State Water Resources Control Board

Division of Drinking Water

Onsite Treatment & Reuse of Nonpotable Water Regulations

Staff Workshop

NATIONAL WATER RESEARCH INSTITUTE

Kevin M. Hardy

Executive Director
National Water Research Institute
Fountain Valley, CA

Welcome

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About NWRI

- Helping communities around the nation create new sources of healthy water since 1991.
- Trusted resource for the collaborative advancement of water resources science, technology, and policy.
- Facilitator of choice for independent panels that provide credible, expert guidance on complex, multi-benefit, water supply, quality, and regulatory initiatives.
- Innovate with partners around the globe to improve public and environmental health; advocate for appropriate investment in healthy, resilient water supplies; and, to promote excellence in water resources management.

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Meeting Ground Rules

- We appreciate your patience!
- Keep yourself muted unless recognized to speak.
- Please keep your camera turned off unless you are speaking.
- Zoom supports internet or phone audio.
- Please enter your name when you sign in so that we can identify who is speaking.
- This meeting is being recorded.

NATIONAL WATER RESEARCH INSTITUTE

To Speak During the Public Comment Session

1. E-mail DDW staff to request special link and passcode at: DDWrecycledwater@waterboards.ca.gov
2. In the subject line write **Onsite Reuse Regulations**
3. In the body of the email, provide the following:
   - Your name
   - Who you represent (yourself, another person, an organization)
   - Whether you will attend by videoconference or telephone
   - For phone commenters only, the last three digits of the phone number from which you intend to call

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Expert Panel Members and Regulatory Staff at Today's Staff Workshop

Adam Olivieri, DrPH, PE

NWRI Panel Chair

Brian Pecson, PhD, PE

NWRI Panel Member

Kevin Day, Beth Maynard

California Building Standards Commission

Emily Withers, Thomas Martin, Randall Enrico

Housing and Community Development

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Agenda

2:00 pm	Welcome, Introductions
2:10 pm	State Board Staff Presentations
2:50 pm	Break
3:00 pm	Stakeholder Input and Questions
4:00 pm	Adjourn Workshop

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State Water Board Division of Drinking Water Staff at Today's Staff Workshop

Randy Barnard, P.E.

Supervising Engineer, Technical Operations Section

Sherly Rosilela, P.E.

Senior Water Resource Control Engineer

Brian Bernados, P.E.

Senior Sanitary Engineer

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Staff Workshop Objectives

- Present draft regulatory concepts for onsite treatment and reuse of nonpotable water
- Receive stakeholder input, comments, and questions

Onsite Treatment & Reuse of Nonpotable Water Regulations

Staff Workshop

CALIFORNIA
Water Boards

Division of Drinking Water | August 1, 2022

DDW staff presentation outline

- Statutory mandate
- Status & schedule
- Effective date
- Selected regulatory elements
- Regulation components overview

Statutory mandate

- CWC 13558 requires that the State Water Board, in consultation with CA Building Standards Commission and the Department of Housing and Community Development, adopt regulations for **risk-based water quality standards** for the onsite treatment and reuse of nonpotable water for nonpotable end uses in multifamily residential, commercial, and mixed-use buildings by December 1, 2022.

Statutory mandate, continued

At a minimum, regulations must address:

1) Risk-based log reduction targets for the removal of pathogens such as enteric viruses, parasitic protozoa, and enteric bacteria for nonpotable water sources, graywater, rainwater, stormwater, and blackwater, and nonpotable end uses, toilet flushing, clothes washing, irrigation, and dust suppression
2) Water quality monitoring requirements
3) Reporting requirements for the water quality monitoring results
4) Notification and public information requirements
5) Cross-connection controls

Exclusions

- **Untreated graywater systems** that are used exclusively for **subsurface irrigation** that are regulated by Chapter 15 of the California Plumbing Code
- **Untreated rainwater systems** that are used exclusively for **surface, subsurface, or drip irrigation** that are regulated by Chapter 16 of the California Plumbing Code

Program implementation by local jurisdiction

- **Statutes grant implementation authority** to the local jurisdictions (City, County, City and County)
- Local jurisdictions **have the choice** of establishing a program for onsite treated nonpotable water systems
  - Must comply with **all** statutory requirements for establishing local programs in CWC 13558(b)

CWC 13558(b) – local jurisdiction requirements

- Summary is not comprehensive. Please refer to statutes
- A local program must be adopted through local ordinance
- Consultation required prior to local program & ordinance adoption with sewer and water service providers to communicate potential significant adverse impacts to the following:
  - existing sewer collection or treatment,
  - existing centralized water recycling program,
  - Receiving waters

CWC 13558(b) – local jurisdiction requirements

- Establish design criteria, permitting, cross-connection control, and enforcement procedures
- Provide an annual report to the State Board
- Terminate operation of a OTNWS at the direction of the State Board
- Implement the program for the protection of public health
- If must terminate a program, comply with the statutory requirements for program termination

State Water Board limited role

- State Water Board is **prohibited** from administering a local jurisdiction's program
- State Water Board receives annual report from local jurisdiction programs
- State Water Board can direct a local jurisdiction to terminate the operation of any onsite treated nonpotable water system

Status & schedule of State Board regulations

- Statutory deadline on December 1, 2022
- Anticipated rulemaking in Fall 2022
- Criteria is approximately 80% complete

Effective date of State Board regulations

- Depending on Office of Administrative Law (OAL) approval & filing with the Secretary of State (SOS)
  - OAL review 30 calendar days
  - Effective date based on SOS filing
    - Dec 1 – Feb 29 → April 1
    - Mar 1 – May 31 → July 1
    - Jun 1 – Aug 30 → October 1
    - Sep 1 – Nov 30 → Jan 1

Selected regulatory elements

- Definition of OTNWS
- Risk based pathogen log reduction targets
- Pathogen control treatment trains
- Opportunistic pathogen control & monitoring

Definition of OTNWS

- Not explicitly defined in the statutes
  - When statutes are unclear, regulations can interpret
- Definition in the proposed regulation is subject to the rulemaking process

An OTNWS is subject to the new regulations if …

- It treats one or more of the following water sources, in whole or in part:
  - rainwater,
  - stormwater,
  - graywater, or
  - blackwater
- The water sources are collected, treated, and used onsite
- The treated water is used for nonpotable purposes
- It is connected to community sewer system as its only mean for disposal (blackwater systems)

Risk based pathogen log reduction targets

- CWC 13558 requires State Board to develop **risk-based** water quality standards
- The goal is to achieve a risk level of health protection from pathogens in onsite treated water (microbial risk) of **1 in 10,000 (10^{-4}) infections per person per year (ppy)**
- Consistent with acceptable risk for drinking water regulations (U.S. EPA) and potable reuse regulations (State of CA)

Assistance in developing LRTs

- CWC 13558(g) allows for contract with public or private entities to “advise the state board on public health issues or scientific and technical matters”
- DDW staff sought expert panel assistance to develop pathogen log reduction targets
- Expert panel is administered by National Water Research Institute and provided recommendations on log reduction targets

Source waters and types of use

- Source waters: blackwater, graywater, stormwater, rainwater
- **Two** sets of LRTs for types of use:
  - **Indoor uses:** toilet flushing, urinal flushing, clothes washing
  - **Outdoor uses:** ornamental plant & landscape irrigation, dust suppression, fire suppression, and car washing

Proposed pathogen log reduction targets

Alternate Water Source	Use Type	Enteric Virus	Giardia	Cryptosporidium
Blackwater	Outdoor use	7.5	5.5	5.0
Blackwater	Indoor use	8.0	6.5	5.5
Graywater[1]	Outdoor use	5.5	3.5	3.0
Graywater	Indoor use	6.0	4.5	4.0
Stormwater	Outdoor use	6.5	4.5	4.0
Stormwater	Indoor use	7.0	5.5	4.5
Rainwater[2]	Outdoor use	Not applicable	1.0	Not applicable
Rainwater	Indoor use	Not applicable	1.5	Not applicable

[1] These targets are not applicable to untreated graywater used exclusively for subsurface irrigation that are regulated by Chapter 15 (commencing with Section 1501.0) of the California Plumbing Code (Part 5 of Title 24 of the CCR).
[2] These targets are not applicable to untreated rainwater used exclusively for surface, subsurface, or drip irrigation that are regulated by Chapter 16 (commencing with Section 1601.0) of the California Plumbing Code (Part 5 of Title 24 of the CCR).

Pathogen control treatment trains

- OTNWS treatment trains must consist of multiple treatment processes/barriers to achieve the minimum LRTs
- Alternatives to the model treatment trains & alternative crediting framework must demonstrate at least an equal degree of public health protection

Alternative to pathogen control treatment trains

- Local jurisdiction must consult with DDW for alternative treatment train approval
- Level of consultation may vary depending on the level of complexity of the alternative
  - UV system on DDW alternative treatment tech report in lieu of NSF 55 Class A
  - Proprietary treatment technology train that requires custom validation .

TENTATIVE

Pathogen control treatment train options

Pathogen Control Treatment Train	Allowable Alternate Water Source
Train A: MBR - UV – Free Cl2	Blackwater, stormwater, graywater, rainwater
Train B: MBR - UV – Free Cl2	Blackwater, stormwater, graywater, rainwater
Train C: MBR - UV – Free Cl2	Stormwater, graywater, rainwater
Train D: MBR - UV	Graywater, rainwater
Train E: MF – UV – Free Cl2	Graywater, rainwater
Train F: UV	Rainwater
Train G: Cl2	Rainwater
Train H: Cl2	Rainwater (outdoor use only)

Continuous process verification monitoring

Treatment process	Parameter
MBR	Effluent turbidity
UV	UV dose, UV transmittance
Free chlorine	Max flow rate per 100 gallons of storage, influent chlorine dose, effluent free chlorine residual, influent ammonia, influent turbidity, influent pH, influent water temperature

- Recording interval is no more than every 15 minutes
- Instrumentation must be approved by local jurisdiction and routinely calibrated per operations plan

Automatic diversion

- Automatic diversion triggered by critical limits
  - Prescribed limits for pathogen control treatment trains
  - Alternative treatment trains established limits based on field verification requirements (established in the Commissioning Period)
- Blackwater and graywater must divert to sanitary sewer

TENTATIVE

Proposed Critical Control Limits for Pathogen Control Treatment Trains A – C

Pathogen Control Treatment Train	Treatment Process	Critical Control Limits*
Train A: MBR - UV - Free Cl2	MBR	Turbidity <0.5 NTU
	UV	Dose >120 mJ/cm^2
	Free Cl2	CT >15 mg-min/L
Train B: MBR - UV - Free Cl2	MBR	Turbidity <0.5 NTU
	UV	Dose >80 mJ/cm^2
	Free Cl2	CT >20 mg-min/L
Train C: MBR - UV - Free Cl2	MBR	Turbidity <0.5 NTU
	UV	Dose >120 mJ/cm^2
	Free Cl2	CT >10 mg-min/L

*Not comprehensive. Draft regulations may include other CCLs.

Proposed Critical Control Limits for Pathogen Control Treatment Trains D – H

TENTATIVE

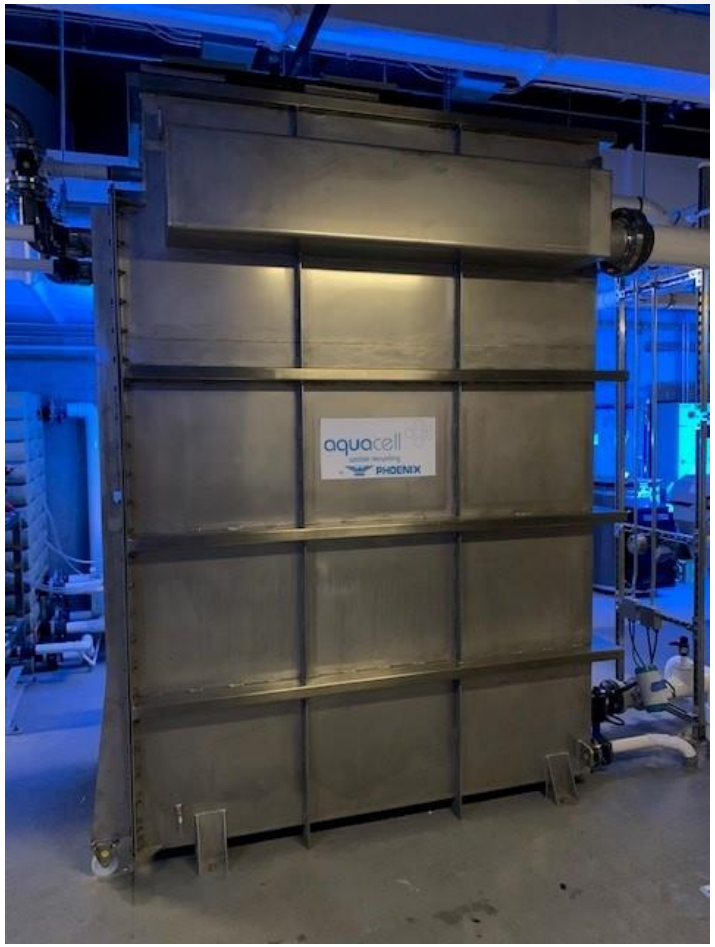
Pathogen Control Treatment Train	Treatment Process	Critical Control Limits*
Train D: MBR - UV	MBR	Turbidity <0.5 NTU
	UV	Dose >200 mJ/cm^2
Train E: MF/UF - UV - Free Cl2	MF/UF	Turbidity <0.5 NTU
	UV	Dose >120 mJ/cm^2
	Free Cl2	CT >15 mg-min/L
Train F: UV	UV	Dose >40 mJ/cm^2
Train G: Free Cl2	Free Cl2	CT >75 mg-min/L
Train H: Free Cl2	Free Cl2	CT >49 mg-min/L

*Not comprehensive. Draft regulations may include other CCLs.

Example of treatment process: UV disinfection system

- UV disinfection system for 5,000 gpd rainwater/graywater system in San Francisco, CA
- NSF 55 Class A reactors
- Each reactor provides 40 mJ/cm2

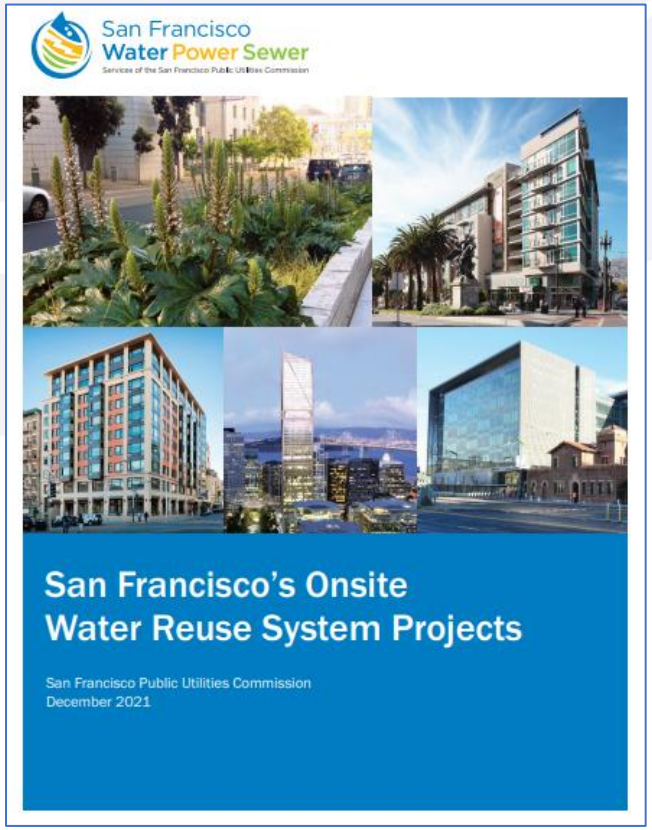
Example of treatment process: Membrane bioreactor



- MBR tank for a 40,000 gpd blackwater system
- Image courtesy of Phoenix/Aquacell

Other examples of onsite reuse system projects in California

- Published by San Francisco Public Utilities Commission
- Showcases single building and multi building (district scale) projects



Opportunistic pathogen control & monitoring

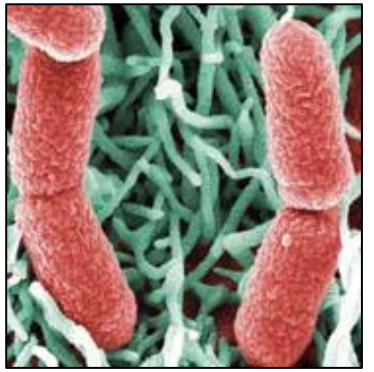
- Some pathogens can regrow after treatment if bacterial regrowth in the storage and distribution systems are not controlled (e.g. Legionella)
- OTNWS must designed to monitor and confirm that a disinfectant residual of either **free chlorine or chloramine** be maintained at concentrations **more than 0.2 mg/L** at distal end-use conditions
- The regulations propose monitoring **twice a week** using a hand-held chlorine residual instrument

Disinfected tertiary recycled water

60301.230. Disinfected tertiary recycled water . . .

"**(b)** The median concentration of **total coliform** bacteria measured in the disinfected effluent does not exceed an MPN of 2.2 per 100 milliliters utilizing the bacteriological results of the last seven days . . .

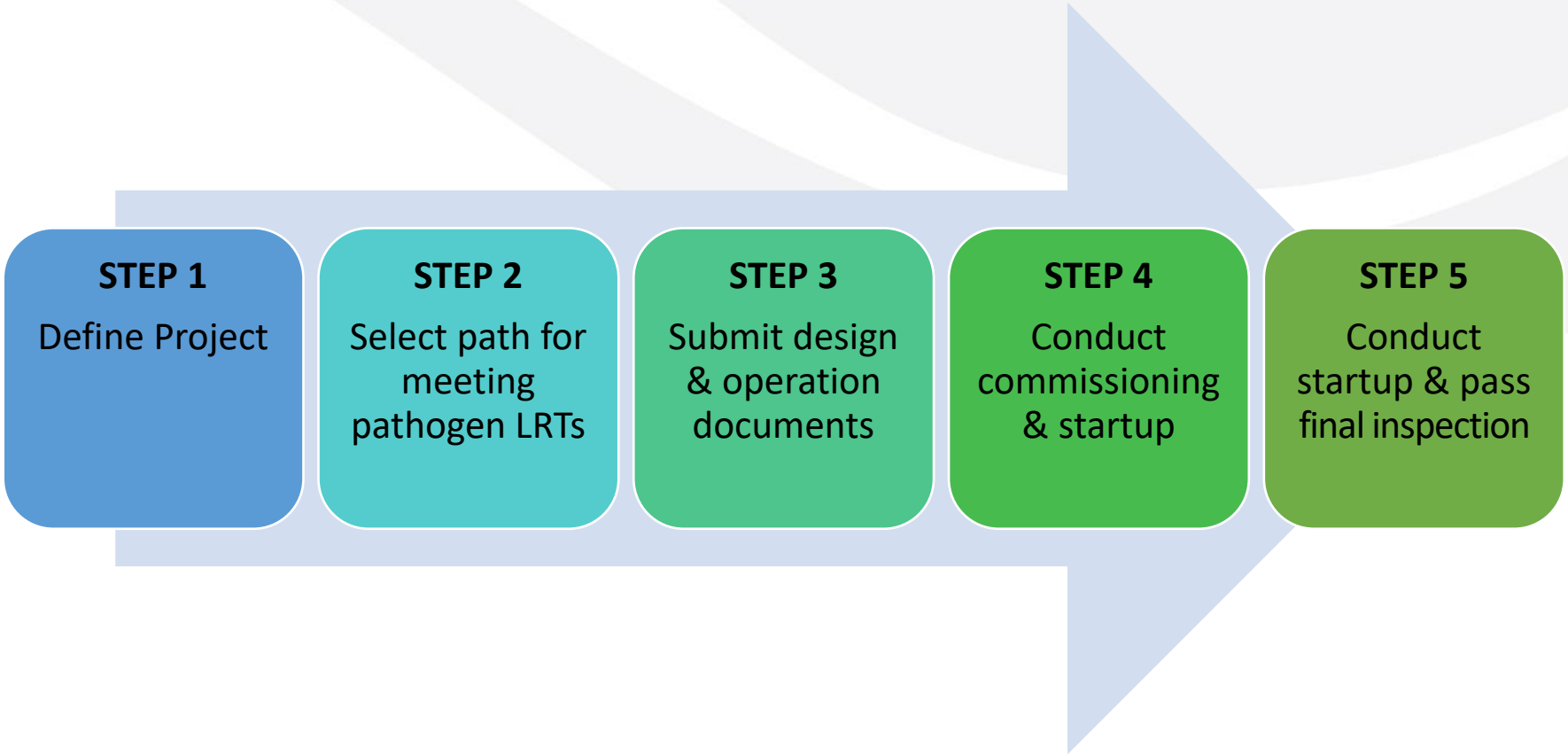
Burden for OTNWS



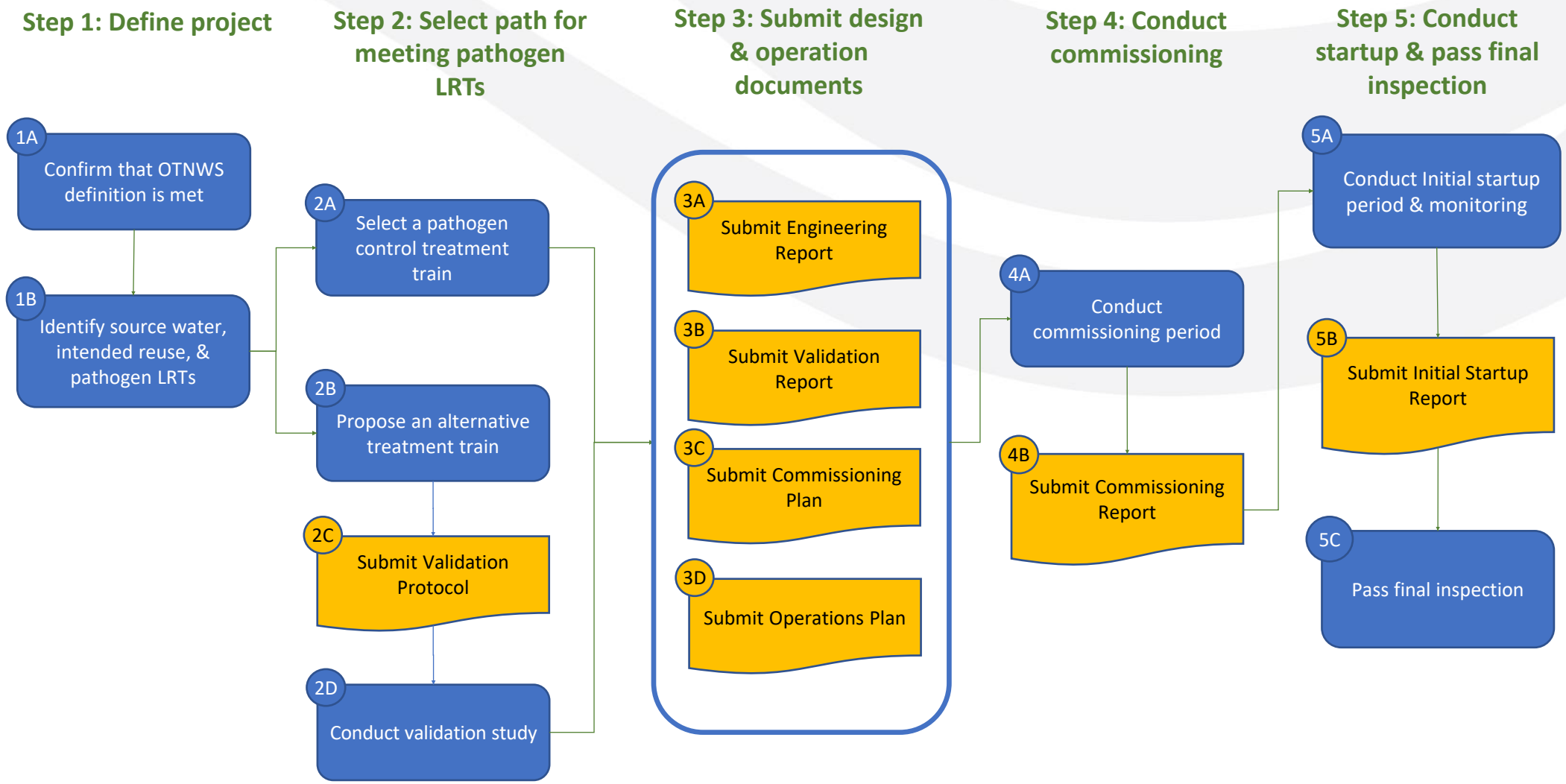
Caution for the regulation component slides

- Illustrations are **high level summary** of regulation text
- Regulation text are subject to rulemaking process & are considered draft until approved/final by Office of Administrative Law
- If the State Board regulations are approved by OAL, the State Board regulations are the baseline
- Local jurisdiction programs may contain more steps and more stringent requirements

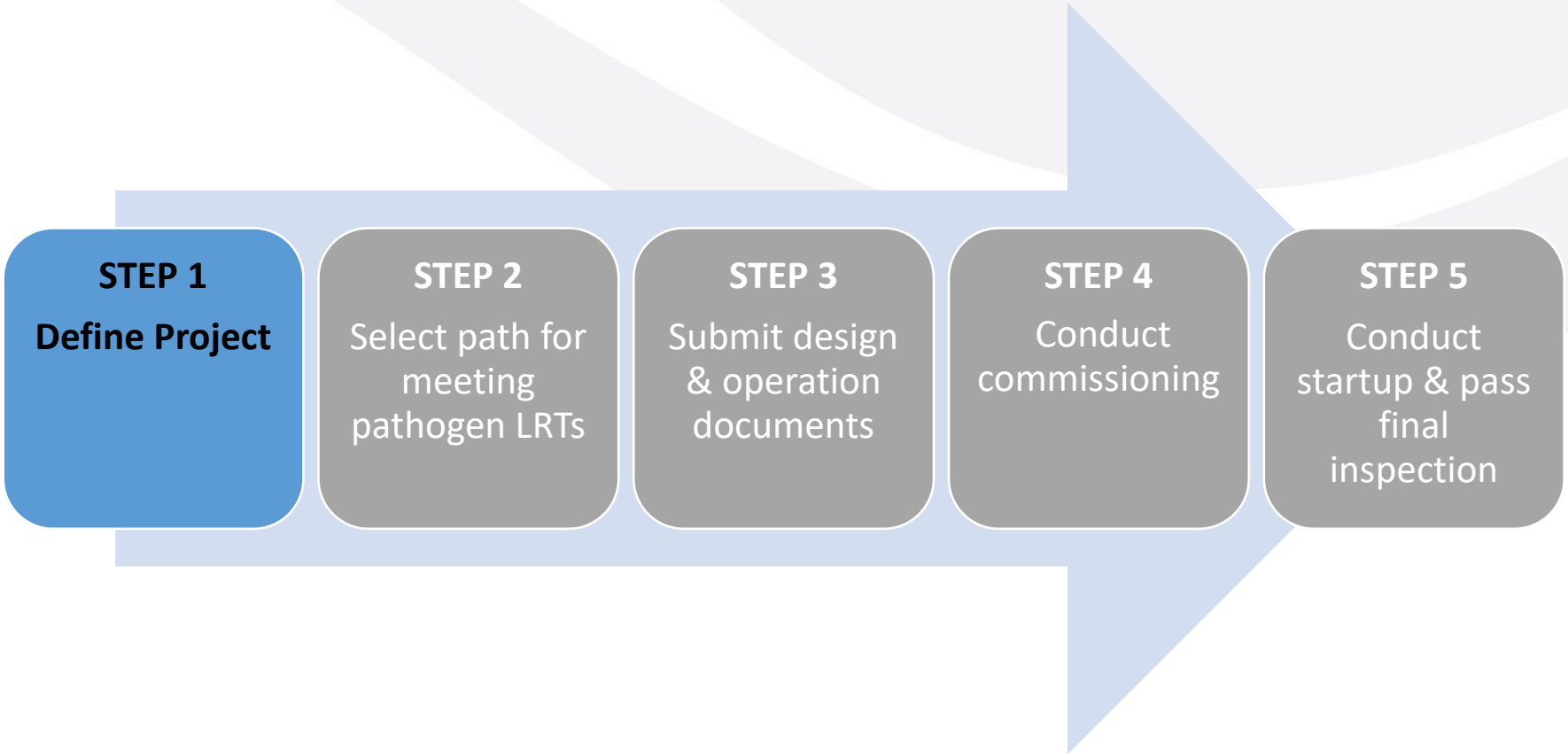
Regulation components overview



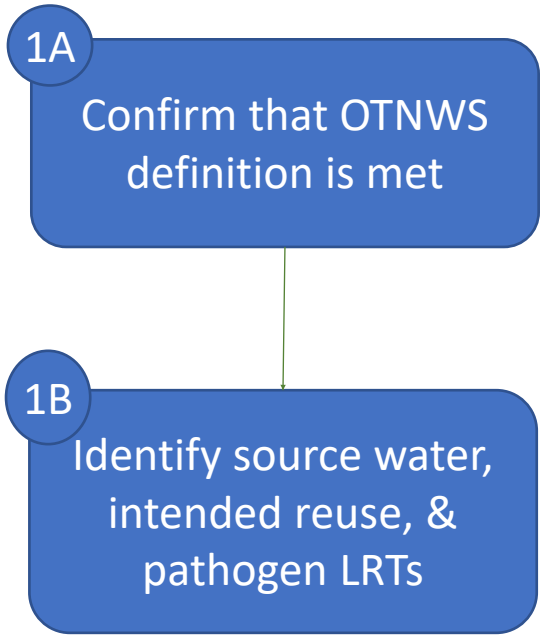
Regulation components overview



Regulation component – Step 1: Define Project



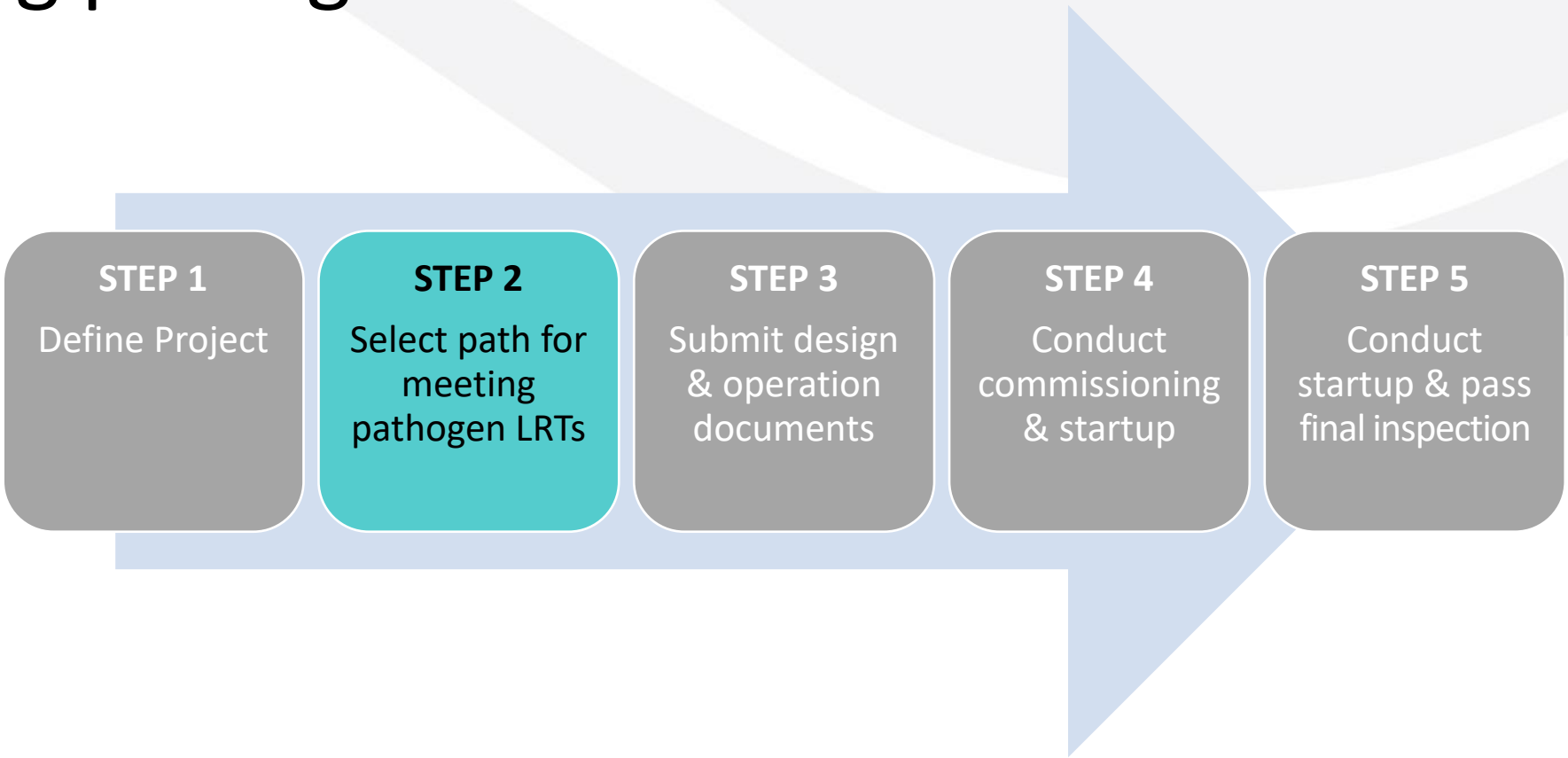
Regulation component – Step 1: Define Project



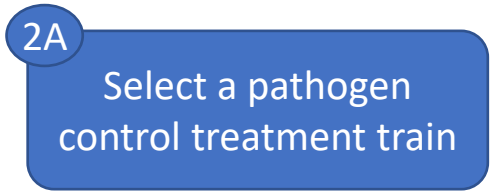
- Does the project treat blackwater, graywater, stormwater, or rainwater?
- Are the source water collected, treated, and reused on site?
- If blackwater is a source, is the system connected to a community sewer system for disposal?

- Does the project consist of multiple types of alternate source waters?
- What is the intended reuse?
- Is the intended reuse fit under “indoor” or “outdoor” uses?
- Look up pathogen log reduction target in the regulations based on the most restrictive source water & use combination.

Regulation component – Step 2: Select path for meeting pathogen LRTs

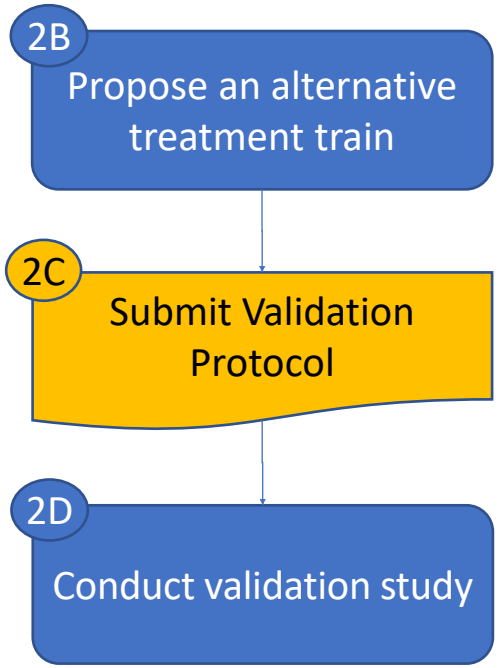


Regulation component – Step 2: Select path for meeting pathogen LRTs



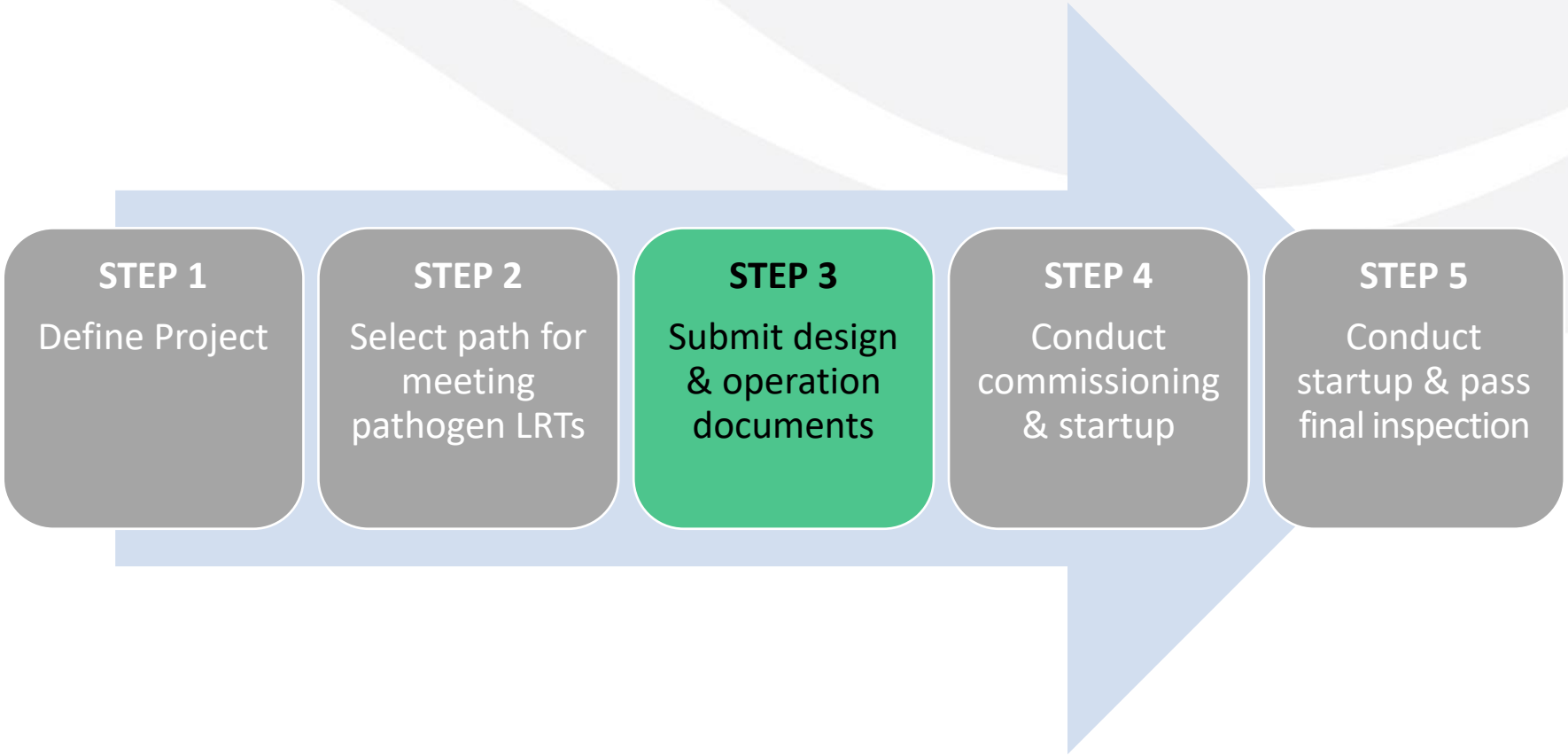
- Look up options of pre-set pathogen control treatment trains in the regulations and choose one based on source water and use type.

OR

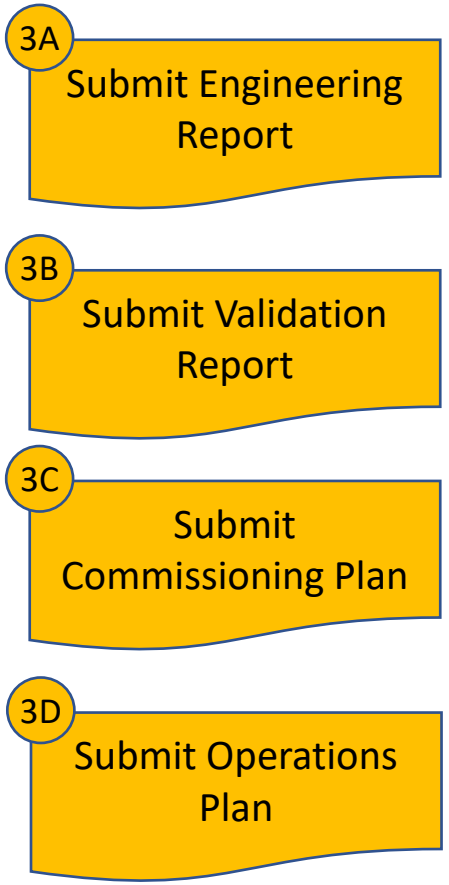


- **Alternative** treatment train requires a case-by-case review and approval by Local Jurisdiction. Level of required efforts depending on extent of proposal, for example:
  - UV disinfection process is non-NSF 55 Class A certified
  - Any treatment train that consists of other treatment processes (e.g. cartridge filtration, reverse osmosis, pasteurization, etc.)
- Can the alternative be validated by an established protocol (e.g USEPA)? If not, the proponent must submit a validation protocol & conduct a study.

Regulation component – Step 3: Submit design & operation documents

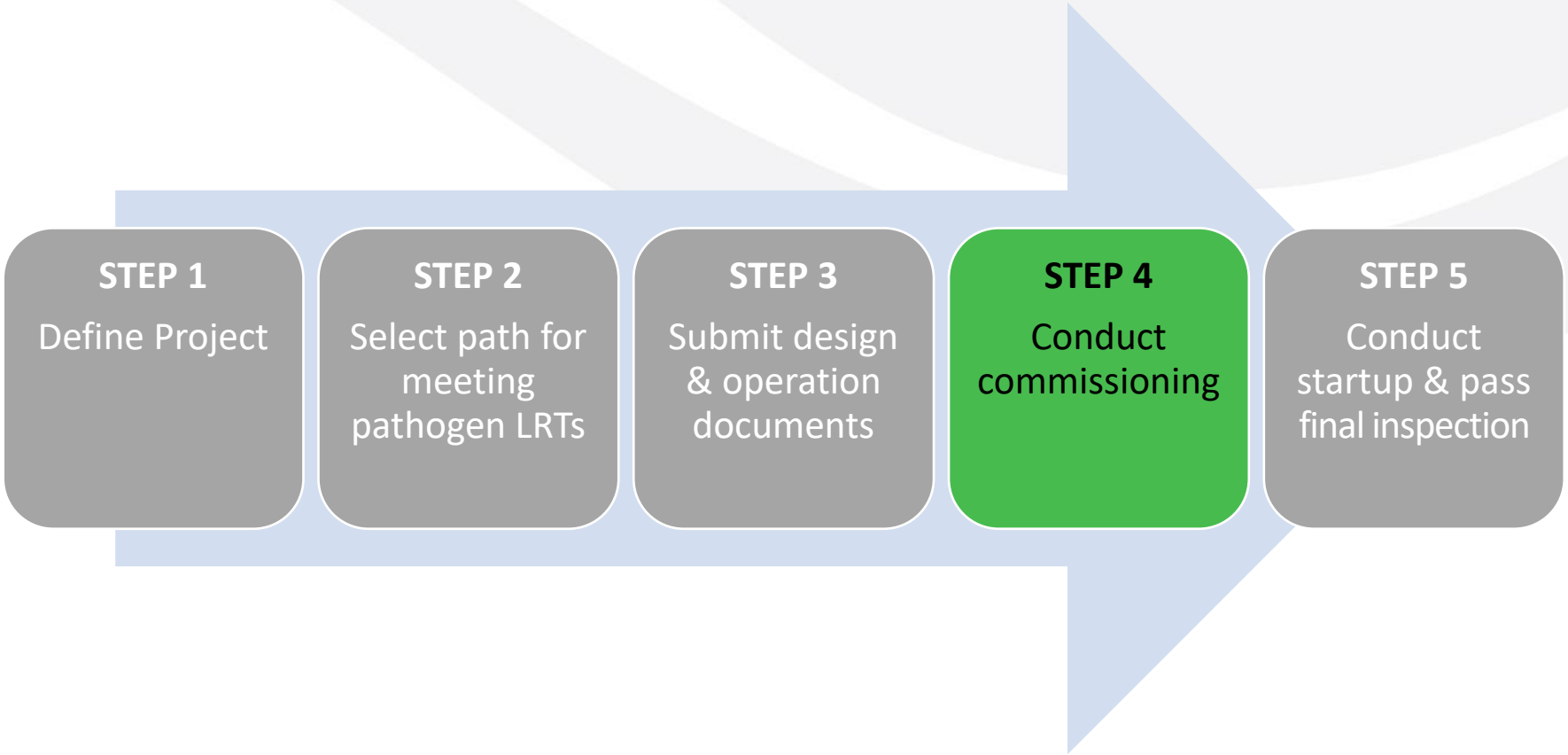


Regulation component – Step 3: Submit design & operation documents

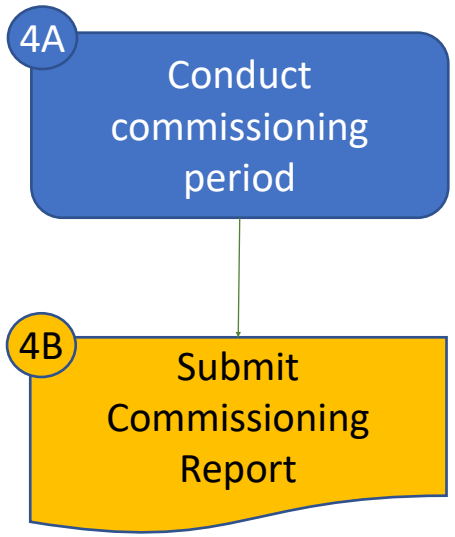


- Engineering report describes the means for compliance with the regulations & local jurisdiction requirements
- Validation Report
  - is **not** required for projects using pathogen control treatment train
  - documents validation study protocol approval (Step 2C), technology evaluation, & ability to achieve LRV
- Commissioning plan describes system testing procedures for demonstrating how system will function as intended at the anticipated operating conditions
- Operations plan
  - consists of all information, plans, procedures required to operate and maintain the system
  - must be representative of the system at all times

Regulation component – Step 4: Conduct commissioning

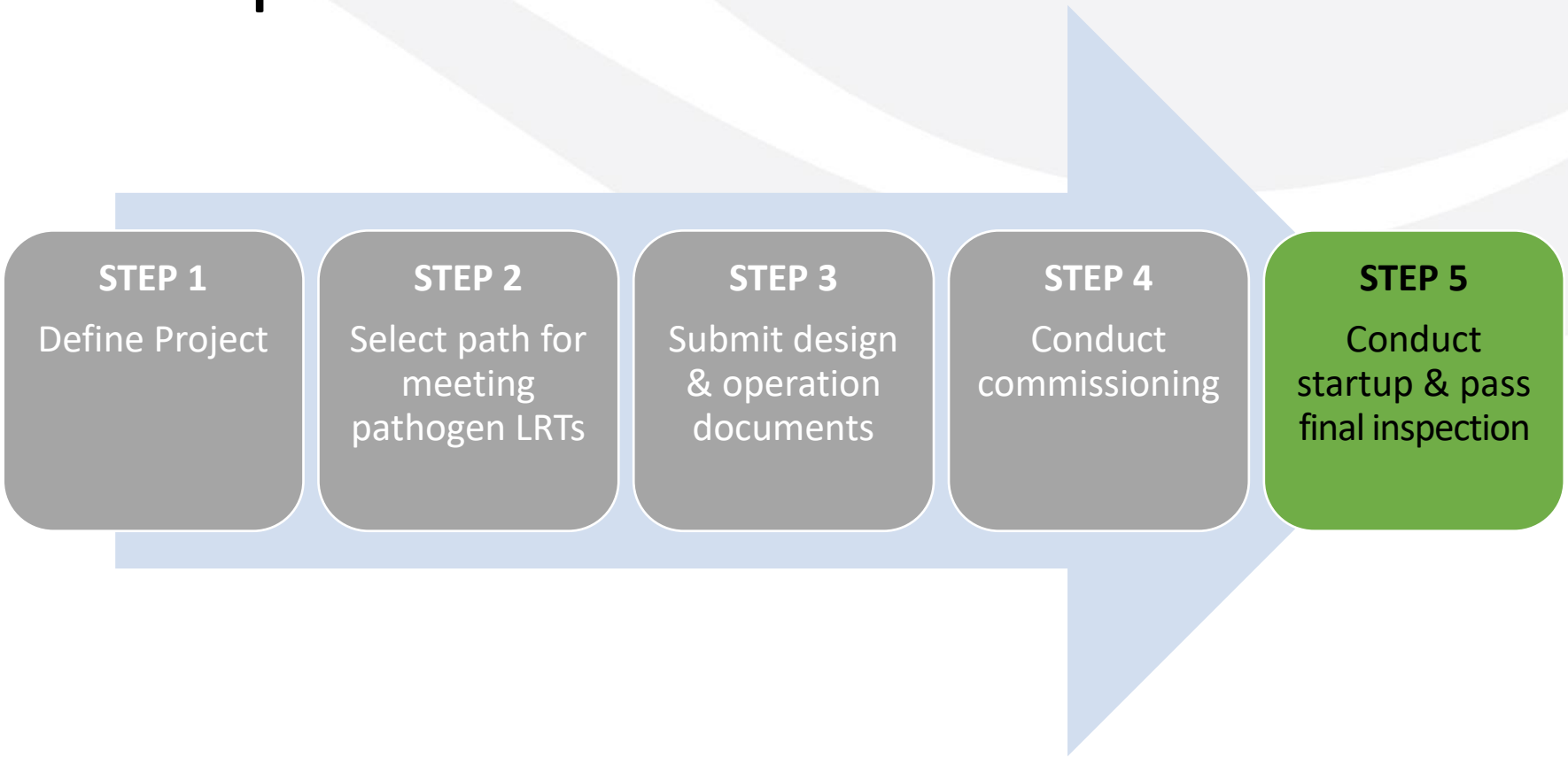


Regulation component – Step 4: Conduct commissioning

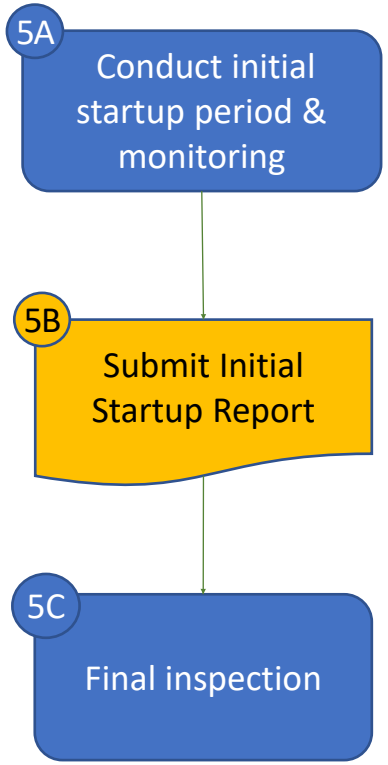


- Commissioning period
  - Conducted per approved Commissioning Plan by Local Jurisdiction (Step 3C)
  - Duration must be sufficient for all processes to reach steady operating conditions
  - Submit report at the end of period
  - Approved report green lights initial startup period

Regulation component – Step 5: Conduct startup & pass final inspection



Regulation component – Step 5: Conduct startup & pass final inspection



- Initial startup period
  - 60-days duration, can be waived by Local Jurisdiction
  - “Test drive” of operation & monitoring
  - Includes field verification step for alternative treatment train
  - Submit report at the end of the first month
  - Final inspection is conducted at the end of initial startup period by Local Jurisdiction

Monitoring & reporting requirements

- Continuous process verification monitoring
- Water quality reports
- Annual report to the State Board

Continuous process verification monitoring

- Required for all systems
- OTNWS must be monitored using supervisory control and data acquisition (SCADA)

Water quality reports

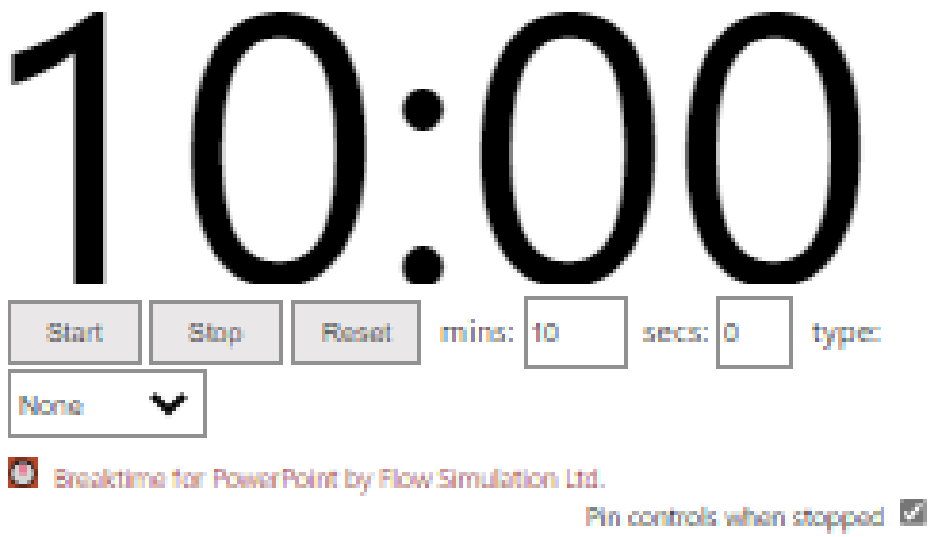
- Required for all systems
- System treated flow, water quality characteristics, daily summary of continuous monitoring, operation incidents and anomalies (malfunctions, upsets, bypasses, complaints)
- Reporting frequency based on alternate water source
  - Blackwater systems report monthly
  - Graywater, stormwater, rainwater systems report quarterly

Annual report to the State Board

- Required for all local jurisdiction administering onsite reuse programs per CWC section 13558(b)(3)
- Permitting program summary
  - Number, location, and description of permitted systems,
  - Types & quantity of source water and end uses,
  - Water quality monitoring data,
  - Violations & corrective actions taken

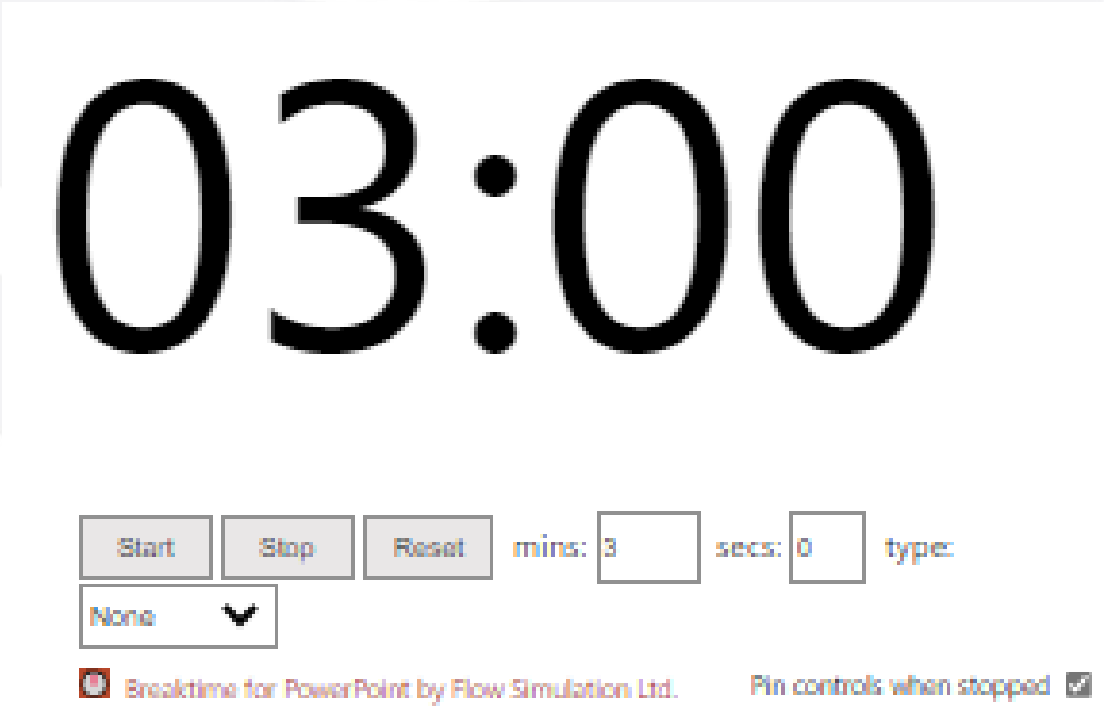
We will be back after the break

If you have not already, please e-mail
DDWRecycledWater@waterboards.ca.gov
if you would like to join us during comment period.



Stakeholder input & questions

1. Input on regulatory elements: draft definition of onsite treated nonpotable water systems, draft log reduction targets, and pathogen control treatment trains;
2. Input on summary of regulatory approach for OTNWS permitting and operations;
3. Suggestions on the scope of **technical** assistance that State Water Board staff can provide to local jurisdictions in establishing or implementing a program for onsite treated nonpotable water systems; and
4. Other questions/input are welcome!



Thank you for your time!

- Today's presentation slides and recording will be available on State Board program webpage
- DDW staff will send out an email to notify availability of the files
- Any questions, please contact: Sherly Rosilela sherly.rosilela@waterboards.ca.gov