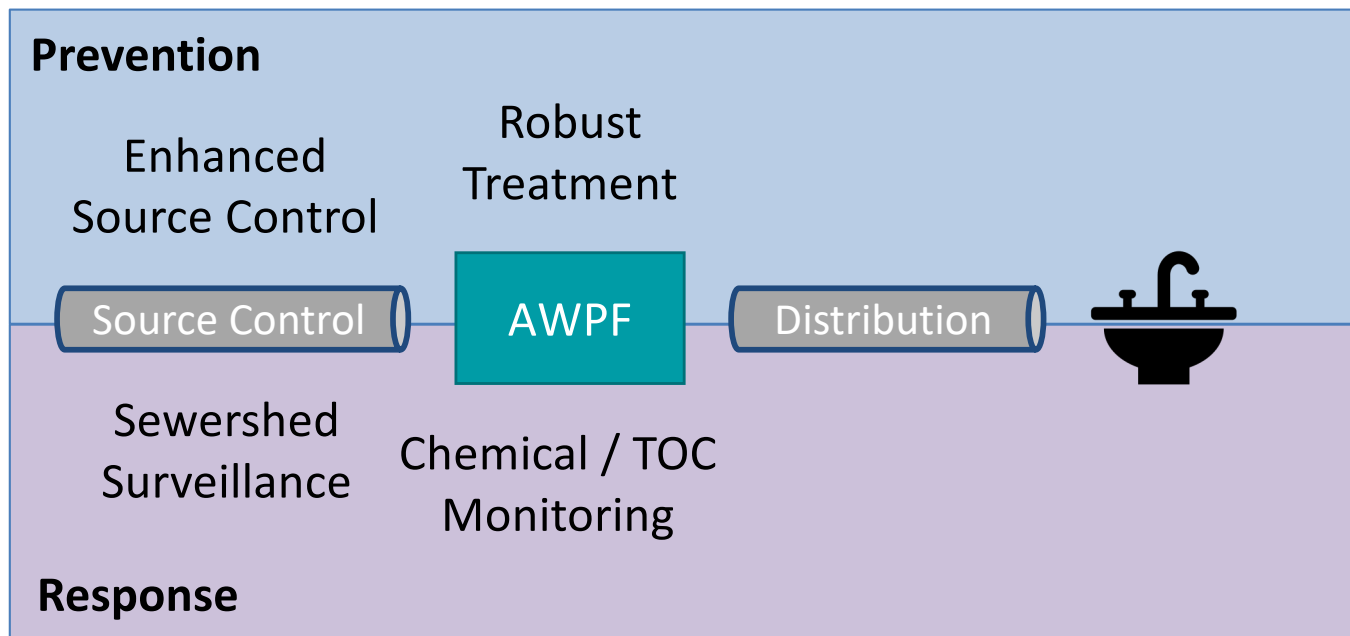


Source Control Requirements

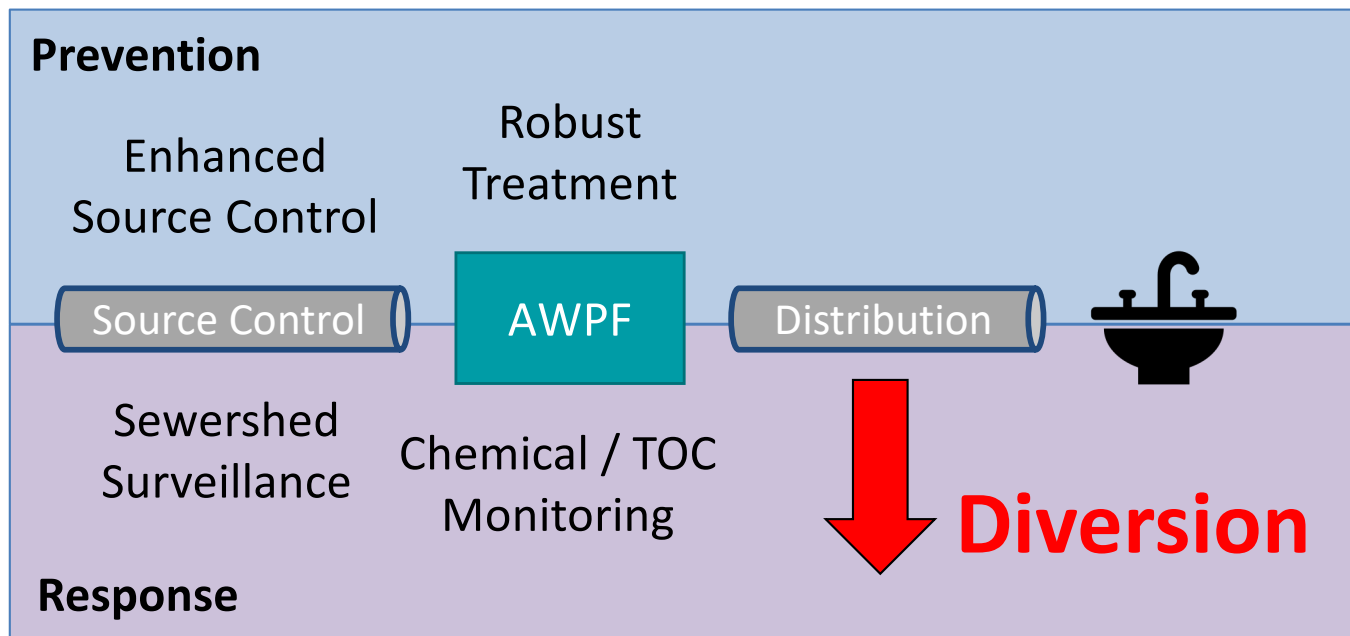
- Local limits for public health
- Quantitative risk assessment
- Source control committee
- 5-year audit
- Sewershed surveillance



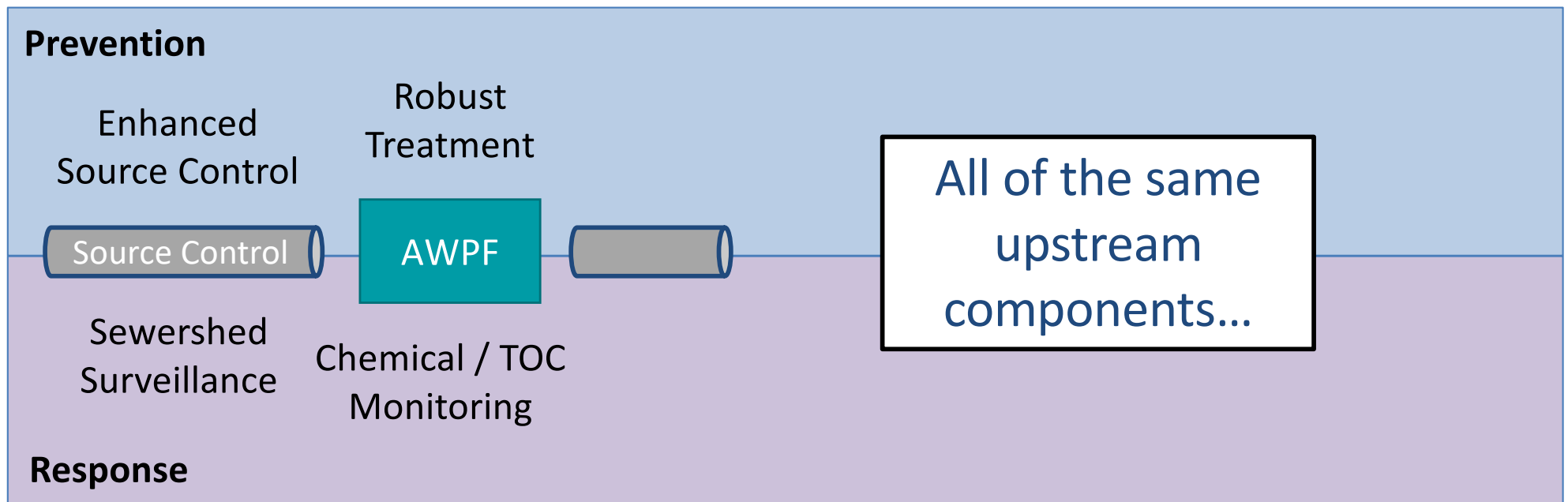
Reliance on Failure Response in TWA



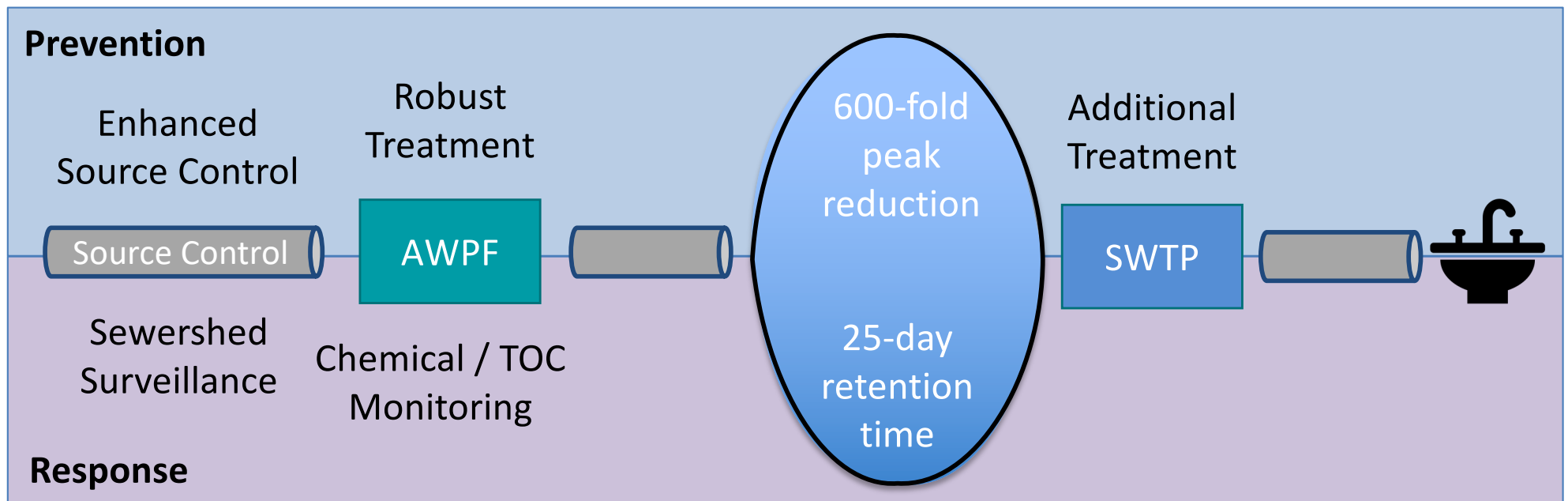
Reliance on Failure Response in TWA



Phase 2 RWA provides additional protections



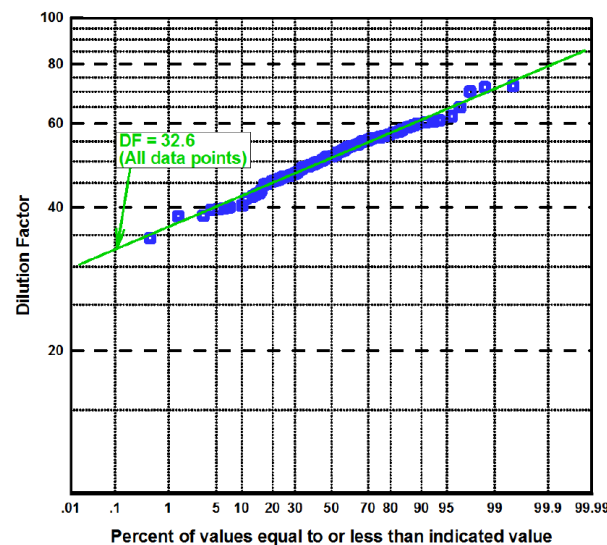
Phase 2 RWA provides additional protections



Can we quantify the benefits of dilution and time?



Dilution



Retention Time

$$\text{Reservoir retention time} = \frac{V_{\text{Reservoir}}}{Q_{\text{Out, Month}}}$$

§64668.30(b)

Equal Protection of Public Health in RWA and TWA

Enhanced
Source
Control

Sewershed
Monitoring

NDN +
Filters

O₃/BAC

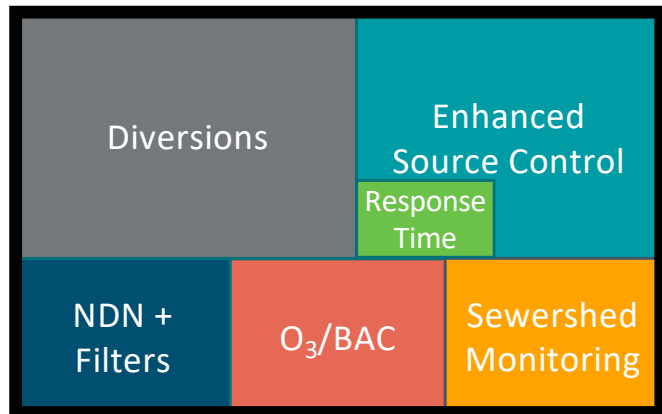
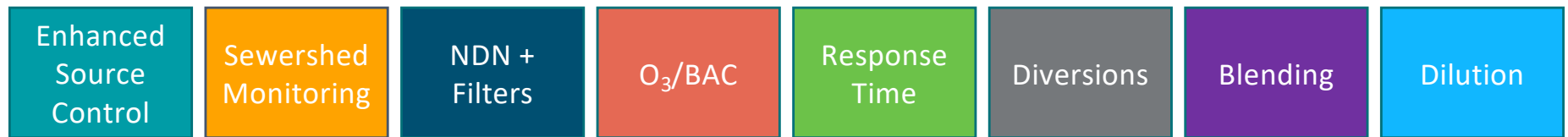
Response
Time

Diversions

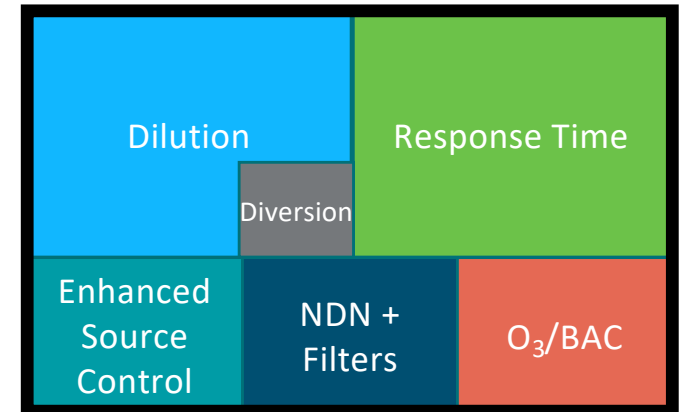
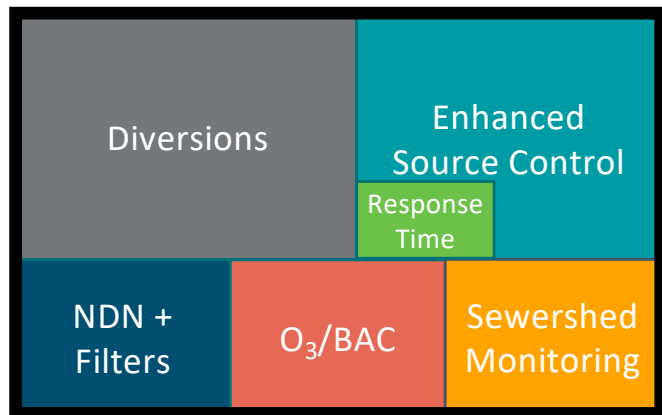
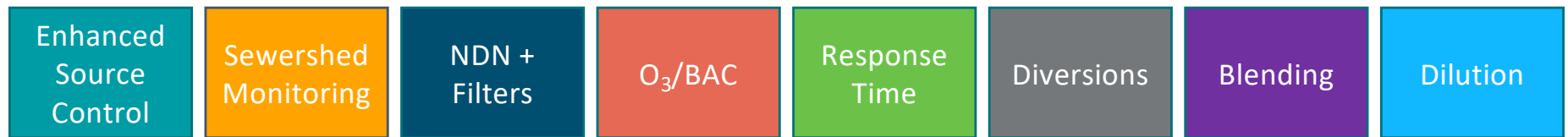
Blending

Dilution

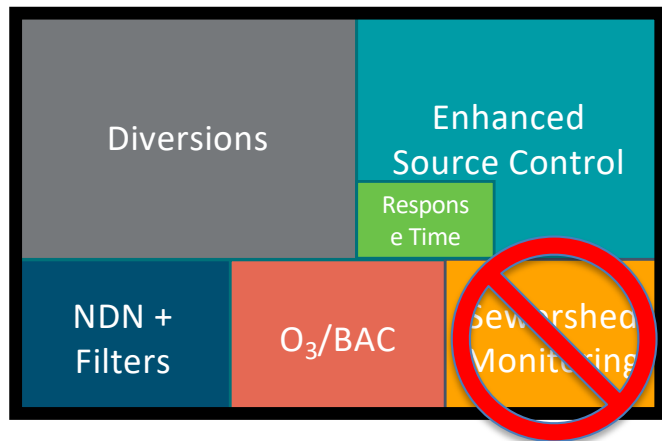
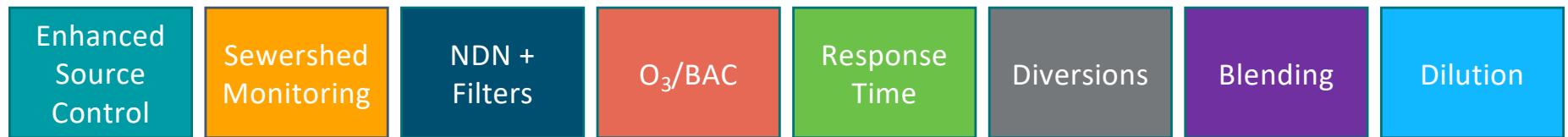
Equal Protection of Public Health in RWA and TWA



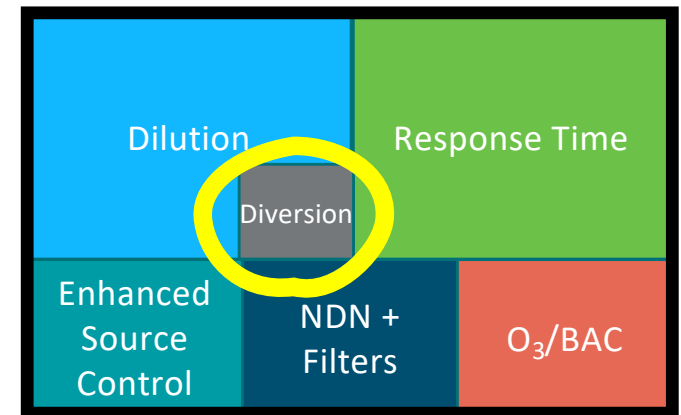
Equal Protection of Public Health in RWA and TWA



Equal Protection of Public Health in RWA and TWA



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Pathogen Control

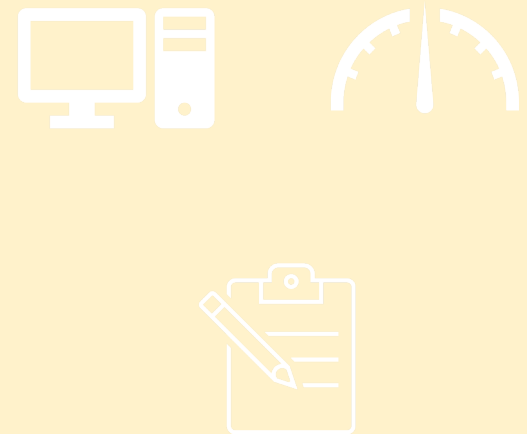
Chemical Control



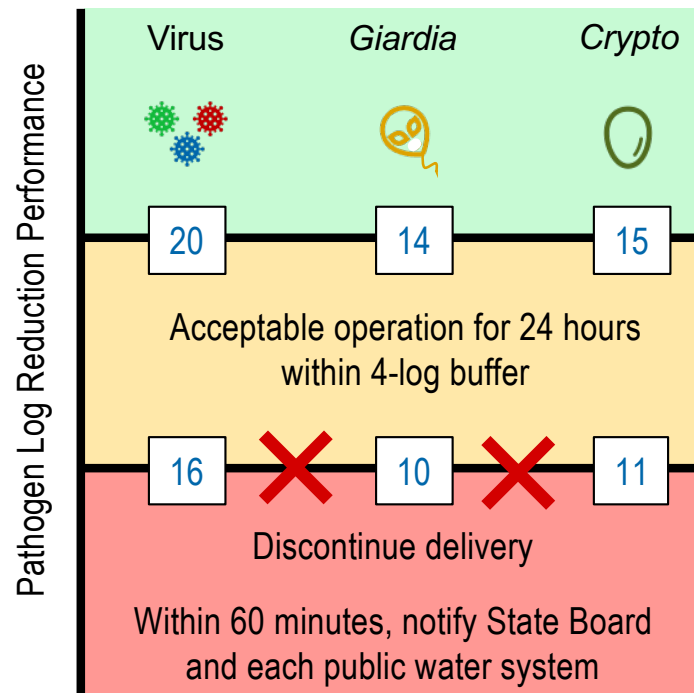
Pathogen Control



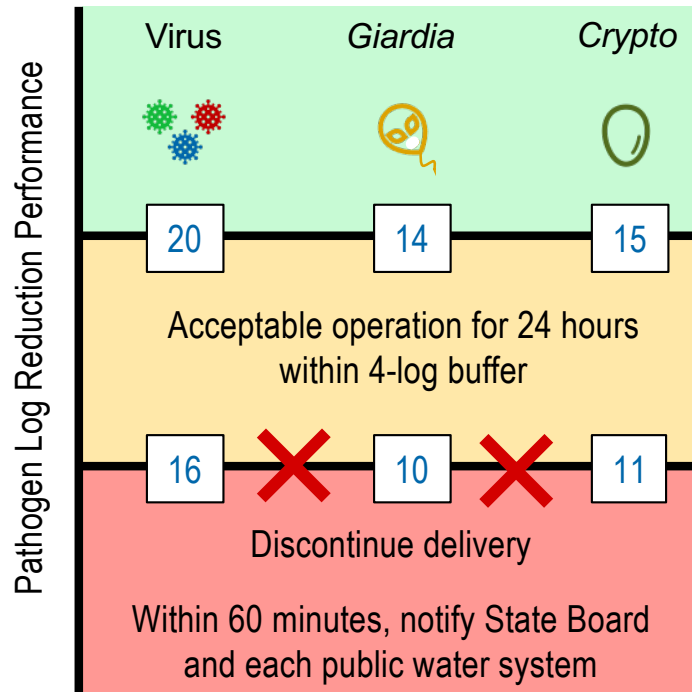
Monitoring & Control



Pathogen Control Requirements



Pathogen Control Requirements

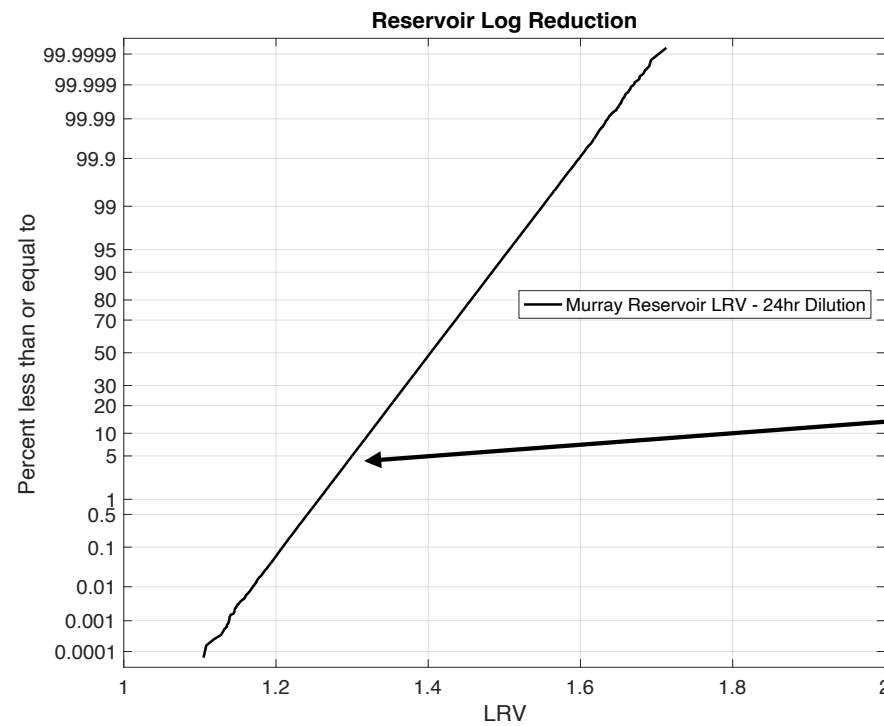


Phase 2 LRVs at WRP and AWPF

Pathogen	CAWRP + CAPWF (AWT)						AWT Total
	MBR	O ₃ /BAC	MF	RO	UV/AOP	Cl ₂	
Virus	1	6	0	2.5	6	6	21.5
Giardia	2.5	6	4	2.5	6	1	22
Crypto	2.5	1	4	2.5	6	0	16

Phase 2 Pathogen Control

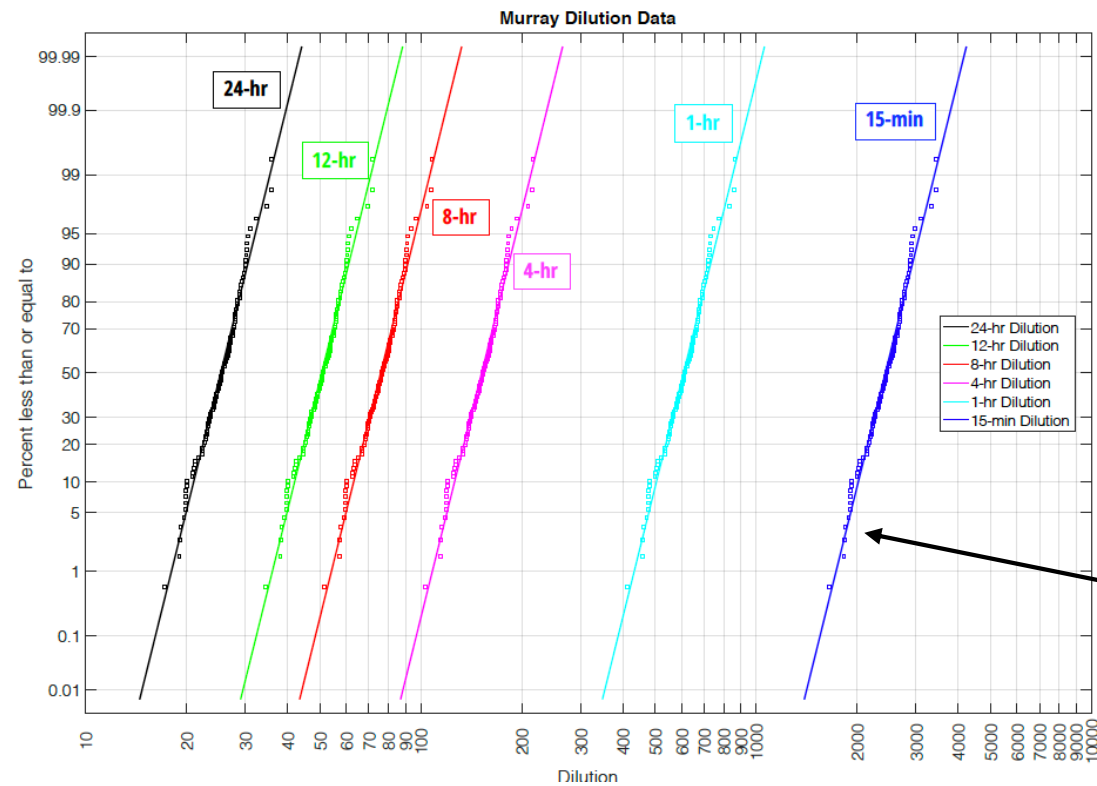
AWT Total	Murray Reservoir
21.5	1.0
22	1.0
16	1.0



5th percentile LRV
of 24-hour pulse:
1.3-log₁₀

Phase 2 Pathogen Control

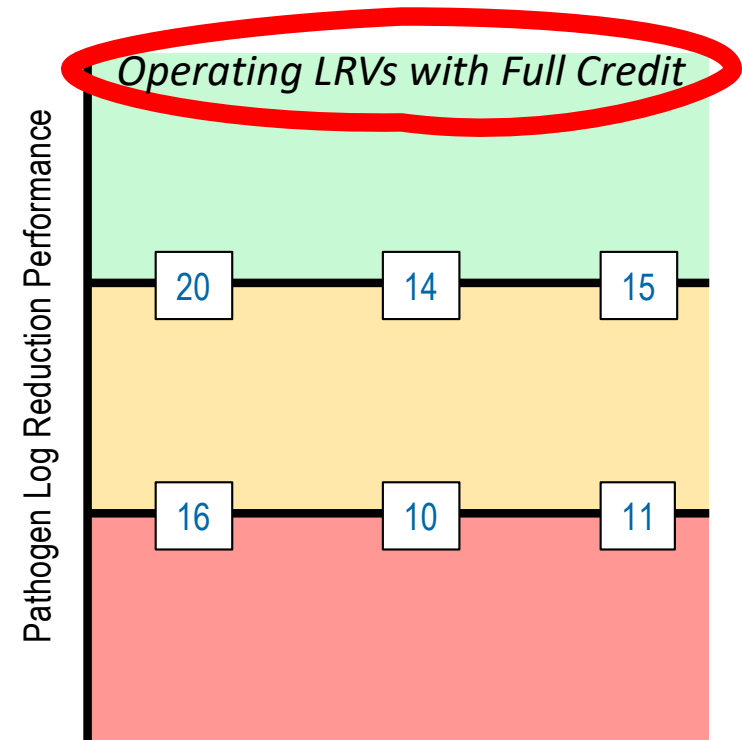
AWT Total	Murray Reservoir
21.5	3.0
22	3.0
16	3.0



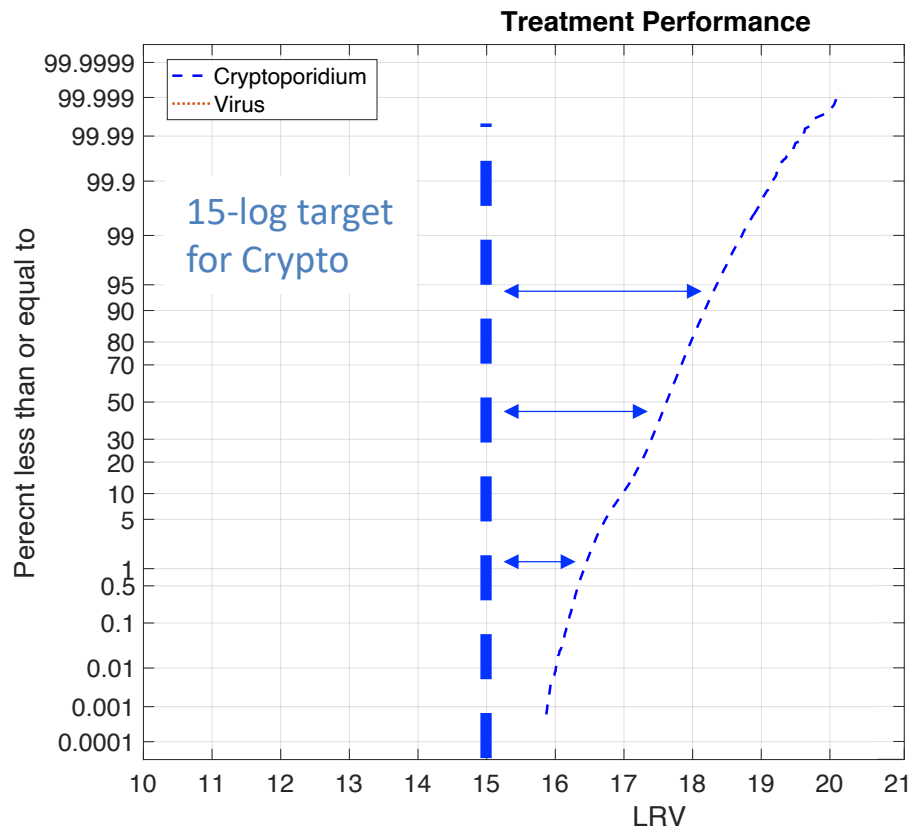
5th percentile
LRV of 15-
minute pulse:
>3-log₁₀

Phase 2 Pathogen Control

AWT Total	Murray Reservoir	AWT + Murray Reservoir	AWT + Murray + Alvarado WTP
21.5	3	24.5	28.5
22	3	25	28
16	3	19	21



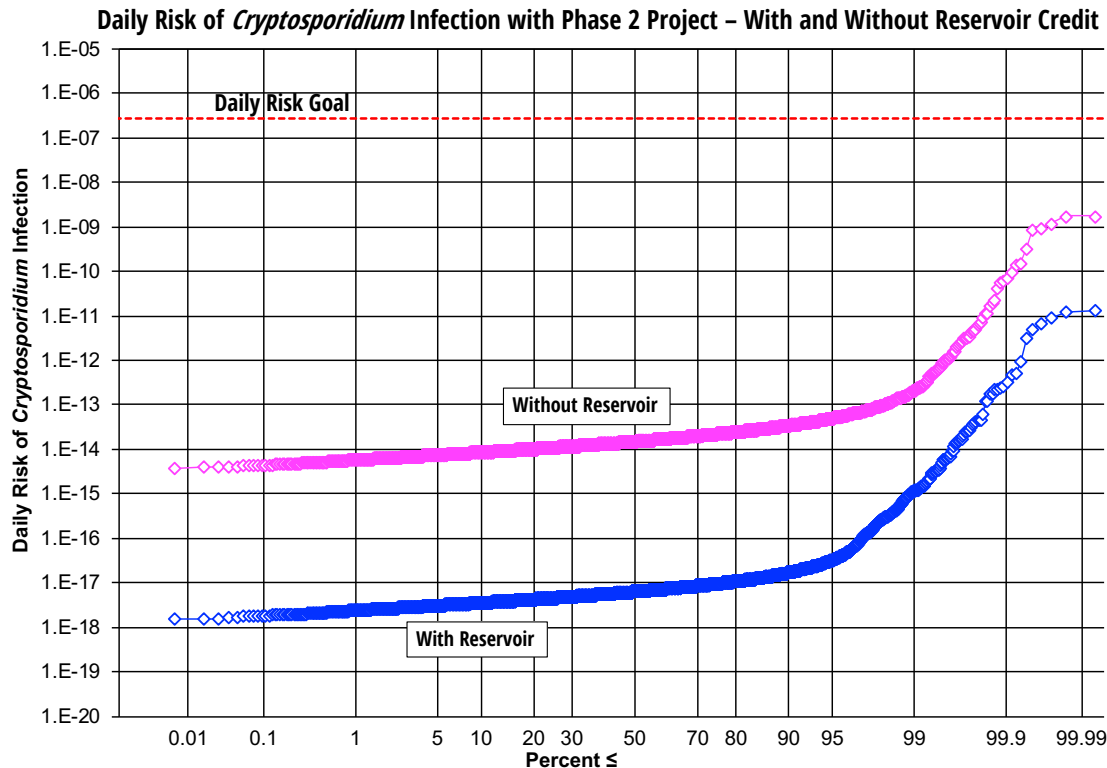
Is Phase 2 protective of Public Health?



Probabilistic Assessment of Treatment Train Performance

- Used same approach as DPR-1
- Treatment consistently meets pathogen LRV targets

Is Phase 2 protective of Public Health?



Quantitative Microbial Risk Assessment

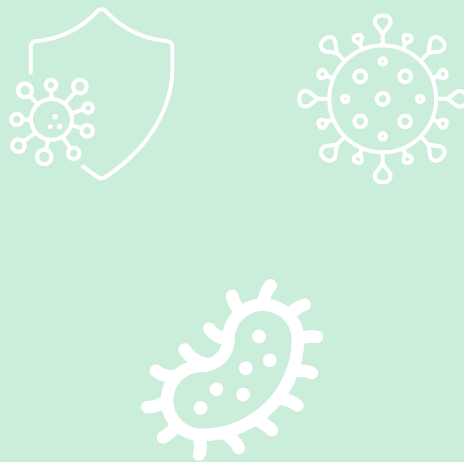
- Same approach as DPR-1
- Treatment consistently meets daily risk targets for DPR

Monitoring and Control

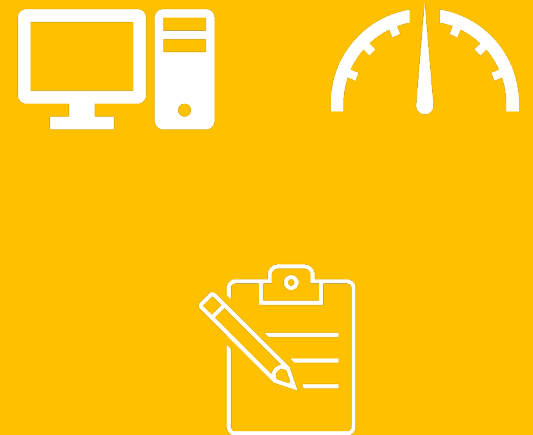
Chemical Control



Pathogen Control

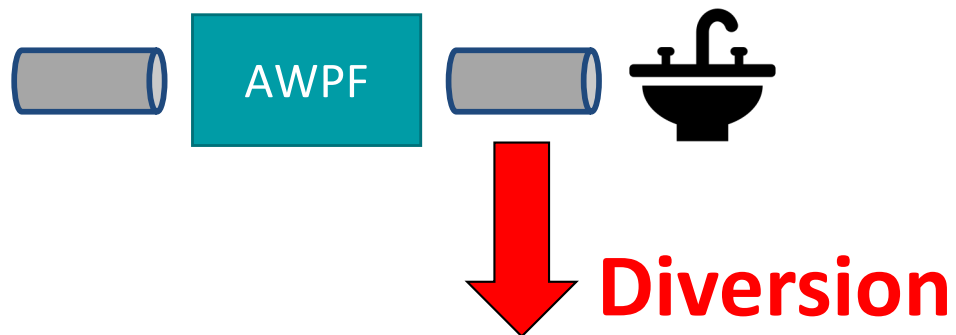


Monitoring & Control

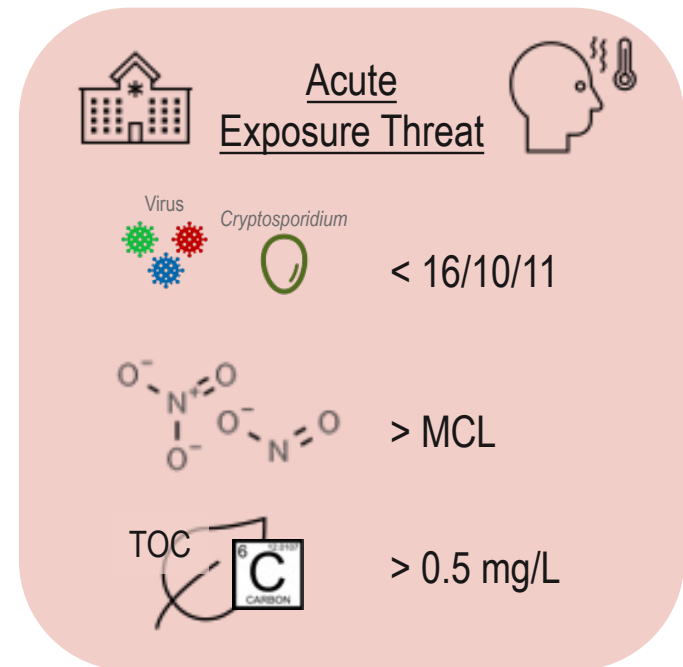


Monitoring and Control Requirements

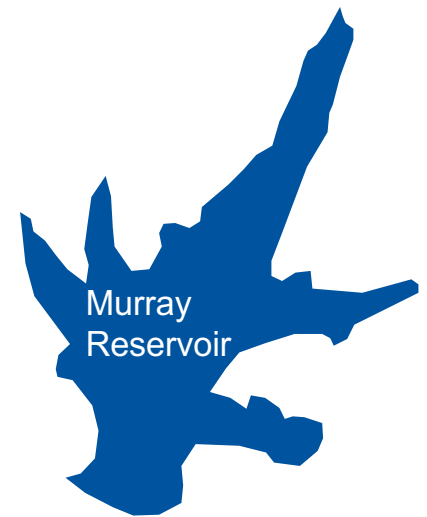
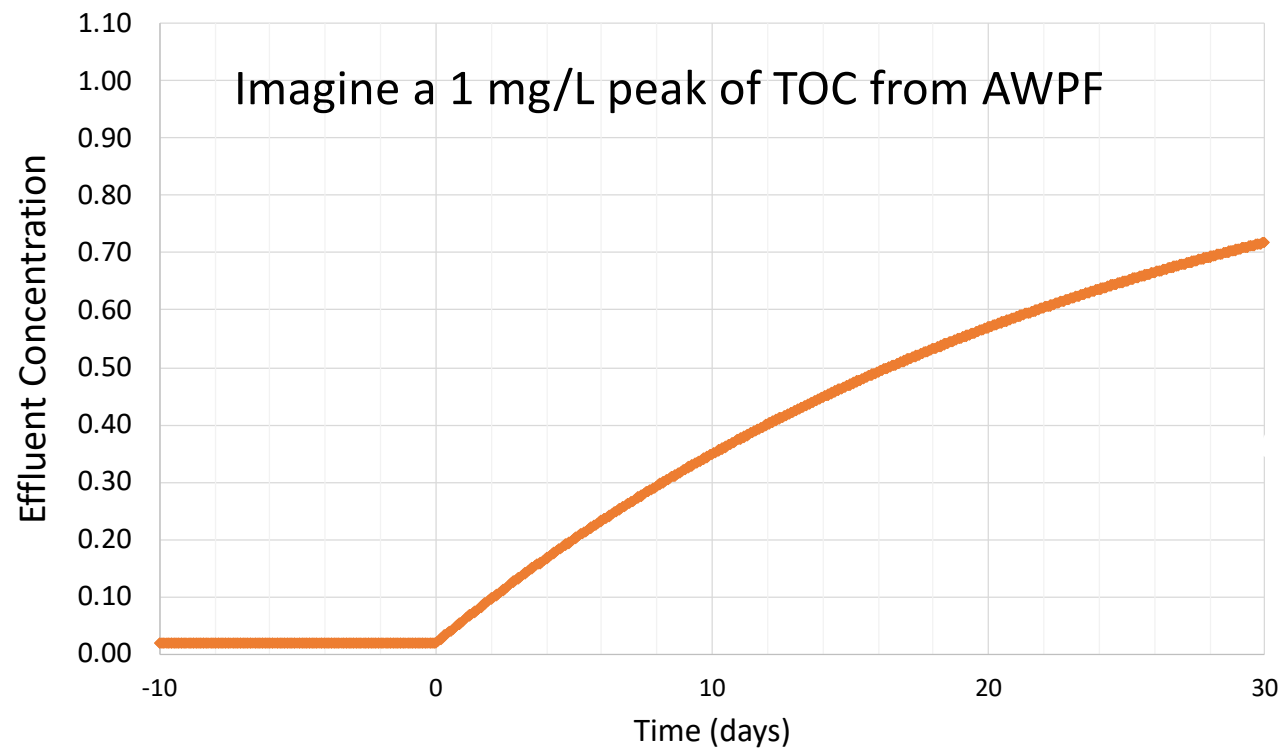
- Response time: be able to divert before 10% of water passes
- Immediate stop for acute threats



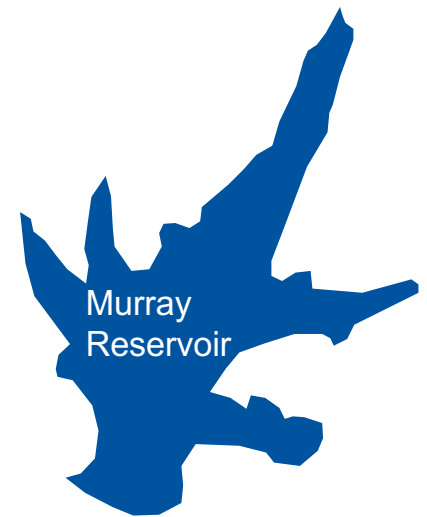
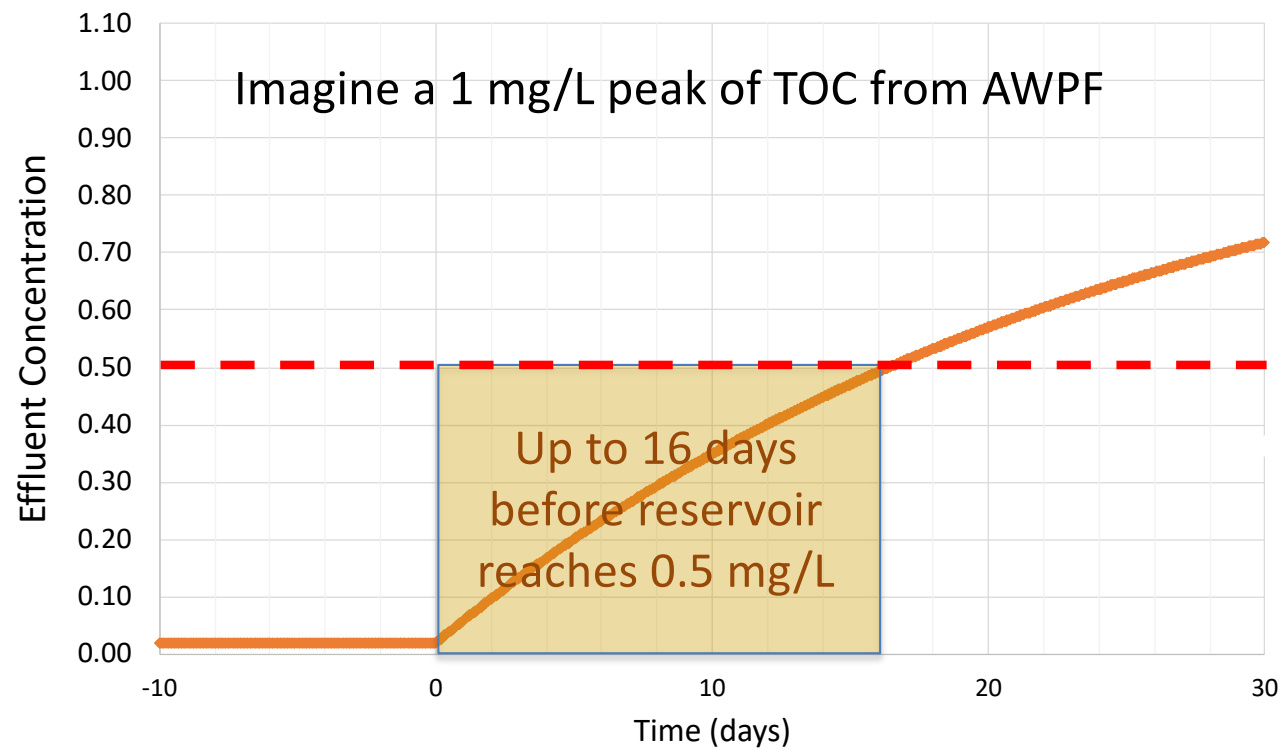
- Staffing: 24/7 requirement for AWT5



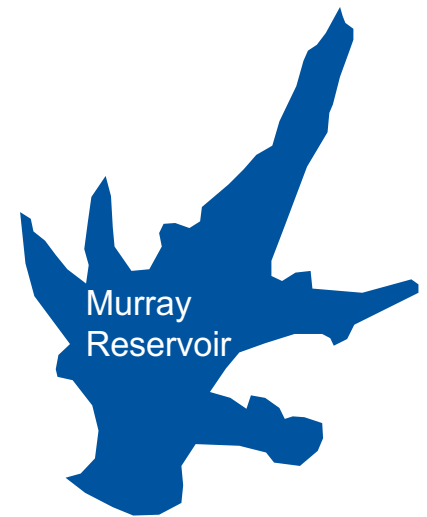
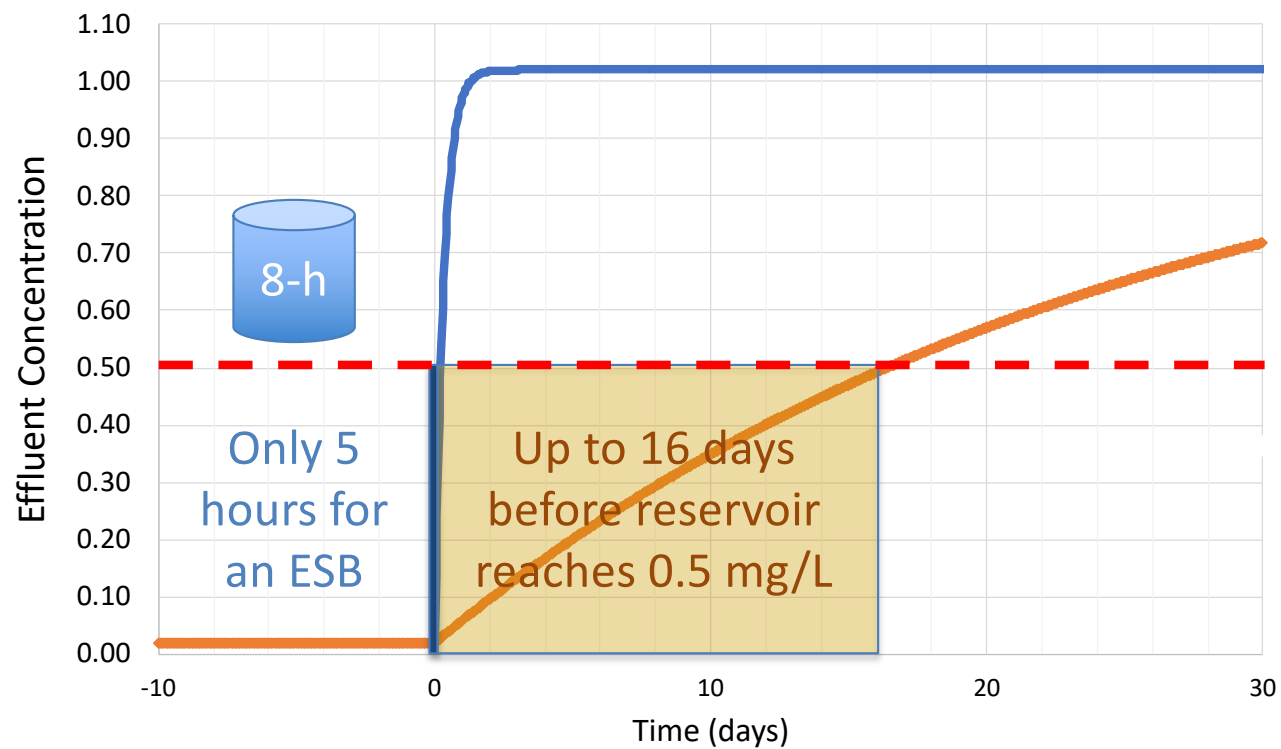
Phase 2 RWA is Less Reliant on Diversion than TWA



Phase 2 RWA is Less Reliant on Diversion than TWA



Phase 2 RWA is Less Reliant on Diversion than TWA

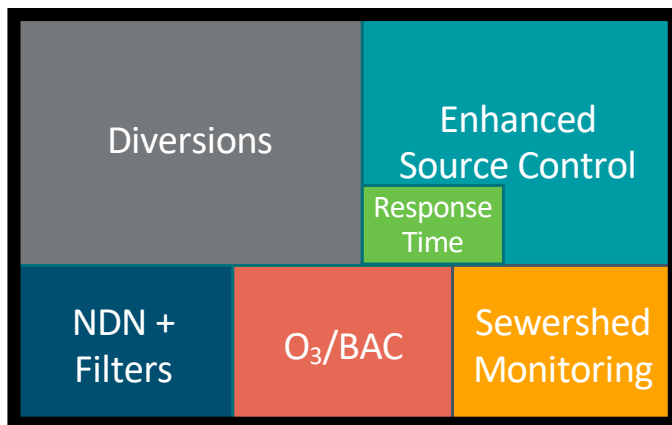


Differentiating Phase 2 RWA from TWA

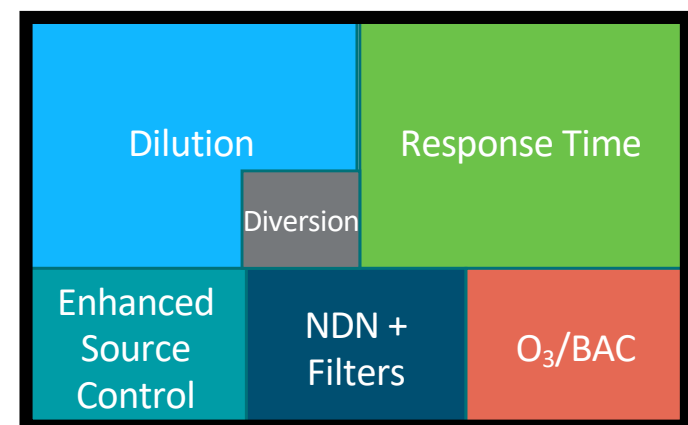
- Murray Reservoir and Alvarado WTP provide important benefits
- Eliminate need for online sewershed monitoring
- Eliminate immediate diversion requirement for acute threats
- Allow project to operate above 16/10/11 for more than 24 hours
- Remove 24/7 staffing requirement for AWTO 5 operators
- Assign credit to reservoir for pathogen & chemical control

Summary

Treated Water Augmentation



San Diego Phase 2 RWA



Questions?

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