INITIAL STATEMENT OF REASONS
Onsite Treatment and Reuse of Nonpotable Water
Title 22, California Code of Regulations

POLICY STATEMENT OVERVIEW

The State Water Resources Control Board (State Board) proposes to amend California Code of Regulations, title 22, division 4 for the purpose of adding chapter 3.5 to provide uniform statewide criteria for onsite treated nonpotable water systems (OTNWS). The adoption of the proposed regulations will establish 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. Untreated graywater systems that are used exclusively for subsurface irrigation and untreated rainwater systems that are used exclusively for surface, sub-surface, or drip irrigations, are regulated by chapters 15 and 16 of the California Plumbing Code (part 5 of title 24 California Code of Regulations) will not be addressed by these proposed regulations.

PROBLEM STATEMENT

(Gov. Code, §11346.2(b)(1))

In September 2018, Senate Bill 966 (SB 966) was enacted, adding sections 13558 and 13558.1 to the Water Code. SB 966 requires that the State Board adopt the onsite treatment and reuse of nonpotable water regulations on or before December 1, 2022. SB 966 also requires the State Board to consult with the California Building Standards Commission (CBSC) and the Department of Housing and Community Development (HCD) in the regulation adoption process. SB 966 requires that HCD, in consultation with the State Board, develop and propose for adoption any necessary corresponding building standards on or before December 1, 2023.

The adoption of the proposed regulations by the State Board will establish risk-based water quality standards for the onsite treatment and reuse of nonpotable water (onsite wastewater, graywater, stormwater, and roof runoff) for indoor and outdoor nonpotable end uses (toilet flushing, urinal flushing, drain trap priming, clothes washing, decorative fountains, landscape irrigation, ornamental plant irrigation, dust suppression, and car washing) in multifamily residential, commercial, and mixed-use buildings.

Regulations addressing alternate water sources (graywater, rainwater, stormwater, cooling tower blow-down water, foundation drainage, and reclaimed [recycled] water) and rainwater for indoor and outdoor nonpotable applications currently exist in the California Code of Regulations, title 24, part 5, (California Plumbing Code) chapters 15 and 16, respectively.

If adopted as building standards by CBSC and HCD in their future rulemaking, the proposed regulations will replace and/or supplement the existing California Plumbing Code requirements for treatment and reuse of onsite wastewater, graywater,

stormwater, and rainwater, except for untreated graywater systems that are used exclusively for subsurface irrigation and untreated rainwater systems that are used exclusively for surface, sub-surface, or drip irrigations, that are regulated under California Plumbing Code.

The broad objective of these proposed regulations is to fulfill the State Board's statutory mandate to establish 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, as required by Water Code section 13558.

The anticipated benefits, including any nonmonetary benefits to the protection of public health and safety of California residents, worker safety, and the state's environment from these proposed regulations, are the following:

- The health and welfare of California residents and worker safety will continue to be protected by preventing cross-connection of OTNWSs and public water supply, as well as providing health-protective risk-based water quality standards for the use of onsite treated nonpotable water; and
- The state's environment benefits from maximized amount of onsite treated nonpotable water that California can safely use for beneficial purposes and offsetting uses of potable water from nonpotable water uses.

BACKGROUND/AUTHORITY

(Gov. Code, §§11346.2, subd. (b)(1); 11349, subd. (a))

In September 2018, SB 966 was enacted, adding sections 13558 and 13558.1 to the Water Code. SB 966 requires that the State Board adopt the onsite treatment and reuse of nonpotable water regulations on or before December 1, 2022. SB 966 also requires the State Board to consult with CBSC and HCD in the regulation adoption process. SB 966 requires that HCD, in consultation with the State Board, develop and propose for adoption any necessary corresponding building standards on or before December 1, 2023.

Water Code section 13558, subdivision (a) requires that the State Board address in the regulations, at a minimum, all of the following:

(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, blackwater, and nonpotable end uses, toilet and urinal 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.

Pursuant to Water Code section 13558, subdivision (a), the State Board has authority to adopt the subject regulations and proposes changes to title 22 of the California Code of Regulations by adopting division 4, chapter 3.5, to establish criteria for onsite treatment and reuse of nonpotable water. The adoption of chapter 3.5 includes the articles and sections summarized as following:

- Article 1 (General) establishes the definitions of terminologies used in the chapter, applicability of the requirements in the chapter, the annual report requirements for local jurisdictions, and the requirements for existing OTNWS to conform to the regulations.
    - Section 60600 (Definitions) establishes definitions related to the proposed regulations.
    - Section 60602 (Limitations of this Chapter) establishes limitations of the requirements of the chapter to exclude applicability of certain graywater and rainwater systems as specified in the statutes.
    - Section 60604 (Implementation Scale) establishes the applicability of the regulations to the statutorily specified types of building occupancies and types of installation (single building or district scale).
    - Section 60606 (Local Jurisdiction Annual Report) establishes the elements of an annual report to be submitted to the State Board by the local jurisdictions that elect to permit OTNWS.
    - Section 60608 (OTNWS in Operation Before the Effective Date of the Regulations) establishes the requirements for an OTNWS in operation before the effective date of the regulations to come into compliance.
- Article 2 (Sources of Onsite Treated Nonpotable Water) establishes the allowable sources for an OTNWS and scope of collection, treatment, and use.
    - Section 60610 (Source Specifications) establishes the types of alternate water sources addressed by the regulations and scope of collection, treatment, and use of the onsite treated nonpotable water.
- Article 3 (Uses of Onsite Treated Nonpotable Water) establishes the types of allowed uses of onsite treated nonpotable water and requirements of use areas.
    - Section 60620 (Allowed Indoor Uses) establishes the types of indoor uses allowed for onsite treated nonpotable water.

  - Section 60622 (Allowed Outdoor Uses) establishes the types of outdoor uses allowed for onsite treated nonpotable water.
  - Section 60624 (Use Area Requirements) establishes the requirements that must be met in use areas where onsite treated nonpotable water is applied.

- Article 4 (Pathogen Control) establishes the risk-based pathogen log reduction targets and how to comply with such targets through the use of prescribed water treatment trains or alternative treatment trains.
  - Section 60630 (Pathogen Log Reduction Targets) establishes the risk-based pathogen log reduction targets for onsite wastewater, stormwater, graywater, and roof runoff.
  - Section 60632 (Pathogen Control Treatment Trains) establishes a selection of prescribed treatment trains corresponding with risk-based pathogen log reduction targets for onsite wastewater, stormwater, graywater, and roof runoff, along with each treatment process criteria.
  - Section 60634 (Alternatives) establishes the criteria for proposing an alternative treatment train, if not using a pathogen control treatment train specified in section 60632, for local jurisdiction approval.
- Article 5 (Monitoring Requirements) establishes the requirements for monitoring OTNWS treatment trains to ensure that the risk-based pathogen log reduction targets are met reliably and continuously.
  - Section 60640 (Field Verification of Alternative Treatment Train Performance) establishes the requirements for field verifying treatment process performance for an alternative treatment train proposed pursuant to section 60634.
  - Section 60642 (Continuous Process Verification Monitoring) establishes the requirements for continuous process verification monitoring for all OTNWS treatment trains. The section provides limits for monitored parameters for treatment processes making up the pathogen control treatment trains specified in section 60632.
- Article 6 (Design Requirements) establishes the design requirements for OTNWS treatment, distribution, and storage facilities.
  - Section 60670 (Supplemental Source of Water for OTNWS) establishes the requirements for an OTNWS to be equipped with a supplemental source of water to ensure continuous operation.

  - Section 60672 (Automatic Diversion) establishes the requirement for all OTNWSs to have automatic diversion capability to ensure that inadequately-treated onsite treated nonpotable water can be diverted, circulated, or disposed of before reaching the use areas.
  - Section 60674 (Reliability Requirements for Disinfection Unit Process) establishes the reliability requirements for disinfection unit process.
  - Section 60676 (Alarms) establishes the requirements for an OTNWS treatment facility to be equipped with alarm devices.
  - Section 60678 (Microbial Regrowth Control for Storage and Distribution) establishes the requirements for microbial regrowth control for OTNWS storage and distribution facilities.

- Article 7 (Plans and Reports) establishes the requirements for preparation, submittal, approval, and maintenance of plans and reports for OTNWS design, commissioning, and operations.
  - Section 60680 (Engineering Report) establishes the requirement for preparation and submittal of an engineering report for local jurisdiction approval.
  - Section 60682 (Validation Study Protocol and Report) establishes the requirement for preparation and submittal of a validation study protocol and report for any alternative treatment trains proposed to be used instead of a prescribed control treatment train. The validation report must be submitted for local jurisdiction approval.
  - Section 60684 (Commissioning Plan and Report) establishes the requirement for preparation and submittal of a commissioning plan for local jurisdiction approval ahead of the start of system commissioning. Upon completion of system commissioning, a report documenting the commissioning must be prepared and submitted for local jurisdiction approval.
  - Section 60686 (Operations Plan) establishes the requirement for preparation and submittal of operations plan for local jurisdiction approval ahead of local jurisdiction permit issuance. The operations plan must be representative of the OTNWS operations at all times and must be made available to the local jurisdiction for review anytime upon request.
  - Section 60688 (Monitoring Report) establishes the requirement for preparation and submittal of monitoring reports for all OTNWSs.

- Article 8 (Other Requirements) establishes other requirements for OTNWSs that are not addressed elsewhere within the article, such as requirements for personnel employed to operate and maintain an OTNWS, signage indicating that onsite treated nonpotable water is in use, notifications for use and delivery of improperly treated water.
    - Section 60690 (Personnel) establishes the requirements for the responsible entity to employ qualified personnel to oversee and operate that OTNWS treatment facility and to ensure that any plumbing modification to OTNWS collection, treatment, and distribution is done by an appropriately licensed contractor.
    - Section 60692 (Signage) establishes the requirements for installation of clear, permanent, visible, and durable signs in areas where onsite treated nonpotable water is used to inform the public that nonpotable water is in use.
    - Section 60694 (Notifications) establishes the requirement for pre-delivery notifications and notifications of inadequately-treated onsite treated nonpotable water to tenants and residents where onsite treated nonpotable water for indoor uses are serving the buildings.
    - Section 60696 (Decommissioning) establishes the requirements for the responsible entity to notify the local jurisdiction prior to the start of decommissioning activities for an OTNWS.
- Article 9 (Cross-connection Controls) establishes requirements for cross-connection control for facilities served by an OTNWS to protect the potable water supply system from the nonpotable system.
    - Section 60700 (Cross-connection Hazard Assessment) establishes the requirement for cross-connection hazard assessment.
    - Section 60702 (Visual Inspection) establishes the criteria for visual inspection.
    - Section 60704 (Cross-connection Test) establishes criteria for cross-connection test procedures.
    - Section 60706 (Cross-connection Control General Requirements) establishes cross-connection control requirements applicable to all cross-connection assessments, inspections, and tests.
    - Section 60708 (Backflow Prevention Assembly) establishes the requirements for backflow prevention assembly inspection and testing.

- Section 60710 (Discovery of Cross-connection) establishes the requirements for notification and procedures to be taken by the responsible entity once a cross-connection of potable water and nonpotable water is discovered.

The net effect of the proposed regulations would be to establish a public health-protective 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.

SPECIFIC DISCUSSION OF EACH PROPOSED REGULATION

(1 CCR §10, subd. (b))

The proposed regulations would be incorporated into Title 22, Division 4, of the California Code of Regulations, Chapter 3.5 Onsite Treatment and Reuse of Nonpotable Water. The following provides a detailed discussion of the proposed regulations.

Article 1. General.

Section 60600. Definitions.

Section 60600 establishes definitions for terms used in Chapter 3.5. These definitions are reasonably necessary to create structure and clarity for the proposed regulations, and to avoid confusion regarding terms that may be susceptible to multiple interpretations. Section 60600 provides definitions for the following terms:

Subsection (a) “Air-gap separation” is defined to specify the characteristics of one of the backflow prevention methods in the proposed regulations.

Subsection (b) “ANSI” defines the American National Standards Institute, which is one of the primary national standards setting bodies.

Subsection (c) “Backflow prevention assembly" is defined to clarify the function and characteristics of a backflow prevention assembly specified in the proposed regulations.

Subsection (d) “Baffling factor” is defined to estimate a reactor’s hydraulic performance and is necessary for determining the efficacy of chlorine disinfection.

Subsection (e) “Blackwater” is defined to describe one of the types of untreated alternate water source. Log reduction targets for blackwater are not a part of the regulation scope. Definition of blackwater is provided in the proposed regulations to clarify how it is originated.

Subsection (f) “Calibrated field meter” is defined to specify the type of field meter that is

acceptable for measurements taken for the purpose of regulatory reporting and compliance.

Subsection (g) “Certified backflow prevention assembly tester” is defined to describe the required certification for any individual who tests backflow prevention assembly(ies) to meet the requirements of the regulations.

Subsection (h) “Certified cross-connection control specialist” is defined to describe the required certification for any individual that performs any cross-connection control hazard assessments, inspections, tests, and prepares related protocols and reports.

Subsection (i) “Challenge test” is defined to describe the type of demonstration to be used to determine the ability of a proposed treatment process to remove pathogen contaminants.

Subsection (j) “Commercial building" is defined to describe one of the types of building occupancies that is covered by the scope of the proposed regulations.

Subsection (k) “Commissioning” is defined because the term is broadly used outside of these proposed regulations and needed clarification as to how the term refers to a set of procedures necessary to bring an OTNWS online.

Subsection (l) “Community sewer system” is defined to provide the characteristics of sewer system relevant to these proposed regulations.

Subsection (m) “Continuous process verification monitoring” is defined to make it clear how continuous monitoring is performed and confirmed for an OTNWS to meet the requirements of the proposed regulations.

Subsection (n) “Critical limit” is defined to make it clear that although the term is broadly used in food safety and water risk management, the use of the term in the regulations is to address pathogen risk management.

Subsection (o) “Cross-connection” is defined to make it clear the condition where potable water supply system and nonpotable water supply system are connected.

Subsection (p) “CT” is defined to make its calculation method and units clear.

Subsection (q) “District-scale project” is defined to describe a multi-building project scale that is covered by the scope of the proposed regulations.

Subsection (r) “Duly authorized agent” is defined to refer to the person or entity that can represent the responsible entity for the purpose of operation and maintenance of the OTNWS.

Subsection (s) “Field verification" is defined to describe a performance confirmation study using challenge testing of an OTNWS required by the proposed regulations.

Subsection (t) “Graywater” is defined to describe one of the types of untreated alternate water sources addressed in the proposed regulations.

Subsection (u) “Local jurisdiction” is defined to specify the types of local jurisdiction addressed in these regulations.

Subsection (v) “Log reduction” is defined to quantify the level of treatment necessary to meet a water quality objective or the level of treatment provided by a treatment process or treatment train.

Subsection (w) “Log Reduction Target” or “LRT” is defined to describe the level of log reduction needed to comply with the pathogen log reduction requirements.

Subsection (x) “MBR” defines the term membrane bioreactor, which is a type of treatment technology.

Subsection (y) “Mixed-use building” is defined to describe one of the types of building occupancies that is covered by the scope of the proposed regulations.

Subsection (z) “Multifamily residential building" is defined to describe one of the types of building occupancies that is covered by the scope of the proposed regulations.

Subsection (aa) “Nonpotable water” is defined to clarify a term that is used in the regulations.

Subsection (bb) “Normal operating condition” is defined to make it clear that the term refers to an operational condition that the OTNWS is expected to consistently serve and perform in.

Subsection (cc) “NSF” is defined to clarify that it means the National Sanitation Foundation.

Subsection (dd) “NTU” is defined to identify the standard unit of measurement for turbidity.

Subsection (ee) “Onsite treated nonpotable water” is defined to clarify a term that is commonly used in the regulations.

Subsection (ff) “Onsite treated nonpotable water system” or “OTNWS” is defined to specify the characteristics of a nonpotable water treatment system that is addressed by the proposed regulations. Statutory definition for OTNWS does not exist; therefore, it is necessary to define the term to clarify the applicability of these proposed regulations. The State Water Board anticipates OTNWS subject to this chapter are building-scale nonpotable water systems installations in an urban setting served by public water systems and community sewer systems and are subject to local jurisdictions oversight. Subsection (ff)(1) specifies the types of untreated alternate water sources collected and treated by the OTNWS. Subection (ff)(2) specifies that distribution and reuse of onsite treated nonpotable water must occur onsite, whether it is within a building for indoor uses, or surrounding a building for outdoor uses. Subsection (ff)(3) specifies that an OTNWS is connected to a community sewer system as its only means for discharge of waste, regardless of whether onsite wastewater is used as its source water. These systems are generally not addressed by waste discharge requirements adopted by the Regional Water Quality Control Boards.

Subsection (gg) “Onsite wastewater” is defined to describe one of the types of untreated alternate water source addressed in the proposed regulations.

Subsection (hh) “Potable water” identifies the California Plumbing Code section that defines it.

Subsection (ii) “Regional Board” is defined to clarify that “Regional Board” means any Regional Water Quality Control Board.

Subsection (jj) “Responsible entity” is defined to refer to the entity responsible for compliance with the proposed regulations. The definition also makes it clear that the entity must have full control and authority to ensure proper OTNWS operation and compliance with the proposed regulations.

Subsection (kk) “Roof runoff” is defined to describe one of the types of untreated alternate water source addressed in the proposed regulations.

Subsection (ll) “State Board” is defined to clarify that “State Board” means the State Water Resources Control Board.

Subsection (mm) “Stormwater” is defined to describe one of the types of untreated

alternate water source addressed in the proposed regulations.

Subsection (nn) “Supervisory control and data acquisition system” or “SCADA” is defined to describe supervisory control and data acquisition system needed for an OTNWS in the proposed regulations.

Subsection (oo) “Surrogate parameter” or “surrogate” is defined to identify the types of contaminant or water properties that may qualify as a surrogate parameter. The definition also describes the circumstances for which a surrogate parameter can be used to indicate the compliance state of a treatment process.

Subsection (pp) “T10” is defined to describe time needed to flow through a reactor. The term is necessary for determining the efficacy of chlorine disinfection.

Subsection (qq) “Treatment train” is defined because the term is used in the regulations and describes the assemblage of processes that are used to produce a water of a certain quality.

Subsection (rr) “Untreated alternate water source” is defined to specify the types of alternate water sources that are addressed in the proposed regulations.

Subsection (ss) “UV” defines the term ultraviolet. Disinfection by UV light is a type of treatment technology.

Subsection (tt) “Validation” is defined to describe the demonstration of the potential of treatment to reduce contaminants.

Section 60602. Limitations of this Chapter.
Section 60602 restates the statutory exemption in Water Code section 13558 subsections (c) and (d) from applicability of these proposed regulations. It is necessary to restate these statutory exemptions in the regulations so any responsible entities who seek to engage in reuse of graywater or rainwater that is addressed by these statutes can immediately be redirected to the correct state regulations.

Section 60604. Implementation Scale.
Section 60604 describes the implementation scale of an OTNWS project. Subsection (a) limits the types of occupancies that can be addressed by the regulations. Water Code section 13558 limits the mandate for adopting risk-based water quality criteria to address multifamily buildings, commercial buildings, and mixed-use buildings. The regulations address these occupancies and clarify that the regulations can address a combination of such occupancies in a district-scale (multi-building) project.

Subsection (b) requires that a proof of property covenant is filed at the county recorder's office and provided to the local jurisdiction for OTNWS project that is located on more than one land parcel. This requirement is necessary to ensure that if any of the parcels are sold to a new owner, the new property owner is aware that the parcel is a part of an OTNWS project operations that may impact other participating land parcels within the district scale project.

Section 60606. Local Jurisdiction Annual Report.
Section 60606 establishes the reporting timeframe, deadline, and content of the local jurisdiction's annual report. The local jurisdiction annual report requirement is to satisfy the requirement of Water Code section 13558, subdivision (b)(3). Subsection (a) requires that number, location, building type, and description of existing, new or replacement, and out-of-service (or terminated) OTNWS. Subsection (b) requires that volumes and types of nonpotable end uses for each untreated alternate water source that is treated by each OTNWS. Subsection (c) requires summary of the continuous process verification monitoring parameters. Subsection (d) requires summary of violations and corrective actions taken for any OTNWS. Subsection (e)

Section 60608. OTNWS In Operation Before the Effective Date of the Regulations.
Water Code section 13558, subdivision (f) requires that an OTNWS in operation before the effective date of the regulations must comply with the regulations within two years of the effective date, or up to five years as granted by the local jurisdiction. Restating the statutory requirement is necessary, particularly for owners of existing OTNWSs and local jurisdictions, to alert them to the fact that the statute includes a timeframe for coming into compliance.

Article 2. Sources of Onsite Treated Nonpotable Water.

Section 60610. Source Specifications.
Section 60610 subsections (a) and (b) establish the types of untreated alternate water sources that are addressed by these regulations and specifies that the collection, treatment, and use of untreated alternate water sources must be within the defined project boundaries as described in the project's engineering report in accordance with section 60680. It is necessary to define the types of alternate water sources in the proposed regulations because the risk-based water quality criteria are developed for these specific types of untreated alternate water sources. It is also necessary to define the extent of collection, treatment, and use of alternate water sources to clearly make the distinction between onsite versus decentralized reuse, which is subject to a different state regulatory framework.

Subsection (c) prohibits untreated alternate water sources not addressed by the regulations from entering the OTWNS, unless approved as supplemental source of

water for OTNWS in accordance with section 60670. This requirement is necessary because the risk-based water quality criteria are developed only for the specific types of alternated water sources. The use of the criteria for all other sources not addressed within the regulations are not appropriate since potential health risks associated with exposure to pathogens must be evaluated for each water source.

Article 3. Uses of Onsite Treated Nonpotable Water.

Section 60620. Allowed Indoor Uses.
Section 60620 establishes the allowable indoor uses for onsite treated nonpotable water, including toilet flushing, urinal flushing, drain trap priming, and clothes washing. It is necessary to limit these allowed indoor uses to avoid exposure which could lead to infection and illness. Subsection (b) includes additional requirements for using onsite treated nonpotable water for clothes washing to ensure minimized risk of cross-connection between onsite potable and nonpotable water.

Section 60622. Allowed Outdoor Uses.
Section 60622 establishes the allowable outdoor uses for onsite treated nonpotable water, including landscape irrigation, ornamental plant irrigation, dust suppression, and car washing. Use of onsite treated nonpotable water for decorative fountains is allowed but must meet the log reduction targets for indoor uses because its exposure risk is higher than exposure risk from landscape irrigation, dust suppression, and car washing. It is necessary to limit these allowed outdoor uses to avoid exposure which could lead to infection and illness.

Section 60624. Use Area Requirements.
Section 60624 lists the use area requirements for use of onsite treated nonpotable water which are necessary to ensure that the use of onsite treated nonpotable water is not resulting in threats to the environment and/or conditions where potential exposure to onsite treated nonpotable water is increased, which would result in infection and illness. The use area requirements are necessary to manage risk of exposure to onsite treated nonpotable water and to protect public health.

Subsection (a) requires that onsite treated nonpotable water use must not create a nuisance condition or odor. This requirement is necessary because nuisance conditions, such as flooding or odor, are indicative of failure in control mechanisms for treatment and exposure, which would result in infection and illness.

Subsection (b) requires that spray, mist, or runoff from outdoor use of onsite treated nonpotable water must not enter dwellings, designated outdoor eating areas, or food handling facilities. This requirement is necessary because spray, mist, or runoff into dwellings, designated outdoor eating areas, or food handling facilities increase the

potential exposure through dermal contact, inhalation, or ingestion, which would result in infection and illness.

Subsection (c) requires that drinking water fountains must be protected against contact with onsite treated nonpotable water spray, mist, or runoff. This requirement is necessary because spray, mist, or runoff exposing a drinking water fountain to onsite treated nonpotable water would increase the potential exposure through ingestion, which would result in infection and illness.

Subsection (d) requires that onsite treated nonpotable water used for irrigation or dust suppression must be used in a manner that will not result in excessive ponding, pooling, or runoff. This requirement is necessary because excessive ponding, pooling, or runoff, are either indicators of malfunctioning distribution equipment (e.g. broken sprinkler heads) or are conditions that would increase potential exposure through dermal contact which would result in infection and illness.

Subsection (e) requires that onsite treated nonpotable water used outdoors in areas accessible to the public must be applied at times when contact with the public is minimized. This requirement is necessary to minimize exposure by choosing the time of application where potential contact to the general public is limited, such as early morning or late night.

Subsection (f) requires no physical connection between any OTNWS and any separate system conveying or storing potable water. This requirement is necessary to prevent cross-connection with potable water system. Cross-connection with a potable water distribution system or storage would increase the potential exposure through ingestion, which would result in infection and illness. State Board recognizes that a temporary connection to a potable water supply for the purpose of initial cross-connection testing for a new OTNWS may be necessary as no other water supply may be available for use. This is only allowed prior to introduction of onsite treated nonpotable water into the OTNWS.

Subsection (g) requires that portions of OTNWS that are in areas subject to access by the general public must not include any hose bibs, and that OTNWS must only use quick couplers that are incompatible with those used on the potable water system. These requirements are necessary to prevent uses of onsite treated nonpotable water for uses that require potable water or unauthorized use of onsite treated nonpotable water by non-authorized personnel.

Subsection (h) requires that all use areas where onsite treated nonpotable water is used must be posted with signs meeting the requirements of section 60692. This requirement

will inform the general public and/or occupants that onsite treated nonpotable water is in use, and that the water must be limited to its designated use and is not appropriate for ingestion.

Subsection (i) prohibits indoor uses of onsite treated nonpotable water for any building that produces or processes food products or beverages, such as food processing plants, restaurants, bottling plants, and similar establishments. The regulation specifies that cafeterias or snack bars in a building whose primary function does not involve the production or processing of foods or beverages are not considered facilities that produce or process foods or beverages. Consistent with existing regulations for dual-plumbed recycled water systems in section 60313(b), this requirement is necessary to ensure that certain types of facilities do not receive onsite treated nonpotable water for indoor use due to their compounded risk for exposure through food or beverage contamination with subsequent human ingestion.

Article 4. Pathogen Control.

Section 60630. Pathogen Log Reduction Targets.
Section 60630 is added to establish the minimum pathogen log reduction targets for onsite treated nonpotable water systems. Senate Bill 966 (2018) requires that the State Board regulations must include risk-based log reduction targets (LRT) 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 such as toilet and urinal flushing, clothes washing, irrigation, and dust suppression. LRTs for onsite wastewater, which is a combination of blackwater and graywater, are addressed in these proposed regulations. Onsite wastewater is representative of the wastewater generated from everyday human activities discharged from buildings.

Section 60630, subsection (a) specifies all OTNWSs must be designed to control the exposure to pathogenic microorganism by meeting the risk-based pathogen LRTs presented in Table 60630-1, reproduced below. The log reductions must be continuously met by a pathogen control treatment train described in section 60632, or by an alternative to a pathogen control treatment train described in section 60634.

Table 60630-1. Pathogen log reduction targets for OTNWS

Untreated Alternate Water Source	Use Type	Enteric Virus	*Giardia*	*Cryptosporidium*
Onsite Wastewater	Indoor use	8.0	6.5	5.5
Onsite Wastewater	Outdoor use	7.5	5.5	5.0

Untreated Alternate Water Source	Use Type	Enteric Virus	*Giardia*	*Cryptosporidium*
Stormwater	Indoor use	7.0	5.5	4.5
Stormwater	Outdoor use	6.5	4.5	4.0
Graywater	Indoor use	6.0	4.5	3.5
Graywater	Outdoor use	5.5	3.5	3.0
Roof runoff	Indoor use	-	1.5	-
Roof runoff	Outdoor use	-	1.0	-

The State Board contracted with the National Water Research Institute (NWRI) to convene an Independent Advisory Panel on Regulations for On-Site Treatment and Reuse of Nonpotable Water (Panel) to assist State Board staff in determining the appropriate pathogen LRTs. The Panel effort and recommendation for the pathogen LRTs for water sources and end uses is summarized in "Risk-based treatment targets for onsite non-potable water systems using new pathogen data" (Pecson et. al (2022a)). The Panel report, titled "On-Site Treatment and Reuse of Nonpotable Water – Technical Guidance" (Olivieri et al. 2021) documents the full Panel effort.

Selection of reference pathogens

Water Code section 13558, subdivision (a) requires the State Board to address in the proposed regulations "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 and urinal flushing, clothes washing, irrigation, and dust suppression." *Giardia lamblia* cyst, *Cryptosporidium* oocyst, and enteric virus are selected as the reference pathogen for the regulations as they are used in other California water recycling regulations with risk-based pathogen log reduction targets.

The proposed regulations require the use of validated treatment technologies in a multi-barrier setting. All OTNWS treatment trains must include filtration and disinfection treatment processes. Prescriptive pathogen control treatment trains predominantly rely on the combination of a membrane bioreactor (MBR), ultraviolet (UV) disinfection, and free chlorine disinfection. The pathogen control treatment trains are selected based on the effectiveness of reducing or inactivating pathogens of concern, availability of continuously-monitored performance surrogates or operational parameters, and treatment process availability for building-scale installation.

Bacteria is not selected as a reference pathogen for the proposed regulations consistent with the Panel's findings that the log reduction targets for virus and protozoa, along with

the required treatment methods, should also provide a high degree of control over bacterial pathogens.

Quantitative Microbial Risk Assessments (QMRAs)

The Panel effort built upon the 2017 publication by Water Environment & Reuse Foundation, "Risk-Based Framework for the Development of Public Health Guidance for Decentralized Non-Potable Water Systems" (Sharvelle et al. (2017)), which includes pathogen LRTs for OTNWSs derived using QMRA. The QMRA method is a stochastic approach used to estimate probability distributions of infection based on the variability associated with pathogen concentration, aimed at attaining a specified tolerable risk level or a risk goal.

The Panel used quantitative microbial risk assessments (QMRAs) to determine the required treatment system performance to achieve a specified risk goal.
The graphical abstract from Pecson et al. (2022a) summarizes the Panel approach in determining the risk-based LRTs, and it is provided below as **Figure 1**. The risk goal (acceptable risk) is achieved by treating each source water to reduce the concentration of pathogens down to acceptable levels for each use (fit-for-purpose). The level of required treatment is expressed in $\log_{10}$ reduction, where 1 log reduction equals 10-fold reduction in concentration, 2 log reduction equals 100-fold reduction in concentration, etc. Level of required treatment is expressed as LRTs in the proposed regulations.

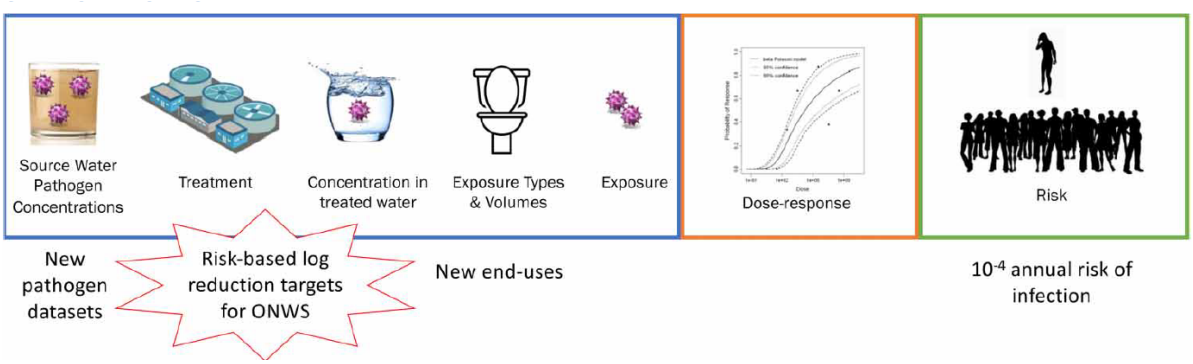

Figure 1: Graphical Abstract from Pecson et al. (2022a)

Elements of the Panel approach in determining the risk-based LRTs are briefly described in the subsequent paragraphs:

- ***Acceptable risk:***

The LRTs were developed with a risk goal of 1 in 10,000 infections per person per year (10^{-4} annual risk of infection). The same risk goal is used in the Federal and California surface water treatment regulations and California potable reuse regulations. This risk goal is selected due to the involuntary exposure of the end users in the occupancies

subject to the proposed regulations. The proposed regulations are intended for use of onsite treated nonpotable water in multifamily residential, commercial, and mixed-use buildings, where the decisions for availability of source waters, treatment system installation, and use of onsite treated nonpotable water are made for the occupants or visitors during design and construction. The end users have no discretion in either engaging in reuse or being in a location where they can be exposed to reused nonpotable water (e.g. multi-family building occupants cannot opt out from washing clothes or flushing toilets using onsite treated nonpotable water).

- ***Dose-response:***

For pathogen dose-response, the Panel utilized the same dose-response models as Sharvelle et al. (2017). A dose-response model describes the relationship between exposure and the probability of infection or illness. A summary of the dose-response models evaluated for each pathogen is available in the Supplementary Material of Pecson et al. (2022a) Pathogen Dose-Response Functions section and the summary of values used in the QMRA. Table ES-1 Summary of dose-response functions is provided as **Figure 2**.

Table ES 1. Summary of dose-response functions

Reference Pathogen	Model	Parameters	Parameter Values	Units	Reference	Susceptible Fraction
Norovirus (GI)	Hypergeometric[a]	alpha beta	0.04 0.055	gc	Teunis et al., 2008	1
Norovirus (GI and GII.4)	Fractional Poisson	P U	0.72 1106	gc	Messner et al., 2014	1
Mastadenovirus Type 4, 7, and 16	Hypergeometric[a]	alpha beta	5.11 2.80	TCID50	Teunis et al., 2016	1
Giardia lamblia	Exponential	r	0.0199	cysts	Rose et al., 1991	1
Cryptosporidium spp.	Fractional Poisson	P U	0.737 1	oocysts	Messner and Berger, 2016	1
Cryptosporidium spp.	Exponential	r	0.09	oocysts	U.S. EPA, 2005	1
Campylobacter jejuni	Approximate beta-Poisson	alpha beta	0.145 7.589	CFU	Medema et al., 1996	1
Salmonella enterica	Approximate beta-Poisson	alpha beta	0.3126 2884	CFU	Haas et al., 1999	1
Rotavirus[b]	Approximate beta-Poisson	alpha beta	0.253 0.426	FFU	Ward et al., 1986	1

[a] For this analysis, the approximate beta-Poisson dose-response model was used instead of the hypergeometric dose-response model due to the significant differences in computing time between the two and the relatively small differences in resulting infection rate at low doses. Several scenarios were run with both dose-response functions and the approximate beta-Poisson dose-response resulted in conservative LRT values that ranged from 0.0 to 0.4 higher than the hypergeometric dose-response model.
[b] Rotavirus dose-response function used in conjunction with enterovirus occurrence data for consistency with the virus reduction requirements of the Surface Water Treatment Rule.

Figure 2: Pecson et al. (2022a) Table ES 1

- ***Source water pathogen concentrations:***

A summary of datasets of pathogen concentrations for onsite wastewater, graywater, stormwater, and roof runoff is provided in Pecson et al. (2022a), Table 1, provided below as **Figure 3**.

As discussed in Pecson et al. (2022a), the Panel used a set of screening criteria to evaluate approximately 40 papers and studies that measured pathogens in untreated alternate source waters, with a focus on papers published after the 2017 evaluation completed by Sharvelle et al. (2017). The Panel employ the criteria for “ideal” pathogen dataset, which includes the following: large sample size, monitoring of multiple locations over time, freshly collected samples (i.e., not stored prior to enumeration), high method sensitivity, pathogens enumerated with methods that are compatible with dose-response functions, targets human-infectious strains or groups, and report raw data including recovery and limit of detection.

The Panel made an assumption that pathogen concentrations in untreated municipal wastewater have sufficient equivalence with pathogen concentrations in onsite wastewater (blended blackwater and graywater). One key limitation highlighted by Sharvelle et al. (2017) was the relative dearth of data describing the distribution of pathogens in untreated alternate source waters. The Panel highlighted this same limitation in Olivieri et al. (2021) across all source waters (onsite wastewater, graywater, stormwater, roof runoff). To estimate LRTs for onsite wastewater, the Panel used a recent dataset that characterized pathogen concentrations in raw municipal wastewater at five facilities in California (Pecson et al. 2022b). This dataset was selected because it was one of the few that met the characteristics of an ‘ideal’ dataset.

The Panel also used a limited empirical dataset characterizing onsite wastewater to estimate LRTs (Kothari et al. 2020) and compared the results against estimated LRTs for untreated municipal wastewater. The empirical dataset is from an OTNWS treating onsite wastewater in San Francisco, serving approximately 500-1,000 people. The Panel finds that there was alignment in the LRTs irrespective of the datasets used. In most cases, the LRTs are within 1 log value of each other for each compared source water.

Graywater pathogen concentration was derived from the municipal wastewater dataset of Pecson et al. (2022b). It was assumed that graywater contained 1% of the pathogen concentrations found in municipal wastewater. This assumption is supported by Jahne et al. (2017) and Schoen et al. (2017).

Stormwater pathogen concentrations were estimated as dilutions of municipal wastewaters with 10 and 0.1% dilutions. These dilutions were based on Schoen et al. (2017) who evaluated measured concentrations of pathogens in stormwater (Bambic et

al. 2011; McBride et al. 2013). The two dilutions bound the likely range of wastewater contribution in urban stormwater.

Roof runoff pathogen concentrations is based on the data presented in Alja'fari et al. (2022). The data includes multiple empirical measurements, including four different pathogen gene targets, and samples were taken at four sites across the United States over multiple seasons. The Panel concludes that, while the dataset is limited, it most closely met the requirements of the 'ideal' dataset of the reviewed published studies.

Table 1 | Recommended (Rec.) and alternate (Alt.) datasets of pathogen concentrations for all source waters

Source water/pathogen	Dataset	Data source	Distribution[a]	Units	Percent detected
Municipal Wastewater (MW) and Onsite Wastewater (OW)					
Cryptosporidium	Rec. (MW)	Pecson *et al.* (2022)	Normal (1.7, 0.4)	oocysts/L	98% (n=120)
	Alt. (OW)	Kothari *et al.* (2020)	Normal (1.4, 0.6)[b]	oocysts/L	12% (n=25)
Giardia	Rec. (MW)	Pecson *et al.* (2022)	Normal (4.0, 0.4)	cysts/L	100% (n=120)
	Alt. (OW)	Kothari *et al.* (2020)	Normal (2.0, 0.9)[b]	cysts/L	64% (n=25)
Norovirus II	Rec. (MW)	Pecson *et al.* (2022)	Normal (4.0, 1.2)	gc/L	72% (n=122)
	Alt. (OW)	Kothari *et al.* (2020)	Normal (1.8, 2.3)	gc/L	38% (n=13)
Adenovirus	Rec. (MW)	Pecson *et al.* (2022)	Normal (2.8, 1.0)	MPN/L	84% (n=122)
	Alt. (OW)	Kothari *et al.* (2020)	Normal (4.9, 0.5)	MPN/L	67% (n=15)[c]
Enterovirus	Rec. (MW)	Pecson *et al.* (2022)	Normal (3.2, 1.0)	MPN/L	95% (n=122)
	Alt. (OW)	Kothari *et al.* (2020)	Normal (1.6, 0.3)	MPN/L	14% (n=14)
Graywater					
Cryptosporidium	Rec.	Pecson *et al.* (2022)	Normal (1.7, 0.4)[d]	oocysts/L	98% (n=120)
	Alt.	Jahne *et al.* (2017)	Modeled Dataset	oocysts/L	–
Giardia	Rec.	Pecson *et al.* (2022)	Normal (4.0, 0.4)[d]	cysts/L	100% (n=120)
	Alt.	Jahne *et al.* (2017)	Modeled Dataset	cysts/L	–
Norovirus II	Rec.	Pecson *et al.* (2022)	Normal (4.0, 1.2)[d]	gc/L	72% (n=122)
	Alt.	Jahne *et al.* (2020)	Normal (2.0, 0.1)	gc/L	6% (n=50)
Adenovirus	Rec.	Pecson *et al.* (2022)	Normal (2.8, 1.0)[d]	MPN/L	84% (n=122)
	Alt.	Jahne *et al.* (2020)	Normal (1.9, 0.4)	gc/L	14% (n=50)
Enterovirus	Rec.	Pecson *et al.* (2022)	Normal (3.2, 1.0)[d]	MPN/L	95% (n=122)
Stormwater					
Cryptosporidium	Rec.	Pecson *et al.* (2022)	Normal (1.7, 0.4)[e]	oocysts/L	98% (n=120)
Giardia	Rec.	Pecson *et al.* (2022)	Normal (4.0, 0.4)[e]	cysts/L	100% (n=120)
Norovirus II	Rec.	Pecson *et al.* (2022)	Normal (4.0, 1.2)[e]	gc/L	72% (n=122)
Adenovirus	Rec.	Pecson *et al.* (2022)	Normal (2.8, 1.0)[e]	MPN/L	84% (n=122)
Enterovirus	Rec.	Pecson *et al.* (2022)	Normal (3.2, 1.0)[e]	MPN/L	95% (n=122)
Roof runoff					
Giardia	Option A	Alja'fari *et al.* (2022)	Normal (−1.4, 0.3)	cysts/L	5% (n=79)
	Option B	Alja'fari *et al.* (2022)	Uniform (−0.7, 1.2)	cysts/L	5% (n=79)
Salmonella	Option A	Alja'fari *et al.* (2022)	Normal (−0.2, 0.6)	cells/L	9% (n=79)
	Option B	Alja'fari *et al.* (2022)	Uniform (0.9, 2.4)	cells/L	9% (n=79)
Campylobacter	Option A	Alja'fari *et al.* (2022)	Normal (−0.4, 0.2)	cells/L	3% (n=79)
	Option B	Alja'fari *et al.* (2022)	Point Estimate (0.6)	cells/L	3% (n=79)

[a]Values are $\log_{10}$ transformed. Normal distribution parameters listed as (mean, standard deviation). Uniform distribution parameters listed as (minimum, maximum).
[b]16 values did not include recovery data. For consistency, the average recovery of the dataset was applied.
[c]Five of 15 values were greater than the measured value. Greater than values were set to the reported value.
[d]A 2-log reduction in mean concentrations was applied to municipal wastewater data with the assumption that graywater contains 1% of the fecal load of municipal wastewater.
[e]Mean values of distributions reduced by 1-log or 3-log to account for low or moderate dilution of municipal wastewater, respectively.

Figure 3 Pecson et al. (2022a) Table 1

- ***Exposure types and volumes:***

The Panel exposure assumptions are based on anticipated end-uses and exposure events for the following uses: toilet flushing, clothes washing, accidental cross-connection, unrestricted irrigation, fire suppression, car washing, and indoor decorative fountains. The values for ingested volume (liters/day), frequency of exposure (days/year), and fraction of population exposed are provided in the summary of exposure assumptions in Pecson et al. (2022a), Table 2, provided below as **Figure 4**.

Table 2 | Summary of exposure assumptions including ingestion volume, frequency of exposure, and fraction of population exposed

End-use	Ingested volume (l/day)	Use frequency (days/year)	Fraction of population exposed
Toilet flushing[a]	3E-05	365	1
Clothes washing[a]	1E-05	100	1
Cross-connection[a]	2	1	0.1
Unrestricted irrigation and dust suppression[a]	1E-03	50	1
Fire suppression[b]	2E-03	20	1
Car washing[a]	1E-03	12	1
Decorative fountains[c]			
Log_{10}-normal	N (−4.05, 3.81)[d]	50	1
Uniform	U (6.00E-05, 3.79E-03)[e]	50	1
Indoor use 1	Combined exposure due to toilet flushing, clothes washing, accidental cross-connection, and decorative fountains (modeled as a uniform distribution).		
Indoor use 2	Combined exposure due to toilet flushing, clothes washing, accidental cross-connection, and decorative fountains (modeled as a log_{10}-normal distribution).		
Indoor use 3	Combined exposure due to toilet flushing, clothes washing, and accidental cross-connection.		

[a]NRMMC 2006. For car washing, assumed similar exposure as garden irrigation.
[b]Water Services Association of Australia 2004.
[c]Sinclair *et al.* 2016.
[d]Values are log_{10} transformed. Distribution values listed as (mean, standard deviation).
[e]Distribution values listed as (min, max).

Figure 4 Pecson et al. (2022a) Table 2

- ***Required level of treatment***

The LRTs are 95th percentile log_{10} pathogen log reduction targets for nonpotable reuse scenarios (unrestricted irrigation and indoor use) and source waters (domestic wastewater or blackwater, graywater, stormwater, and roof runoff water). The Panel round up 95th percentile value to the nearest 0.5 log increment. This approach will ensure the recommended LRT met the annual risk goal of (10^{-4} annual risk of infection).

<u>Refinement to the Panel's LRT recommendations</u>

The State Board staff made the following refinements to the Panel's LRTs Panel recommendations:

- The Panel provided two sets of stormwater LRTs to reflect lower (0.1%) and higher (10%) dilution of untreated municipal wastewater, which impacted the QMRA input of pathogen concentrations in stormwater. These values are intended to bookend the estimates of the range of wastewater contributing to a stormwater stream. There have been no subsequent publications or studies that provide a more accurate estimate of pathogen concentration in stormwater or a methodical characterization of stormwater source to determine whether lower or higher dilution-based LRTs should be used; therefore, stormwater LRTs reflecting 10% untreated municipal wastewater contribution was selected for the proposed regulations. Infrastructure conditions and stormwater sources for OTNWSs are highly variable statewide, and higher wastewater contribution can

be caused by sanitary sewer overflows or chronic leakages into stormwater networks. In absence of definitive and practical path to distinguish between the lower and higher dilution (0.1% and 10%), State Board staff deferred to the more conservative assumption for a public health protective criteria.

- LRTs for *Giardia* and *Cryptosporidium* were selected for the proposed regulations instead of including a single set of LRTs for parasitic protozoa for the following reasons:
    - As described above in the discussion regarding reference pathogen selection, it provides a consistent regulatory approach with other California risk-based drinking water and recycled water regulations.
    - LRTs for roof runoff is based on Giardia only. Both Cryptosporidium and Giardia are parasitic protozoa assessed to establish the protozoa LRTs. A roof runoff OTNWS addressing Giardia would result in a simpler treatment train compared to a roof runoff OTNWS addressing both Giardia and Cryptosporidium.

Subsection (b) is added to establish the requirement for pathogen LRTs when multiple source waters are blended for OTNWS treatment. When multiple source waters are blended, the more restrictive LRTs must be used to ensure that the provided treatment addresses the source water posing the highest risk to end-users.

Section 60632. Pathogen Control Treatment Trains.
Section 60632 establishes the requirement for sequences of treatment processes (treatment trains) designed to reduce pathogen concentrations in the untreated alternate source waters to achieve the acceptable risk for the use. Subsection (a) requires that an OTNWS must use one of the prescribed treatment trains provided in Table 60632-1, which lists pathogen control treatment trains A – F, and designation of untreated alternate water sources.

Subsections (b) through (e) provides specifications for each treatment process that make up the pathogen control treatment trains. MBR, UV disinfection, chlorination, and membrane filtration are established alternate source water treatment technologies that are generally available for smaller scale (building scale) installations. Selection of these treatment technologies are also based on the availability of established treatment technology validation frameworks and the availability of surrogates that can be monitored continuously to confirm that the pathogen log reduction targets are continuously met. Additional discussions on the surrogates and validation frameworks that State Board staff relied upon are provided in section 60642.

Subsection (b) provides specification for the UV disinfection process. The proposed

regulations require UV disinfection process that is tested and certified as meeting the specifications of NSF/ANSI 55-2022 Ultraviolet Microbiological Water Treatment Systems for Class A UV disinfection systems. The testing and certification of the UV disinfection process must be accredited by an ANSI accredited product certification organization to ensure that the testing and certification process are conducted in accordance with the NSF/ANSI 55 standard. UV reactors may need to be installed in series to produce the total required UV dose for pathogen log reduction. If such installation is performed, it must be installed in accordance with the UV reactor manufacturer specifications to ensure that the UV process' can effectively provide disinfection at the specified dose.

Subsection (c) provides specification for the MBR process. The proposed regulations require MBR process that utilizes hollow fiber or flat sheet membranes with pore sizes up to 0.4 micrometers operating in a submerged configuration. The MBR process specification is as recommended in "Membrane Bioreactor Validation Protocols for Water Reuse" published by the Water Research Foundation (Salveson et al. 2021) for MBRs capable of providing 1.0 log reduction of virus and 2.5 log reduction of protozoa, as long as the MBR filtrate turbidity values are maintained at or below 0.2 NTU 95% of the time and that turbidity of 0.5 NTU is not exceeded at any time.

Subsection (d) provides specification for the chlorine disinfection process. Chlorine disinfection process effectiveness to remove pathogens is reflected by CT values, achievable through specific conditions. Factors that influence disinfection efficiency are residual chlorine concentration, disinfectant contact time, temperature, pH, turbidity, and the absence or minimal presence of interfering organic and inorganic substances in the water, such as oxidizing iron and manganese or reacting with ammonia to form chloramine, a less effective disinfectant. The desired pathogen inactivation through the chlorine disinfection process is through free available chlorine or free chlorine residual.

Subsection (e) provides specification for membrane filtration process. Membrane filtration process must use a microfiltration, ultrafiltration, nanofiltration, or reverse osmosis membrane so that the turbidity of the filtrate does not exceed 0.2 NTU more than 5 percent of the time within a 24-hour period, and 0.5 NTU at any time. The turbidity standards for membrane filtration process is a performance standard consistent with the requirement for production of filtered wastewater pursuant to section 60301.320(b). This requirement is necessary to ensure the effectiveness of the disinfection process (i.e. UV disinfection or chlorination).

Section 60634. Alternatives.
Section 60634 provides an alternative to the pathogen control treatment train requirement in section 60632. State Board staff anticipates that not all projects can or

will elect to install pathogen control treatment trains; therefore, a path for alternatives to pathogen control treatment trains is provided to facilitate such installations. Subsection (a) establishes the allowance for using an alternative to the pathogen control train so long as the proposed alternative meets the pathogen log reduction targets established in Table 60630-1. Subsection (a) also requires that local jurisdiction consult with the State Board for alternatives approval prior to issuing a local jurisdiction permit for the approval of OTNWS. The requirement for State Board consultation is to ensure that there is a level of statewide consistency in the review and approval of alternatives proposal. This requirement is also intended to lessen the burden of technical reviews workload, particularly for local jurisdictions that have insufficient staffing to take on OTNWS technical reviews .

Subsection (b) provides the requirements of alternatives to pathogen control treatment trains to ensure that the alternatives provide an equal level of public health protection as the pathogen control treatment trains prescribed by section 60632.

Subsection (b)(1) requires that an alternative treatment train must consist of at least one filtration and one disinfection treatment processes. Each process cannot be credited more than 6-log reduction for each pathogen to ensure a multi-barrier treatment approach and preventing over-reliance on a single treatment process.

Subsection (b)(2) requires that the alternative to the pathogen control treatment trains consists of treatment processes that are validated for pathogen log reduction as documented by a local jurisdiction approved by the validation study report meeting the requirements of section 60682. This requirement is necessary to ensure that an alternative to the pathogen control treatment trains are at least equally effective to remove or inactivate pathogens as a pathogen control treatment train.

Subsection (b)(3) requires that a field verification of the treatment train performance be performed during the commissioning period to confirm that the treatment train is operating correctly at its site specific conditions.

Article 5. Monitoring Requirements.

Section 60640. Field Verification of Alternative Treatment Train Performance.
Section 60640 establishes the requirement for field verification of treatment train performance. The requirement for field verification is limited to projects that employ an alternative to pathogen control treatment trains. Pathogen control treatment trains, as described in section 60632, are pre-assembled treatment trains with a prescriptive set of specifications and operational limits. State Board staff anticipates that not all projects can or will elect to install pathogen control treatment trains; therefore, a path for alternatives to pathogen control treatment trains is provided to facilitate such

installations. Alternative treatment trains must demonstrate their ability to meet the required pathogen log reduction to ensure that OTNWSs utilizing alternative treatment trains are not producing nonpotable water that is of lesser quality and is not as protective of public health as those provided by a pathogen control treatment train.

Subsection (a) provides the exemption for pathogen control treatment trains meeting the requirements of section 60632 from the requirement for field verification of treatment train performance because pathogen control treatment train have already been provided with a prescriptive set of specifications and operational limits that will confirm the treatment train performance.

Subsection (b) states the purpose of field verification for alternative treatment train performance which is to confirm that, at full-scale installation, the alternative treatment train is achieving the required pathogen log reduction, and that operational monitoring and control systems are functional. Stating this objective is necessary to ensure that the Responsible Entity understands the purpose of field verification and can properly plan for procedure and test run conditions that meet the objective of this requirement.

Subsection (c) requires that field verification test runs be conducted after an OTNWS has achieved normal operating conditions. This is necessary to ensure that the selected test run conditions are representative of the treatment train performance in its anticipated operational conditions.

Subsection (d) requires that field verification testing must consist of at least eight different test runs demonstrating varying changes to operational parameters. This is necessary to ensure that a variety of conditions are tested to confirm that the treatment train is capable of performing beyond a single or a very narrow band of operational conditions that is not representative of the actual expected variations of operational conditions. At least one of the test runs must be at an operational condition where the expected water quality parameter(s) and/or influent flow rate to the treatment train that is the most challenging for one or more treatment processes. Either water quality parameter or flow rate is an expected common parameter that is expected to be varied during treatment train operations. State Board staff expect that full scale facilities are inherently limited in their operational flexibility; therefore only one test condition is specified, while the remaining tests are selected at the discretion of the Responsible Entity.

Subsection (e) requires that the procedure and test run conditions be described in the commissioning plan that is submitted to the local jurisdiction for review and acceptance. The local jurisdiction is required to consult with State Board staff prior to approval of the field verification study to ensure that there is statewide consistency on how new

alternatives to pathogen control treatment are reviewed and approved. This addition to the process would help minimize inconsistencies on acceptance or rejection of new treatment processes between local jurisdictions.

Section 60642. Continuous Process Verification Monitoring.
Section 60642 establishes the requirement for continuous process verification monitoring for OTNWS treatment trains to ensure that pathogen log reduction targets are met at all times for effluent delivered for nonpotable uses, thus ensuring protection of public health. Subsection (a) states this requirement and specifies that continuous process verification monitoring systems must use either pathogen microorganisms of concern or surrogate parameters consistent with each treatment process' validation conditions. This is necessary to ensure a representative measurement pathogen log removal is done for all OTNWS treatment trains. This subsection also requires that process verification monitoring be verifiable at all times.

Subsection (b) establishes the requirement for continuous process verification monitoring for alternatives to pathogen control treatment trains. An alternative to pathogen control treatment trains may include treatment processes that are subject to treatment process approved validation studies.. The validation studies will propose the critical limits, means, and methods for continuous process verification monitoring.

Subsections (c) through (h) provide critical limits for pathogen control treatment trains provided in Table 60632-1.

Trains A, B, C, and D include an MBR followed by UV process.

MBRs combine biological treatment (activated sludge) and membrane filtration, such as microfiltration or ultrafiltration. Pathogen removal capability of an MBR process is evaluated by two published validation frameworks: "Membrane Bioreactor Validation Protocol" published by Australian WaterSecure Innovations Ltd (WaterSecure 2017a) and "Membrane Bioreactor Validation Protocols for Water Reuse" published by the Water Research Foundation (Salveson et al. 2021). Both documents present MBR pathogen reduction crediting efforts through the development of a "tiered" system to assign pathogen credits for MBRs. Salveson et al. (2021) presents pathogen removal values by MBRs in two tiers: Tier 1 log reduction values are conservative credits based upon analysis of a broad data set of existing MBR log reduction values; Tier 2 log reduction values are credits that must be established and demonstrated through commissioning testing, commissioning validation, and ongoing membrane integrity and LRV monitoring to ensure MBR performance complies with validated parameters.

For the proposed regulations, log reduction credits for MBR is selected based Tier 1 credits in Salveson et al. (2021). The Tier 1 crediting is selected to allow a simplified approach, where a set of predefined, conservative LRVs is adopted based on the

statistical analysis of historical MBR performance data. WaterSecure (2017a) Tier 1 validation allows adoption of predefined, conservative LRVs based on literature from prior projects, provided they operated within a prescribed operating envelope. Under Tier 1, projects may adopt predefined, conservative LRVs based on literature from prior projects, provided they operated within a prescribed operating envelope. Salveson et al. (2021) re-evaluated the LRV dataset from Branch and Le-Clech (2015), which is the basis for Tier 1 LRVs established in WaterSecure (2017a). Salveson et al. (2021) concludes that Tier 1 MBR LRVs of 1.0 for virus and 2.5 for protozoa are applicable to any hollow fiber/flat sheet MBR, with pore sizes up to 0.4 micrometer (µm), as long as MBR filtrate turbidity values are maintained at or below 0.2 NTU 95% of the time and that a turbidity of 0.5 NTU is not exceeded at any time.

UV disinfection is a physical disinfection process, where UV light inactivates microorganisms by damaging their nucleic acid, thereby preventing them from replicating. Effectiveness of UV disinfection is demonstrated by assays to quantify microorganism inactivation by measuring the ability of the microorganism to reproduce.

UV transmittance monitored on the MBR filtrate/UV feed, will provide a rough indication of the level of organic carbon removal being achieved by the MBR process. UV transmittance for properly microfiltered and biologically treated wastewater generally exceeds 65%. UV transmittance lower than 65% is indicative of either poor biological treatment performance or that the MBR process receives a non-typical blend in the raw wastewater that contains abnormal chemical constituents.

For the proposed regulations, a UV disinfection process must be tested and certified as meeting the specifications of NSF/ANSI 55-2022 (Ultraviolet Microbiological Water Treatment Systems) for Class A UV disinfection systems equipped with UV sensor and alarm. NSF/ANSI 55 Class A UV systems are required to deliver a UV dose of at least 40 millijoules per square centimeters (mJ/cm^2) at 254 nm to inactivate pathogenic microorganism. The dosage is verified through the bioassay test procedure detailed in the standard. Building scale OTNWS are anticipated to be smaller scale systems when compared to a municipal wastewater recycling treatment facilities and may include systems that rely on smaller and/or intermittent source of waste stream flows generated indoors or outdoors. The small scale treatment trains can benefit from the availability of NSF/ANSI 55 Class A UV systems in the market, since not many small scale UV systems are validated to USEPA's Ultraviolet Disinfection Guidance Manual (USEPA, 2006) or NWRI Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse (NWRI, 2012).

The UV doses specified in trains A, B, C, and D range from 40 mJ/cm^2 to 240 mJ/cm^2. To achieve the required UV dose, UV reactors may be installed in series in accordance with the requirement of section 60632.

The UV dose to pathogen inactivation relationship is based on United States Environmental Protection Agency (USEPA) “Innovative Approaches for Validation of Ultraviolet Disinfection Reactors for Drinking Water Systems” (USEPA, 2020), Table 2.4 is presented as **Figure 5** below. The UV dose requirements were developed based on UV dose-response data for *Cryptosporidium* oocyst, *Giardia lamblia* cyst, and adenovirus measured using a collimated beam apparatus equipped with a low-pressure UV lamp.

Table 2.4: UV Dose (mJ/cm^2) for 0.5 to 6.0 log Inactivation of *Cryptosporidium*, *Giardia*, and Adenovirus

	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
Cryptosporidium	1.6	2.5	3.9	5.8	8.5	12	15	22	30	45	64	85
Giardia	1.5	2.1	3.0	5.2	7.7	11	15	22	28	42	60	84
Adenovirus	39	58	79	100	121	143	163	186	208	231	253	276

Figure 5: USEPA (2020), Table 2.4

Trains A, B, C, and E includes chlorine disinfection. Chlorine disinfection is a well-established treatment technology for wastewater treatment. WaterVal validation protocol for Chlorine Disinfection (WaterSecure, 2017b) specifies residual chlorine concentration, contact time, temperature, pH, and turbidity as factors that influence disinfection efficacy. In general, the highest levels of pathogen inactivation are achieved with high chlorine residuals; long contact times; high water temperature, with good mixing; low pH; low turbidity; and the absence of interfering substances. The validation protocol relies on primarily the 2012 “Chlorine disinfection of human pathogenic viruses in recycled waters” study (Keegan et al., 2012) for chlorine CTs for inactivating Coxsackie B5, an enterovirus known to be highly resistant to free chlorine. The study was carried out in secondary-treated wastewater, which had undergone primary sedimentation, activated sludge treatment and clarification, and has low ammonia levels (below 0.5 mg/L). A Journal of Water and Health article in 2019 summarizes the study (Wati et al., 2019), noting the presence of nitrogenous compounds in wastewater, particularly ammonia, which react with chlorine quickly to form monochloramine, dichloramine, and nitrogen trichloride. Where water has a high ammonia concentration, monochloramine would be the disinfectant choice.

For the proposed regulations, the following parameters are required to be monitored continuously for the chlorination process:

- CT, which is the product of free chlorine residual and contact time measured at the same point, measured in milligrams-minute per liter (mg-min/L). Consistent with WaterSecure (2017b), the contact time to be applied for the proposed regulations is T10.
- Flow rate through the chlorine contact chamber is continuously measured to

ensure a maximum flow of 1 gpm/100 gallons of reactor volume. This requirement ensures a minimum theoretical hydraulic detention time (reactor volume divided by flow rate) of 100 minutes. The flow rate measurement, along with an assumed baffling factor of 0.1, will be used to continuously calculate T10. This approach is conservative, as it results in a minimum T10 of 10 minutes and overestimates the degree of short-circuiting that occurs within the reactor. It is a simplified option for projects that cannot carry out a site-specific determination of T10 and baffling factor. T10 is typically obtained by measurement, determined through a tracer study or estimated based on computational fluid dynamic modelling in the design phase and subsequently confirmed in a tracer study. An alternative limit on flow rate, baffling factor, and T10 can be proposed based on a tracer study conducted in accordance with a protocol that has been reviewed and approved by the local jurisdiction.

- Free chlorine residual concentration in milligrams per liter (mg/L).
- Influent turbidity measured in Nephelometric Turbidity unit (NTU).
- Influent ammonia concentration in mg/L. A minimum ammonia concentration is provided as a limit because it is an interference for free chlorine disinfection process. Excess ammonia will react with chlorine to form chloramine, which is a slower acting disinfectant, compared to free chlorine.
- Influent pH (unitless).
- Influent temperature in degree Celsius (°C).

Pathogen log reduction by chlorination for pH range of 7 to 9, temperature ranging from 5°C to 25°C, turbidity ranging from 0.2 NTU to 5 NTU is provided in WaterSecure (2017b) Table 1, provided as **Figure 6** below. CT values is based on the product of free chlorine residual and T10 as contact time.

Table 1 CT values for 1 to 4 log reduction values of viruses at a range of turbidity, pH and temperature

pH	Log_{10} inactivation	≤0.2 NTU					≤2 NTU					≤5 NTU				
		5 °C	10 °C	15 °C	20 °C	25 °C	5 °C	10 °C	15 °C	20 °C	25 °C	5 °C	10 °C	15 °C	20 °C	25 °C
≤7	1	4	3	2	2	1	4	3	2	2	1	4	3	2	2	1
	2	5	4	3	2	2	5	4	3	2	2	6	4	3	2	2
	3	7	5	4	3	2	7	5	4	3	2	7	5	4	3	2
	4	8	6	4	3	2	9	6	4	3	2	9	7	5	3	3
≤7.5	1	7	5	4	3	2	7	5	4	3	2	8	6	4	3	2
	2	10	7	5	4	3	10	7	5	4	3	13	9	6	5	4
	3	13	9	7	5	4	13	9	7	5	4	16	12	9	6	5
	4	16	11	8	6	4	16	11	8	6	4	21	15	11	7	6
≤8	1	9	7	5	3	3	10	7	5	4	3	12	9	6	4	3
	2	14	10	7	5	4	15	10	7	5	4	19	13	9	7	5
	3	18	13	9	7	5	19	13	10	7	5	25	18	13	9	7
	4	23	16	12	8	6	23	16	12	8	6	32	23	16	11	8
≤8.5	1	11	8	6	4	3	12	9	6	5	4	14	10	7	5	4
	2	17	12	9	6	5	19	13	9	7	5	21	15	11	8	6
	3	23	16	12	9	6	25	17	13	9	7	29	21	15	10	8
	4	29	21	15	10	8	31	22	16	11	8	37	26	18	13	9
≤9	1	13	9	6	5	3	14	10	7	5	4	15	10	7	5	4
	2	20	14	10	7	5	22	16	11	8	6	23	16	12	8	6
	3	28	19	14	10	7	30	21	15	11	8	32	23	16	11	8
	4	35	25	17	12	9	38	27	19	13	10	41	29	20	14	10

Figure 6: WaterSecure (2017b); Table 1

Subsection (c) provides critical limits for pathogen control treatment train A, which consists of MBR, UV disinfection system, and chlorination. When operated in accordance with the specified critical limits, the treatment train is expected to provide 8-log enteric virus, 6.5-log *Cryptosporidium* oocyst, and 5.5 *Giardia lamblia* cyst reduction required for indoor use of onsite wastewater. Outdoor use of onsite wastewater, stormwater, graywater, and roof runoff require lesser log reduction; therefore, treatment train A can be used to address these untreated alternate water sources as well. Log reduction contribution by treatment process is provided in Table 1.

Table 1: Train A – pathogen log reduction credit by treatment process

Treatment process	**Enteric virus**	***Cryptosporidium***	***Giardia***
MBR	1	2.5	2.5
UV	3	4	3
Chlorination	4	0	0

Subsection (d) provides critical limits for pathogen control treatment train B, which consists of MBR, UV disinfection system, and chlorination. When operated in

accordance with the specified critical limits, the treatment train is expected to provide 7-log enteric virus, 5.5-log *Cryptosporidium* oocyst, and 4.5 *Giardia lamblia* cyst reduction required for indoor use of stormwater. Outdoor use of stormwater, graywater, and roof runoff require lesser log reduction; therefore, treatment train B can be used to address these untreated alternate water sources as well. Log reduction contribution by treatment process is provided in Table 2.

Table 2: Train B - pathogen log reduction credit by treatment process

Treatment process	**Enteric virus**	***Cryptosporidium***	***Giardia***
MBR	1	2.5	2.5
UV	2	3	2
Chlorination	4	0	0

Subsection (e) provides critical limits for pathogen control treatment train C, which consists of MBR, UV disinfection system, and chlorination. When operated in accordance with the specified critical limits, the treatment train is expected to achieve 6-log enteric virus, 4.5-log *Cryptosporidium* oocyst, and 3.5 *Giardia lamblia* cyst reduction required for indoor use of graywater. Outdoor use of graywater and roof runoff require lesser log reduction; therefore, treatment train C can be used to address these untreated alternate water sources as well. Log reduction contribution by treatment process is provided in Table 3.

Table 3: Train C - pathogen log reduction credit by treatment process

Treatment process	**Enteric virus**	***Cryptosporidium***	***Giardia***
MBR	1	2.5	2.5
UV	3	2	1
Chlorination	2	0	0

Subsection (f) provides critical limits for pathogen control treatment train D, which consists of MBR and UV disinfection system. When operated in accordance with the specified critical limits, the treatment train is expected to provide 6-log enteric virus, 4.5-log *Cryptosporidium* oocyst, and 3.5 *Giardia lamblia* cyst reduction required for indoor use of graywater. Outdoor use of graywater and roof runoff require lesser log reduction; therefore, treatment train D can be used to address these untreated alternate water sources as well. Log reduction contribution by treatment process is provided in Table 4 .

Table 4: Train D - pathogen log reduction credit by treatment process

Treatment process	**Enteric virus**	***Cryptosporidium***	***Giardia***
MBR	1	2.5	2.5
UV	5	2	1

Subsection (g) provides critical limits for pathogen control treatment train E, which consists of membrane filtration, UV disinfection system, and chlorination. When operated in accordance with the specified critical limits, the treatment train is expected to provide 6-log enteric virus, 4.5-log *Cryptosporidium* oocyst, and 3.5 *Giardia lamblia* cyst reduction required for indoor use of graywater. Outdoor use of graywater and roof runoff require lesser log reduction; therefore, treatment train E can be used to address these untreated alternate water sources as well. Log reduction contribution by treatment process is provided in Table 5.

Table 5: Train E - pathogen log reduction credit by treatment process

Treatment process	**Enteric virus**	***Cryptosporidium***	***Giardia***
Membrane filtration	0	0	0
UV	3	4.5	3.5
Chlorination	3	0	0

Membrane filtration in Train E is not assigned any pathogen log reduction credit. The purpose of membrane filtration is to condition the water entering the UV system and to eliminate concerns related to impacts of particles, leaving viruses as the pathogen of concern to be addressed by the UV system (NWRI 2012).

Subsection (h) provides critical limits for pathogen control treatment train F, which consists of UV disinfection system. When operated in accordance with the specified critical limits, the treatment train is expected to 1.5-log *Cryptosporidium* oocyst reduction required for indoor use of roof runoff. Outdoor use of roof runoff require 1.0-log *Cryptosporidium* oocyst reduction, which can also be addressed by treatment train F. Log reduction contribution by treatment process is provided in Table 6.

Table 6: Train F - pathogen log reduction credit by treatment process

Treatment process	**Enteric virus**	***Cryptosporidium***	***Giardia***
Chlorination	0	1.5	0

Subsection (i) specifies additional critical limits for any treatment train that includes an MBR process treating onsite wastewater or graywater sources that have not been operational or receiving onsite wastewater or graywater influent for at least 96 hours. The requirements ensure biologic processes are established in the bioreactor to allow treatment of organic waste and nitrogenous species. Without establishing effective waste treatment conditions in the bioreactor, effluent may not be of sufficient quality to allow effective and reliable disinfection. Limits on turbidity and minimum UV transmittance are imposed to ensure disinfection effectiveness. An ammonia limit is imposed to allow evaluation of nitrification/denitrification effectiveness of the MBR process. An appropriately designed and stabilized MBR should reduce ammonia in its

product water to levels below 0.5 mg/L.

Article 6. Design Requirements.

Section 60670. Supplemental Source of Water for OTNWS.
Section 60670 subsections (a), (b), and (c) require that the potable water supply must be protected from cross-connection with nonpotable water supply through the use of the appropriate means for backflow prevention along with the approval by the potable water supplier. These requirements are necessary to prevent cross-connection with potable water supply, which would result in potential exposure through ingestion and lead to possible infection and illness. Subsection (a) requires that municipally supplied potable water be available as a supplemental source of water if onsite treated nonpotable water is distributed for indoor uses. The requirement ensures that there is a reliable supply available for necessary indoor uses, such as toilet flushing or clothes washing. Subsection (b) requires that, if used as supplemental source of water for OTNWSs, municipally supplied recycled water acceptable for indoor and/or outdoor use must be disinfected tertiary recycled water or better quality, which is consistent with existing state regulations governing the use of recycled water. Subsection (c) requires the responsible entity to obtain approval from municipal potable water supplier and/or recycled water supplier that potable water and/or recycled water will be used as a supplemental source so the municipal potable water supplier and/or recycled water supplier can assess and impose the necessary backflow protection measures to protect the municipal distribution system(s) from backflow conditions.

Section 60672. Automatic Diversion.
Section 60672 establishes the requirements for automatic diversion to prevent delivery of untreated or partially treated alternate water sources. The requirements in subsections (a) through (e) are necessary to minimize pathogen exposure risk. Insufficiently treated alternate source water contain excess pathogens that are not inactivated or removed, which pose higher exposure risk, and consequently higher threat to public health.

Subsection (a) requires onsite treated nonpotable water not meeting the full pathogen LRT as confirmed by the continuous process verification monitoring in section 60642 to be prevented from reaching the use site.

Subsection (b) limits the time between SCADA discovery of pathogen LRT shortage (triggering an alarm) and when delivery is ceased to limit the amount of insufficiently treated alternate source water reaching the use site.

Subsection (c) requires that an OTNWS must be fully equipped for automatic diversion that can function independent of normal power supply in case of a power outage. A

diversion that results as discharge to the community sewer, storm sewer, or off-site storm drainage systems, the responsible entity must confirm the necessary requirements, such as utility connection sizing or pretreatment, and obtain approvals from the relevant local jurisdiction and/or utility providers prior to discharging.

Subsection (d) requires that causes of inability for treating to full pathogen LRT must be investigated and corrected before resetting or restarting delivery of onsite treated nonpotable water. It also allows the local jurisdiction to require approval prior to restarting system operations, as well as the submission of an incident report.

Section 60674. Reliability Requirements for Disinfection Unit Process.
Section 60674 establishes reliability requirements for disinfection unit processes in an OTNWS treatment train to ensure uninterruptible pathogen removal or inactivation, which is necessary for ongoing protection of public health. Subsections (a) and (b) describe the requirements for UV disinfection and chlorine disinfection processes as both processes are specified as components of pathogen control treatment train. Subsection (c) requires that, if a different type of disinfection unit process is proposed for use, the proposal must be provided in the engineering report for local jurisdiction approval.

Section 60676. Alarms.
Section 60676 subsections (a) through (c) require OTNWS to be equipped with alarms that provide warnings to appropriate personnel(s) of failures and/or incidents that could result in threats to public health. These requirements are necessary to minimize threats to public health resulting from an OTNWS failure.

Subsection (a) establishes requirements for OTNWSs to be equipped with alarms to warn personnel operating the OTNWS when a power failure occurs, when the treatment train is not meeting the pathogen LRTs, and other types of incidents for which warning is required by the local jurisdiction to minimize threats to public health resulting from an OTNWS failure.

Subsection (b) requires that all required alarm devices to be capable of operating independently of the power supply for the OTNWS. Independently powered alarms allows for reliability in notifications to the authorized OTNWS personnel, who then can take prompt corrective actions.

Subsection (c) requires that the personnel(s) to be warned by an alarm device must be capable of taking prompt corrective actions necessary to prevent delivery of inadequately-treated onsite treated nonpotable water to the use area. This requirement is necessary to minimize delays for corrective actions to be taken.

Section 60678. Microbial Regrowth Control for Storage and Distribution.
Section 60678 establishes requirements to ensure that storage and distribution facilities are maintained to control microbial regrowth of opportunistic pathogens by means of disinfectant residual and temperature control. Opportunistic pathogens of plumbing systems are human pathogens that, under certain conditions, may grow to sufficiently high concentrations that inhaling water aerosols could cause infections. *Legionella pneumophila* is the most documented waterborne biofilm pathogen, and primarily responsible for Legionnaires' disease, a potentially fatal respiratory disease acquired through exposure to aerosolized water. These requirements are necessary to minimize microbial regrowth of opportunistic pathogens to prevent threat to public health.

The main site for this pathogen growth is in biofilms that commonly form on wet plumbing surfaces. Biofilm growth is particularly problematic in stagnant water because of reduced residual disinfectant exposure to biofilms (Ashbolt 2015).

Other interacting factors that lead to microbial instability (biofilm growth) include warm water (>25 °C), bioavailable nutrients (organic carbon and inorganic nitrogen and phosphorus), and surface material type (Wingender et al. 2011). Maintenance of disinfectant residual, as described in subsection (c), and temperature control, as described in subsections (a) and (b), are two measures that can be practically implemented on a day-to-day basis by staff operating an OTNWS. The recommendations for disinfectant residual is consistent with the recommendations of the 2023 National Drinking Water Advisory Council's Report of the Microbial and Disinfection Byproducts Rule Revisions Working Group (NDWAC, 2023). The recommended disinfectant residual requirements would likely be proposed as a revision to the current U.S. Environmental Protection Agency (EPA) Surface Water Treatment Rule requirement of at least 0.2 mg/L at the point of entry. The 2020 National Academies of Sciences report on "Management of Legionella in Water Systems" (NAS, 2020) notes several papers suggesting that disinfectant residuals are lost once water starts to stagnate in premise plumbing. Non-potable water produced by OTNWS are more prone to stagnation as only selected fixtures can be served for non-potable uses. The proposed regulations are also intended for commercial, mixed-use, and multi-family buildings, which generally are large buildings (e.g. hotels, apartment complexes, hotels, offices, high rises) with larger plumbing networks with likely more operational variability, and a 0.2 mg/L disinfectant residual would not be adequate (NAS, 2020). Onsite disinfection with a set minimum disinfectant residual to manage microbial regrowth is necessary to manage public health risks from opportunistic pathogens.

If the required disinfectant residual in subsection (c) is not met, the responsible entity must restore the disinfectant residual and retest within 48 hours upon discovery in accordance with the corrective action plan required in section 60686. Sampling plan,

including corrective action plan to address undetectable or very low disinfectant residual, must be included with the OTNWS' Operations Plan. This is necessary to minimize the potential for opportunistic pathogen to proliferate and the potential for exposure and illness.

Article 7. Plans and Reports.

Section 60680. Engineering Report.

Section 60680 establishes the requirement for preparation, submittal, and approval of an engineering report for any entities that produce, supply, or use nonpotable water from an OTNWS.

Subsection (a) establishes the requirement that the engineering report be approved by the local jurisdiction to ensure that it contains the information regulatorily required to issue a permit.

Subsection (b) establishes the requirement for an engineering report preparer. The engineering report must be prepared by a properly qualified engineer, licensed in California, with a minimum of 3 years' experience in wastewater treatment. The minimum qualification will help ensure that the preparer is sufficiently knowledgeable and experienced.

Subsection (c)(1) through (c)(15) establish the required information to be provided in the report.

Subsection (c)(1) requires that the responsible entity and all other entities that will be involved in the construction, commissioning, and ongoing operation and maintenance of the project be identified. This information will provide the local jurisdiction a clear understanding of who is the entity ultimately responsible for permit compliance, and all of the parties that are involved in bringing the project into operation.

Subsection (c)(2) requires that the untreated alternate water source(s) proposed for treatment by the OTNWS be described, including the manner of collection and storage. This information is necessary to ensure that the project meets the definition of an OTNWS for collection of source water onsite or within its project boundary, and that appropriate pathogen log reductions are met.

Subsection (c)(3) requires a set of documentation for the collection, storage, and distribution system for the OTNWS. A complete documentation of the OWTNS facility components is necessary to ensure review of proper facility component siting and design to collect untreated alternate source water, treat, and safely distribute the finished water for use.

Subsection (c)(4) requires a description of the OTWNS treatment train, which is necessary to ensure that the project clearly meets the requirements of pathogen log reductions associated with its source water and proposed use. Subsections (c)(4)(A)-(C) specify the treatment train information that must be provided in the engineering report.

Subsection (c)(4)(A) requires that a complete schematic of the treatment train and how it is connected to the collection, storage, and distribution system, is provided. A complete and clear schematic of the treatment train and how it is connected to the rest of the system is necessary to orient the reviewer with how the treatment train is expected to receive and treat the source waters and distribute the finished nonpotable water.

Subsection (c)(4)(B) requires a description of how the proposed treatment train meets the pathogen log reduction requirements described in section 60630. The responsible entity can select either one of the pathogen control treatment trains described in section 60632 or describe a proposal for an alternative to the pathogen control treatment train meeting the requirements of section 60634. This information is necessary as the path for compliance for the two types of treatment trains differ. Alternatives to pathogen control treatment trains require additional steps, including demonstration through validation study and field verification. Reports related to validation study report and commissioning are also required information for the engineering report in subsections subsection (c)(13) and (c)(14).

Subsection (c)(4)(C) requires a description of each treatment process, including design and operation parameters. This information is necessary to confirm if the design and operation parameters are appropriately matched or compatible with collection, storage, and distribution system.

Subsection (c)(5) requires a description of the capability of the SCADA system to perform the functions necessary to ensure that the OTNWS is operating properly by gathering, analyzing, and processing real-time data, therefore enabling the system to automatically adjust processes or alarm operators to perform such adjustments to prevent non-compliant effluents to be delivered to the use sites. Subsection (c)(5)(A)-(C) list the required primary functions of a SCADA system for an OTNWS.

Subsection (c)(5)(A) requires that the SCADA system is capable of identifying, acquiring, and using the monitoring data to inform operators when anomalous conditions are detected, as well as generate reports and take autonomous action. For example, if a chlorine metering pump goes offline due to a malfunction, the SCADA system should be able to detect the lack of chlorine residual in the treated water stream,

inform the operator of the malfunction, and autonomously increase or decrease chemical dosing, automate valves, and eventually trigger a diversion sequence if the needed chlorine residual is not met.

Subsections (c)(5)(B) and (c)(5)(C) require that the SCADA system is capable of identifying, alerting, and responding to a failure of a control point to meet a critical limit and halt or divert the flow water. For example, if there is a sustained period of very high effluent turbidity leaving an MBR system and entering a UV system, the measurement picked up by the turbidimeter sensor is communicated to the SCADA system, and registers that the stream is not compliant with a critical limit, which should subsequently result in the stream being recirculated back to the beginning of the treatment process or disposed to the sanitary sewer.

Subsection (c)(6) requires that information regarding supplemental supply is provided. A readily available supplemental water supply is a required component of an OTNWS to ensure that there is no interruption for the users. The supplemental water supply must be protected to ensure that no cross-connection or backflow condition can occur.

Subsection (c)(7) requires that information on planned monitoring and reporting is provided to ensure that the responsible entity understands the minimum monitoring and reporting responsibility associated with the operation of the OWTNS along with the associated maintenance of all monitoring instruments to ensure the integrity of the monitoring instruments.

Subsection (c)(8) requires that information on how the project will implement and comply with the design requirements of the proposed regulations is provided.

Subsection (c)(9) requires that contingency planning for the OTNWS is described in the Engineering Report. Contingency planning is required to ensure that inadequately-treated onsite treated nonpotable water is not delivered to the users or designated use areas. Subsections (c)(9)(A)-(C) specify the information that must be described by the responsible entity to demonstrate adequate considerations of conditions that would warrant immediate diversions, such as loss of power, equipment malfunction, or critical limit exceedance.

Subsection (c)(10) requires that complete information on onsite treated nonpotable water use area be provided, as listed in (c)(10)(A)-(H) to ensure that the proposed use and associated use area are appropriate for the type of onsite treated nonpotable water to be used.

Subsection (c)(11) requires that a description of staffing for the full operation and

maintenance of the entirety of the OTNWS facilities is provided to ensure that there is sufficient coverage and oversight of the OTNWS facilities to deliver water that continuously meet the requirements of the regulations.

Subsection (c)(12) requires that a description of how the project will address compliance with cross-connection control requirements in Article 9 of the proposed regulations is provided.

Subsection (c)(13) requires that a validation study report prepared in accordance with section 60682 is provided with the Engineering Report if the responsible entity is required to submit one as a part of an alternative treatment train proposal.

Subsection (c)(14) requires that a commissioning plan prepared in accordance with section 60684 is provided with the Engineering Report. A commissioning plan is necessary to ensure that the responsible entity has properly considered the installation site and operational conditions to confirm that the OTNWS treatment train is correctly installed and is capable of meeting all of its design and regulatory requirements.

Subsection (c)(15) allows the local jurisdiction to specify any other report elements to be submitted with the Engineering Report to address the local jurisdiction specific requirements.

Section 60682. Validation Study Protocol and Report.
Section 60682 establishes the requirement for completion of a treatment system validation study and submission of a report documenting the validation study. The purpose of the validation study is to confirm the ability of a treatment system to remove or inactivate a pathogen under the conditions in which the treatment system can effectively perform pathogen removal or inactivation.

Subsection (a) exempts pathogen control treatment trains specified in and meeting the requirements of section 60632 from the requirement to complete a validation study. The pathogen control treatment trains' ability to meet the required pathogen log reduction targets has been confirmed by the State Board.

Subsection (b) requires all other treatment processes be validated for pathogen log reduction or inactivation. The documentation of the validation is through a validation study report, which follows a validation study protocol. Both validation study protocol and report must be approved by the local jurisdiction.

Subsection (c) requires the local jurisdiction to consult with the State Board prior to approving the validation study protocol and validation study report. The State Board

recognizes that technical support in reviewing these validation reports may be needed by local jurisdictions that have minimal or no prior experience in implementing risk-based water quality standards. State Board's involvement is also necessary to ensure that there are statewide consistency in how validation study protocols and reports are approved.

Subsection (d) specifies that a validation study report must be prepared by a qualified engineer registered in California. For UV disinfection system validation, a qualified engineer registered in states other than California is acceptable, due to the limited availability of California licensed engineers that can perform UV disinfection system validations. For consumer protection, a minimum qualification for a validation report preparer in this subsection is necessary to ensure that an individual with appropriate and relevant experience and expertise is hired to carry out the work.

Subsection (e) requires that a validation study report demonstrate that the proposed treatment process and the overall treatment train provides reliable and continuously verifiable pathogen removal. Subsection (e)(1) requires that the validation study report include a validation study protocol approved by local jurisdiction. This requirement ensures the validation report documents validation conditions described in the validation study protocol, and that the local jurisdiction can be aware of any deviation from the approved validation study protocol. Subsection (e)(2) requires that the validation report includes a detailed technology evaluation addressing the testing of the treatment process over a wide range of operational conditions. This requirement is necessary to determine the range of operational conditions where the treatment process is effective and capable of pathogen removal or inactivation. Subsection (e)(3) requires that the validation report include evidence, such as datasets or test results, to demonstrate that the treatment process is able to achieve the log reduction value reliably and consistently. The evidence must also specify the required operating conditions/parameters and surrogate parameters proposed for continuous process verification monitoring.

Subsection (f) identifies the required validation study protocol elements. The validation study protocol elements are necessary to ensure that the study will be focused on the measures appropriate to the technology being tested, will result in a quality data set for evaluation, and will draw usable conclusions from the data. The protocol elements are consistent with the State Board approach on validation procedures used for treatment technology validation for risk-based water recycling regulations.

Subsection (f)(1) requires the treatment mechanism(s) be identified. This is necessary to ensure everyone understands fundamentally how the treatment reduces pathogenic organism densities and, therefore, what measurements must be made to characterize

the operation during the study.

Subsection (f)(2) requires that a resistant pathogen, or its surrogate, be measured to determine the log reduction. This is necessary to ensure that the log reduction is based on direct evidence of reduction and to ensure that the performance would also be effective for pathogens that are less resistant to the treatment.

Subsection (f)(3) requires that the pathogen or surrogate challenge be high enough to allow calculation of the log reduction claimed. This is necessary to ensure that the data collected is able to be analyzed.

Subsection (f)(4) requires that any factors that can affect the performance of the treatment be determined and measured and is necessary so that the factors can be included as conditions of the validation.

Subsection (f)(5) requires that the log reduction be correlated with some operational parameter that can be measured continuously to be used to determine in real time if the treatment is providing the validated log reduction. This is necessary to ensure treatment performance can be continuously monitored to demonstrate efficacy and protection of public health.

Subsection (f)(6) requires the validation methodology be described to quantify the reduction of the target pathogen or appropriate surrogate within an identified range of operating parameters, which makes up the operational envelope. This requirement is necessary so that the study can be compared to the required study elements, including the need for a challenge test and identification of the validation acceptable operational envelope.

Subsection (f)(7) requires a description of how the data will be evaluated to allow a review of the basis for the results. This is necessary to ensure data collected by the study is analyzed using sound scientific principles.

Subsection (f)(8) requires a description of how the critical limit and control strategy will be determined. This is necessary to make sure these are consistent with the critical control point operational approach.

Subsection (f)(9) requires a description of the method used to calculate the validated log reduction value. This is necessary to make sure that the log reduction is properly justified.

Subsection (f)(10) requires identification of circumstances that indicate the need to re-

review the validation conditions. This is necessary so that these circumstances that trigger a review of validation conditions (or revalidation) can be identified in the operations plan or in some other fashion.

Section 60684. Commissioning Plan and Report.
Section 60684 subsection (a) establishes the requirement for each OTNWS to perform commissioning period prior to supplying onsite treated nonpotable water for indoor and outdoor uses. Responsible entities must have a commissioning plan and commissioning report approved by the local jurisdiction prior to placing an OTNWS in operation. The purpose of the commissioning plan is to demonstrate to the local jurisdiction that the OTNWS proposed for operation is appropriately installed and tested to ensure proper operation at its anticipated operating conditions. The proposed treatment system design and performance described in the Engineering Report must either match or be within the expected acceptance parameters set by the local jurisdiction.

Subsection (b) requires that the commissioning plan must be prepared by a properly qualified professional engineer, licensed in California, and who has a minimum of 3 years' experience in wastewater treatment. This requirement is necessary to ensure that the plan and report are prepared by an individual with relevant experience and qualifications.

Subsection (c) requires that each OTNWS must have a commissioning plan approved by the local jurisdiction prior to commissioning. This requirement is necessary to ensure that OTNWS commissioning will be conducted in a manner that is acceptable to the local jurisdiction to demonstrate that the OTNWS treatment facility will function as intended at the anticipated operational conditions.

Subsection (d) requires that the commissioning plan contain information necessary to demonstrate that the OTNWS treatment facility will function as intended at the anticipated operational conditions. Information required in subsections (d)(1), (d)(2), (d)(3), and (d)(4) are basic information on OTNWS treatment facility test condition (hydraulic load during test), and sampling and monitoring (locations, methods, and personnel). Subsection (d)(5) requires that indicators of normal operating condition to be provided. This is an anticipated set of indicators of which the OTNWS treatment facility is expected to observe in its influent or effluent conditions. Subsection (d)(6) requires that methods used to verify that the required pathogen log reduction values are achieved to be identified. For pathogen control treatment trains, the requirement of continuous process verification monitoring can be used to satisfy this subsection. Subsection (d)(7) requires a test plan for triggering critical alarms, reliability features, and automatic diversion features. This is necessary to ensure that critical alarms, reliability features, and automatic diversion features are operational and functioning as

designed. Subsection (d)(8) requires that alternatives to pathogen control treatment trains, as authorized pursuant to section 60634 must perform a field verification study as a part of commissioning. This is necessary to ensure confirmation of the performance of alternative treatment train once it is installed as a full-scale operational facility. Subsection (d)(9) requires any additional information that the local jurisdiction determines is necessary to demonstrate how the OTNWS will operate as designed at the anticipated operating conditions. This is necessary to anticipate local jurisdiction program specific conditions that is not addressed in the regulations.

Subsection (e) requires that the duration of the commissioning period must be sufficient for all treatment processes to reach steady operating conditions, to experience at least one continuous operation between two consecutive backwash cycles (or other actions that renew treatment function yield or efficacy), and to collect sufficient treatment system performance data to determine that the treatment train meets the reliability requirements pursuant to section 60674. This requirement is necessary to confirm that the OTNWS treatment facility is operating as designed. A uniformly specified timeframe – in days or hours of operation – would not be appropriate, since an OTNWS treatment train could consist of various combination of treatment processes and flows.

Subsection (f) requires that a commissioning report documenting the OTNWS commissioning must be submitted to the local jurisdiction for review and approval within 30 days of completion of the commissioning period. This timeframe is necessary to provide the responsible entity the time to prepare the commissioning report for submittal to the local jurisdiction. Subsection (f) requires that a commissioning report contain information demonstrating that the commissioning procedures have been completed to confirm that the OTNWS facility can operate as designed. Subsections (f)(1) through (5) describe the commissioning report required information. Subsection (f)(1) requires identification of any deviation from the local jurisdiction-approved commissioning plan. This information is necessary to evaluate whether the deviation from the commissioning plan is indicative of the OTNWS treatment facility functionality in meeting the requirements of the regulations. Subsections (f)(2) and (3) require information on efficacy of treatment and functionality of treatment unit operations, which demonstrate the ability of the OTNWS treatment facility to operate. Subsection (f)(4) requires that any situations resulting in out-of-specification performance of each treatment process not anticipated in the commissioning plan to be included in the commissioning report. This information is necessary to evaluate whether the unplanned out-of-specification performance is indicative of the OTNWS treatment facility functionality in meeting the requirements of the regulations. Subsection (f)(5) requires that the commissioning report includes finding(s) on whether the OTNWS treatment facility commissioning demonstrates that it can reliably comply with the requirements of Articles 4, 5, and 6, and any additional local jurisdiction requirements necessary to demonstrate that the

OTNWS will operate in a manner that is protective of public health. This requirement is necessary to ensure that the commissioning report provide a conclusive information whether the OTNWS treatment facility will operate in a manner that is protective of public health.

Section 60686. Operations Plan.

Section 60686 establishes the requirement for each OTNWS to have an operations plan approved by the local jurisdiction prior to local jurisdiction permit issuance. The purpose of the operations plan is to demonstrate that the responsible entity has the information necessary to operate an OTNWS treatment facility. An operations plan will also be a valuable tool for new personnel to fully understand the day-to-day operation of the treatment facility and to ensure consistent operation.

Subsections (a)(1) -(12) contain the minimum requirements for the content of an operations plan, which are necessary to ensure the OTNWS operates as designed and is protective of public health.

Subsection (a)(1) requires that a compilation of operation and maintenance manuals, which includes preventive maintenance recommendations and frequencies, lists of spare parts, and technical cut sheets, be available in the operations plan. This is necessary to ensure that equipment used in OTNWS operation is operated and maintained in accordance with the manufacturer's recommendations.

Subsection (a)(2) requires a user guide for OTNWS personnel on how to operate, navigate, and if necessary, configure the OTNWS facility SCADA system. The OTNWS SCADA system is a crucial component of demonstrating the treatment train capability for meeting the required log reduction target; therefore, it is important for the personnel to be knowledgeable on the operation and navigation of SCADA system. Programming is typically done by an offsite provider. The user guide should provide the personnel operating the OTNWS treatment facility a minimum understanding of the SCADA system in order to communicate any issues that come up during operations to the offsite provider, understand how alarms and notifications are triggered by the process control, troubleshooting common issues, accessing data points, and managing user permissions.

Subsection (a)(3) requires that as-built construction drawings and specifications to be included in the operations plan. As-built construction drawings and specifications document the facilities design as constructed and accepted by the building owner, which may or may not be the same as the responsible entity. This information is necessary to provide OTNWS personnel the information when identifying or troubleshooting facilities issues.

Subsection (a)(4) requires that the operations plan include best management practices for corrosion control for the onsite treated nonpotable water storage and distribution system. The presence of corrosion and scale increases the likelihood of biofilm formation, where opportunistic pathogens, such as *Legionella sp.,* can proliferate. Along with temperature control and disinfectant residual, each OTNWS facility must consider corrosion control best management practices, such as monitoring and maintaining water chemistry to prevent corrosion by monitoring and adjusting pH levels, minimizing stagnation and water age, and when appropriate, applying corrosion inhibitors. Effective best management practices would depend on the size of the building and occupancy, and therefore, a set of standard requirement in the regulations would not be appropriate.

Subsection (a)(5) requires that the operations plan include standard operating procedures which include a detailed startup and shutdown procedures, operator log sheets and checklists, and troubleshooting procedures. This information is necessary to facilitate training of OTNWS personnel and familiarize new OTNWS personnel with critical operational activities. A standard operating procedure will ensure that the operation of the OTNWS facility is consistently effective.

Subsection (a)(6) requires that the operations plan include a summary of regulatory compliance information which includes monitoring and reporting requirements to comply with the local jurisdiction’s permit, methods, and monitoring locations. This information is necessary for all OTNWS personnel to be knowledgeable of the local jurisdiction permit requirement to ensure that the OTNWS facility is operated in accordance with the requirements of the local jurisdiction permit requirements.

Subsection (a)(7) requires that health and safety protocols, including personal protective equipment and emergency contact information, are included in the operations plan. This requirement is necessary to ensure that personnel is knowledgeable of health and safety protocols related to OTNWS operations, and whom to contact or where the nearest hospital or clinic is located in case of an emergency. For example, OTNWS treatment trains involve use of chemicals, such as chlorine, which would warrant the personnel to be knowledgeable on safety protocols related to storage (if applicable) and handling of chlorine.

Subsection (a)(8) requires that contingency planning information, which includes procedures for actuation of supplemental water sources, disposal of inadequately-treated onsite treated nonpotable water, customer notification, and key contact information in the event of emergencies, be provided. This information is necessary to ensure that personnel is aware of and can carry out the contingency planning laid out in

the approved engineering report.

Subsection (a)(9) requires that staffing information, which includes a list of staff persons responsible for operation and maintenance of the OTNWS treatment facility including certifications or licenses, if applicable; staffing schedules; contact information for staff responsible for onsite operations, offsite or on-call maintenance staffing contact information and frequency of scheduled onsite visits if applicable; a signed statement by the responsible entity certifying that staff responsible for operating the treatment facility possess the knowledge of subjects described in section 60690(b) to be provided. This information is necessary to ensure that an adequate coverage for personnel is provided, and if needed, OTNWS personnel have access to resources to address issues where an outside provider is needed. A self-certification statement by the responsible entity is necessary to be submitted and kept with the operations plan to make sure that the responsible entity updates the information on staffing, the self-certification information is also kept current.

Subsection (a)(10) requires that a quick reference section that includes information on critical alarms and monitoring instrumentation is necessary to ensure that OTNWS personnel can easily refer to the quick reference section on a day-to-day operation and if or when alarms are triggered. The frequencies of instrumentation maintenance must also be in the quick reference section to make sure that all critical instrumentation, particularly those used for continuous process verification, are calibrated and maintained per manufacturer’s recommendations.

Subsection (a)(11) requires that the operations plan includes a sampling plan to demonstrate compliance with section 60678. The sampling plan for each facility would vary depending on configuration of plumbing, fixtures, and storage facilities. The sampling plan should identify the locations of where temperature measurements are taken in the storage and distribution systems, location of disinfectant residual measurement, the make and model of calibrated instruments used to take the measurements, time of sampling, and frequency of readings. This requirement is necessary to ensure uniformity and consistency in the locations and methods of monitoring in the storage and distribution system. The sampling plan must also include a corrective action plan to address any occurrences of undetectable or very low disinfectant residual that is not meeting the requirement of section 60678. This requirement is necessary to ensure that the OTNWS personnel can promptly respond and perform any action necessary to restore disinfectant residual as soon as it is discovered. Such actions are necessary to minimize the potential for opportunistic pathogen to proliferate and the potential for exposure and illness.

Subsection (a)(12) requires that the operations plan include any other additional

information that the local jurisdiction determines is necessary to ensure the OTNWS operates as designed and is protective of public health. This information is necessary to capture any specific local jurisdiction program requirement that are necessary for protection of public health but is not addressed in this section.

Subsection (b) requirements ensure that the responsible entity is accountable to properly maintain the operations plan to reflect the current operations of the OTNWS. Local jurisdiction's approval of changes to the operations plan related to operations, maintenance, and monitoring, particularly changes in operations that result in changes to operations beyond those documented in the local jurisdiction-approved commissioning report, and maintenance and monitoring of the OTNWS that relate to compliance with the regulations, is necessary to ensure that the OTNWS continues to deliver treated water that is safe for use.

Subsection (c) requires that the operations plan must be kept onsite and is available to all personnel responsible for operation of the OTNWS. Operations plan contain all necessary information on proper operation of the OTNWS. Personnel operating the OTNWS should be familiar with operations of the OTNWS described in the operations plan and knowledgeable of how to find needed information contained in the operations plan. The operations plan should be a document that the personnel can use as a guide or reference on a daily operation basis, which necessitates that the document is accessible to personnel at all times.

Section 60688. Monitoring Report.
Section 60688 establishes the requirements for monitoring reports to be submitted to the local jurisdiction. An ongoing evaluation of the system performance through monitoring and reporting to the local jurisdiction is necessary to ensure that the responsible entity operates the OTNWS as designed. A quarterly report must be submitted for each OTNWS to the local jurisdiction containing the minimum required elements described in subsections (a) through (g).

Subsections (a) and (b) require information on daily average flow from the treatment facility and volumetric production (treatment) and use of onsite treated nonpotable water. These requirements are necessary to confirm that the OTNWS is operated within the capacity proposed in its engineering report. Information on volume of onsite treated nonpotable water produced and used are useful to inform the local jurisdiction and the State Board on the volume of potable water use offset by the production and use of onsite treated nonpotable water.

Subsection (c) requires daily summaries of continuous process verification monitoring parameters provided in Table 60688-1. The required monitoring parameters are

dependent on the treatment train used in the OTNWS. For example, if a pathogen control treatment train consist of only MBR and UV disinfection processes, only parameters associated with MBR and UV disinfection must be reported. An alternative treatment train must perform continuous process verification monitoring utilizing an appropriate surrogate(s) that is demonstrated to be indicative of the treatment trains capability for pathogen removal, as required in section 60642 subsection (b). Continuous process verification monitoring for alternative treatment trains are determined by the validation studies approved by the local jurisdiction. This requirement is necessary to confirm that the treatment trains are operating in accordance with the requirement of the regulations for production of onsite treated nonpotable water.

Subsection (d) requires information on malfunctions, breakdowns, upsets, bypasses, or any other system operation anomalies, along with information on how such issues are resolved. This requirement is necessary to ensure that any issues with the system are addressed and resolved, instead of being bypassed.

Subsection (e) requires reporting of any complaints related to the OTNWS, along with information on how the complaints are resolved. This requirement is necessary to ensure that any complaints related to the OTNWS are addressed and resolved, instead of being ignored, and to keep the responsibility entity accountable for operating the OTNWS in a manner that is protective of public health. User complaints related to treated effluent quality, such as odor or turbidity, are indicative of poor treatment process performance. User complaints related to application of onsite treated nonpotable water, such as ponding, are indicative of poor implementation of use area requirements pursuant to section 60624.

Subsection (f) requires submittal of results of sampling to confirm control of microbial regrowth control for storage and distribution pursuant to section 60678. This requirement is necessary to confirm that the required controls of storage and distribution are performed and maintained.

Subsection (g) requires submittal of any other monitoring parameters that the local jurisdiction determines is necessary to demonstrate how the OTNWS will operate as designed. This requirement is necessary to not limit the ability of local jurisdictions from confirming a local jurisdiction specific monitoring if needed, for example, monitoring for volatile organic carbon for treated stormwater sources if hydrocarbon-based fuels is known to be stored or used within the OTNWS project footprint.

Article 8. Other Requirements.

Section 60690. Personnel.
Section 60690 subsection (a) requires that any plumbing modification must be

performed by an appropriately licensed contractor or any other individual in accordance with the state and local plumbing codes. This requirement is necessary to guarantee that any plumbing modifications impacting OTNWS facility are performed to state and local requirements and that the work is performed by someone qualified and licensed to do such work.

Subsection (b) establishes requirements for the responsible entity to ensure that appropriate and qualified staffing is provided for the OTNWS facilities to ensure a continuous and proper operation and maintenance. The personnel operating an OTNWS must have a set of knowledge of technical and regulatory requirements for OTNWS. OTNWS treatment trains consist of treatment processes that are complex to maintain and operate, similar to wastewater and drinking water treatment systems, although for the most part, OTNWS treatment trains produce smaller flows. The State of California currently does not have a state-sponsored OTNWS certification program; therefore, the responsible entity is responsible for ensuring that the qualified individuals are operating the OTNWS facilities in accordance with state regulations and local ordinances through a self-certification that the personnel operating the OTNWS treatment facility possess knowledge of subjects described in subsections (b)(1) through (b)(7).

Subsection (b)(1) requires that personnel operating a OTNWS treatment facility to possess knowledge of the regulations and any local jurisdiction program requirements to ensure that the facility is operated in a manner that is protective of public health. Subsections (b)(2) and (b)(3) requires that the personnel have the technical knowledge and understanding of how the OTNWS treatment processes are maintained and operated. Subsection (b)(4) requires that the personnel have a knowledge of pathogen control, which consist of the understanding of necessity for multibarrier treatment processes and verification of pathogen log removals through the treatment trains, and how these concepts are important to protect public health. Subsection (b)(5) requires that the personnel possess the knowledge of and ability to carry out personnel tasks and functions to ensure that the OTNWS treatment facility is operating in a manner that is consistent with the approved operations plan. Proper operations of an OTNWS treatment facility would be reflected in its approved operations plan. It is necessary for the personnel to be familiar with and knowledgeable of the content of operations plan. Subsection (b)(6) requires that the personnel possess the knowledge of cross-connection control measures, including how to comply with the requirements in Article 9 of this chapter to ensure that cross-connection control for OTNWS operations are continuously and correctly performed. Subsection (b)(7) is provided to allow additional personnel qualifications or requirements that the local jurisdiction determines necessary to ensure that the OTNWS operates as designed and in a manner that is protective of public health.

Subsection (c) requires that if the responsible entity delegates the responsibility to a duly authorized agent for the OTNWS operation, the local jurisdiction must be informed within 30 days of personnel change to ensure continuity of communication relating to regulatory compliance. This requirement is necessary for the local jurisdiction to maintain information on the most current contacts on personnel responsible for OTNWS treatment facility operations, particularly in the event of a treatment system failure or emergencies.

Section 60692. Signage.
Section 60692 subsections (a) through (e) establish the requirements for signage material, installation, and wording or graphics necessary to communicate to the potential users, whether it is residents, tenants, or the general public, that nonpotable water is in use and is not appropriate for human consumption. These signage requirements are consistent with existing signage requirements for graywater and recycled water in California Plumbing Code Chapter 15. Consistency with signage requirements for graywater and recycled water requirements in the California Plumbing Code is necessary to facilitate implementation of these requirements as the content and format of these signs are familiar to the local jurisdiction. The desired outcomes from these signage requirements are identical, which is to provide clear notification to the public that nonpotable water is in use.

Section 60694. Notifications.
Section 60694 establishes the requirements for notifications prior to delivery of onsite treated nonpotable water and upon discovery of delivery of untreated or inadequately-treated onsite treated nonpotable water. Subsection (a) requires that a notification is provided to tenants and/or residents prior to supplying onsite treated nonpotable water for indoor uses. It is necessary for the tenants and/or residents who will be relying on the onsite treated nonpotable water for their water supply to be aware that a portion of their water demand is going to be served using a source of water that is not potable and should not be used for potable purposes. Tenants and/or residents must acknowledge receipt of the information so that there is a clear record that information regarding onsite treated nonpotable water use was provided.

Subsection (b) requires that the responsible entity notify the local jurisdiction by phone and electronic mail within 24 hours of discovery of delivery of untreated or inadequately-treated onsite treated nonpotable water. The notification to the local jurisdiction is necessary so the local jurisdiction can monitor subsequent actions that the responsible entity needs to complete, anticipate any subsequent public concerns related to incident, and react or provide support accordingly to ensure that public health is protected.

Subsection (c) requires that the responsible entity to provide notification to the building

tenants and/or residents within 24 hours of discovery of delivery of inadequately-treated onsite treated nonpotable water for indoor uses. The notification is necessary to mitigate or prevent any further exposure to waterborne pathogens that may not be properly removed by the treatment facility, which may result in illness.

Section 60696. Decommissioning.
Section 60696 establishes the requirements for decommissioning an OTNWS. This is necessary to ensure that the local jurisdiction is informed of any planned non-operation or demolition of an OTNWS to ensure that the activities are carried out safely and systematically. Subsection (a) requires that the responsible entity provide a notification to the local jurisdiction at least 30 days prior to the start of decommissioning activities to provide the local jurisdiction the time to review the required procedural information described in subsection (a)(1) and (a)(2), and other necessary activities to decommission an OTNWS pursuant to the local jurisdiction determination in subsection (a)(3). Subsection (a)(4) requires that the responsible entity provide an estimated timeline to complete decommissioning activities and provide a notification within 30 days after completion of decommissioning activities pursuant to subsection (b). This requirement is necessary so the local jurisdiction is aware of the status of decommissioning and can have this reflected in the local jurisdiction's permitting program records, and subsequently reflected in the statutorily mandated reporting to the State Board as described in section 60606.

Article 9. Cross-Connection Controls.

Section 60700. Cross-connection Hazard Assessment.
Section 60700 establishes a requirement for site specific cross-connection hazard assessment of the onsite treated nonpotable water system inclusive of the treatment, distribution, and use area facilities. There are many possible combinations and sizes of how these facilities will be designed, constructed, and operated, which warrants a site-specific evaluation as required in subsection (a). The purpose of a hazard assessment is to identify potential hazards that would result in a health risk through cross-connection with the onsite potable water system.

Subsection (a) requires that a hazard assessment must be conducted prior to the initial delivery of onsite treated nonpotable water and at least once every four years thereafter. These ongoing assessments are necessary to confirm that any current and subsequently new potential cross-connection hazards are identified to protect the potable water system from unintended cross-connection.

Subsection (b) provides the minimum survey elements that must be addressed in consideration of potential cross-connection scenarios, impacts, and remediation mechanisms. Subsection (b)(1) requires that the assessment to identify any current and

potential cross-connections between the onsite potable water system and current and/or proposed onsite nonpotable water system(s). This requirement is necessary to terminate and correct existing cross-connection(s) and identify any future or potential cross-connections to prevent such cross-connections from occurring. Subsection (b)(2) requires that the assessment identifies distribution system conditions that increase the likelihood of a backflow event, such as hydraulic gradient differences impacted by pipeline breaks or high water-demand situations. Identification of these conditions are necessary to recognize what conditions would trigger a backflow event, and therefore can be prevented or avoided. Subsection (b)(3) requires the assessment to address proper backflow protection(s) or action(s) required to eliminate and prevent any cross-connection(s) identified in subsections (b)(1) and (b)(2). Subsection (b)(4) requires an assessment of the connection(s) to supplemental water supply(es). An OTNWS may have both potable water supply and recycled water supply as approved supplemental water supplies by the respective water supply providers. This requirement is necessary to ensure that the appropriate backflow protection is in place to prevent any backflow or cross-connection into the onsite potable water or recycled water supply and distribution system(s). Subsection (b)(5) requires an assessment of methods to ensure containment at the point of potable water service, and if available, recycled water service connections. This requirement is necessary to ensure the adequacy of the containment of any cross-connection or backflow conditions to prevent contamination of the municipal distribution systems.

Section 60702. Visual Inspection.

Section 60702 establishes the requirements for visual inspections. These requirements are necessary to ensure that there is no visible cross-connections between the onsite treated nonpotable water distribution system and the onsite potable water distribution system, locks and seals to prevent cross-connection between distribution systems are untampered, and that signs, markings, and labels to clearly indicate nonpotable water facilities are in place.

Subsection (a) establishes the requirement for a visual inspection prior to the initial delivery of onsite treated nonpotable water and annually thereafter. Subsection (b) specifies the elements of a visual inspection. The elements in subsections (b)(1) through (b)(4), which include meter service locations, pumps and equipment room and related facilities, valves, and supplemental source of water supply, are specified because these elements are critical locations where cross-connections can occur. These locations/items are also generally most visible and accessible elements for inspection. While these items are practical to inspect, they are also are more likely to be tampered with, vandalized, or stolen. Subsection (b)(5) requires that signs in publicly accessible or common areas served by onsite treated nonpotable water as described in section 60692 must be checked to confirm that no signs have been removed and that

nonpotable facilities marking are clear and visible. This requirement is necessary because signage warns the public to exercise caution on tampering with or modifying facilities serving onsite treated nonpotable water, hence minimizing the risk of cross-connection.

Section 60704. Cross-connection Test.
Section 60704 establishes the requirements for a cross-connection test. These requirements are necessary to ensure that there are no cross-connections between the onsite treated nonpotable water distribution system and the potable water distribution system.

Subsection (a) specifies the required frequency of a cross-connection test. An initial cross-connection test is required to ensure that the onsite treated nonpotable water distribution system is not cross-connected to the potable water distribution system. A minimum test frequency of once every four years is consistent with the requirement of cross-connection test for dual plumbed recycled water systems in Title 22 section 60316 subsection (a).

Subsection (b) requires that a cross-connection test for the onsite nonpotable water treatment facility be conducted in accordance with a site-specific developed test protocol for the facility. An onsite nonpotable water treatment facility addressed by the regulations cover various water sources, types of uses, and is not restricted by treatment process types or capacity, which makes a uniform protocol infeasible. A requirement to identify risks for cross-connection at an onsite nonpotable water treatment facility through a survey and hazard assessment is contained in section 60700, subsection (a).

Subsection (c) provides the steps in a cross-connection test to determine whether a cross-connection has occurred in the onsite treated nonpotable water distribution system. These steps are consistent with the protocol for cross-connection test for dual-plumbed recycled water systems as provided in the California Plumbing Code Chapter 15. Consistency with the dual-plumbed recycled water system is necessary to facilitate implementation of these requirements as these steps should be familiar to the local jurisdiction. The desired outcome from these procedures are identical, which is to test for occurrence of cross-connection, regardless of the type of water supply being tested. The steps described in subsections (c)(1) through (c)(9) generally provides the procedures for a two-way shut down test, testing for presence of cross-connection on onsite potable water system and onsite treated nonpotable water system. Subsections (c)(1) through (c)(4) describes testing steps while potable water system is activated and pressurized, while the onsite nonpotable water system is shut down, depressurized, and drained. Subsections (c)(4) through (c)(10) describes testing steps while onsite treated

nonpotable water system is activated and pressurized, while the potable water system is shut down, depressurized, and drained.

Subsection (d) allows for an alternative cross-connection test procedure to be proposed by responsible entity in lieu of conducting the cross-connection test as specified in subsection (c). The multi-family, commercial, and mixed-use buildings addressed by the proposed regulations will be highly varying in sizes, occupancies, and operational needs, that there may be site-specific circumstances where the prescribed steps provided in subsection (c) are not feasible. An alternative cross-connection test must be submitted to the local jurisdiction and the State Board for approval prior to conducting the cross-connection test. The alternative cross-connection test procedure cannot be used as a means for reducing or simplifying the cross-connection test procedure provided in subsection (c). The alternative cross-connection test procedure proposal must describe how the alternative cross-connection test procedure can demonstrate that it is providing the same level protection of public health.

Section 60706. Cross-connection Control General Requirements.
Section 60706 subsection (a) requires that hazard assessments, inspections, and cross-connection tests are conducted by a certified cross-connection control specialist. Subsection (b) requires that records and written reports be submitted to the local jurisdiction within a reasonable time to complete and submit such written documentation.

These general requirements ensure proper qualification for those that are tasked to inspect and test the distribution systems, and that proper records are maintained to ensure that cross-connection control is an ongoing practice for the facilities served by an OTNWS.

Section 60708. Backflow Prevention Assembly.
Section 60708 subsection (a) requires an annual inspection and testing of any backflow prevention assembly serving an OTNWS use area to ensure that the backflow prevention assembly is in working order. Subsection (b) requires that the backflow prevention assembly is tested by a certified backflow prevention assembly tester as defined in section 60600. Subsection (c) requires that written reports documenting the tests and inspections be submitted to the local jurisdiction within a reasonable time to complete and submit such written documentation.

Section 60710. Discovery of Cross-connection.
Section 60710 establishes the requirements for the responsible entity to take immediate actions when a cross-connection between onsite potable water system and onsite nonpotable water system is discovered. The requirements apply for whether the discovered cross-connection is with onsite treated nonpotable water system or onsite

nonpotable water that is untreated (collection system).

Subsection (a) provides the necessary actions to be taken immediately upon discovery of cross-connection. Subsection (a)(1) requires that the responsible entity notifies the local jurisdiction, potable water supplier, and building tenants and/or residents of the cross-connection no later than 24-hours upon discovery. Subsection (a)(2) requires that the responsible entity ceases delivery of onsite treated nonpotable water into the building and use area premises and drain the onsite treated nonpotable water riser (if applicable). Subsection (a)(3) requires that the responsible entity shut down potable water service into the building and its premises at the meter. Subsection (a)(4) requires that the responsible entity uncover and disconnect the cross-connection. Subsection (a)(5) requires the responsible entity to perform another visual inspection and cross-connection test in accordance with sections 60702 and 60704, respectively, to ensure that the cross-connection has been remedied. Subsection (a)(6) requires that the responsible entity disinfect the potable water system. The concentration of disinfectant and duration is consistent with the current California Plumbing Code disinfection requirements for dual plumbed recycled water system. Subsection (a)(7) requires that the responsible entity flush the onsite potable water system after 24 hours and perform a standard bacteriological test for the local jurisdiction approval. Once the results are satisfactory to the local jurisdiction, the onsite potable water system can be recharged. These actions are necessary to ensure that any discovered cross-connection is corrected, and nonpotable water is entirely purged from the potable water supply to ensure that exposure to pathogens is minimized and further prevented.

Subsection (b) specifies that a notification to the local jurisdiction must be done immediately upon discovery and no later than 12 hours upon discovery. The time requirement is imposed so the responsible entity acts promptly to remedy the discovered cross-connection. If the cross-connection event has broader implications, such as impacting a large number of occupants or general public, the notice also provides the local jurisdiction with time to anticipate or carry out response actions to remediate additional public health concerns resulting from cross-connection, such as monitoring for an outbreak of an illness.

Subsection (c) requires that prior to restarting delivery of onsite treated nonpotable water, the responsible entity must investigate the cause of cross-connection and complete corrective actions. The responsible entity must submit a report describing the incident and completed corrective actions to the local jurisdiction prior to restarting OTNWS operations. This is necessary to ensure that the local jurisdiction can confirm that the cross-connection event and its cause have been thoroughly corrected and addressed, and no longer posing threat to public health.

DOCUMENTS INCORPORATED BY REFERENCE

The following documents are incorporated by reference in the proposed regulations as it would be too cumbersome, unduly expensive, or impractical to publish these documents into regulation. These documents are provided in **Appendix A**.

1. NSF/ANSI 55-2022 - Ultraviolet Microbiological Water Treatment Systems (2022), available at: https://webstore.ansi.org/standards/nsf/nsfansi552022

DOCUMENTS RELIED UPON

(Gov. Code, §11346.2(b)(6))

The following are technical, theoretical, and empirical study, report, or similar document upon which the agency relies in proposing the adoption of the regulations. When available, electronic access to these documents are provided in **Appendix B**.

1. Alja'fari, J. H., Sharvelle, S. E., Brinkman, N. E., Jahne, M., Keely, S., Wheaton, E., Welty, J., Sukop, M. C. & Meixner, T. 2022. Characterization of roof runoff microbial quality in four U.S. cities with varying climate and land use characteristics. Water Research 225, 119123. https://doi.org/10.1016/j.watres.2022.119123

2. Ashbolt, N.J. Environmental (Saprozoic) Pathogens of Engineered Water Systems: Understanding Their Ecology for Risk Assessment and Management. 2015. Pathogens 4(2): p. 390-405. https://doi.org/10.3390%2Fpathogens4020390

3. Bambic, D., McBride, G., Miller,W., Stott, R. & Wuertz, S. 2011. Quantification of Pathogens and Sources of Microbial Indicators for QMRA in Recreational Waters. WERF, Alexandria, VA. https://www.waterrf.org/research/projects/quantification-pathogens-and-sources-microbial-indicators-qmra-recreational

4. Branch A & Le-Clech P. 2015, National Validation Guidelines for Water Recycling: Membrane Bioreactors, Australian Water Recycling Centre of Excellence, Brisbane. https://vuir.vu.edu.au/id/eprint/32073

5. Jahne, M. A., Schoen, M. E., Garland, J. L. & Ashbolt, N. J. 2017. Simulation of enteric pathogen concentrations in locally-collected greywater and wastewater for microbial risk assessments. Microbial Risk Analysis 5, 44–52. https://doi.org/10.1016/j.mran.2016.11.001

6. Keegan, A., Wati, S., Robinson, B. 2012. Chlor(am)ine disinfection of human pathogenic viruses in recycled waters. Smart Water Fund.

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BENEFITS ANTICIPATED FROM THE REGULATORY ACTION

(Gov. Code, §11346.2(b)(1))

The anticipated benefits, including any nonmonetary benefit to the protection of public health and safety of California residents, worker safety, and the state's environment, from these proposed regulations are the following:

- The health and welfare of California residents and worker safety will continue to be protected by preventing cross-connection of onsite treated nonpotable water systems and public water supply as well as providing health-protective risk-based water quality standards for the use of onsite treated nonpotable water;
- The state's environment will benefit from maximized amount of onsite treated nonpotable water that Californians can safely use for beneficial purposes and offsetting uses of potable water from nonpotable water uses.

MANDATE OF SPECIFIC TECHNOLOGIES, EQUIPMENT, ACTIONS, OR PROCEDURES

(Gov. Code, §§11340.1(a); 11346.2(b)(1); 113462(b)(4)(A))

The proposed regulations provide the regulated entities two options: (1) the use of prescribed treatment technologies and performance standards, and (2) the use of alternatives to the prescribed treatment technologies and performance standards. The alternatives can be accepted so long as they are supported by demonstration that the proposed alternatives are as protective of public health.

ECONOMIC IMPACT ASSESSMENT

(Gov. Code, §11346.3(a)(3))

The State Board has prepared the following Economic Impact Assessment pursuant to Gov. Code section 11346, subdivision (b)(1)(A)-(D). The State Board estimates that the economic impact of this regulation (which includes the fiscal impact) is below $10 million and is a non-major regulation. A detailed Economic Impact Assessment is provided in **Appendix C.**

Compliance with the proposed regulations will be mandated only for those engaging in onsite nonpotable water treatment and recycling. The proposed regulations will impact local jurisdictions with existing OTNWS permitting programs and existing OTNWS owners who are subject to the requirement to bring the existing OTNWS into compliance with the proposed regulations upon its effective date.

State Board staff estimated the total cost impact of the proposed regulations for the first seven years after the regulation is effective, where total cost impact includes direct cost impact and fiscal impact. Direct cost impact to privately owned businesses and fiscal impact to local government consist of capital and operations & maintenance costs

related to the replacement of and the subsequent operation and maintenance of existing OTNWSs in operation before the effective date of the regulations. Total cost is expected to range between $6.4 million and $8.6 million per year in the first five years, where the maximum total cost is expected to occur on year five (see **Table 7**). Costs for subsequent years beyond year five are limited to annually incurred operations and maintenance cost of $2.8 million.

Table 7: Cost estimate for the first 7 years of regulatory implementation, for privately owned business and local governments

Year	Capital Cost	O&M Cost	Total Cost
1	$5,815,000	$567,100	$6,382,100
2	$5,815,000	$1,134,200	$6,949,200
3	$5,815,000	$1,701,300	$7,516,300
4	$5,815,000	$2,268,400	$8,083,400
5	$5,815,000	$2,835,500	$8,650,500
6	$0	$2,835,500	$2,835,500
7	$0	$2,835,500	$2,835,500

The State Board has made additional determinations regarding the economic impact of the proposed regulations:

- The creation or elimination of jobs within the State of California (Gov. Code, §11346.3(b)(1)(A)): With existing manufacturers of equipment and material for treatment trains potentially expanding production in the short term, these businesses might slightly increase hiring of jobs in this sector because of the proposed regulations. However, the overall impact of the proposed regulations on jobs is negligible compared to California's labor force: as explained in the Appendix, the total number of jobs within the state is estimated to increase by 50 per year, on average, in the seven years after the proposed regulations are effective.

- The creation of new businesses or the elimination of existing businesses within the State of California (Gov. Code, §11346.3(b)(1)(B)): The proposed regulations are not expected to cause entry of new businesses or the exit of existing ones from the commercial, multi-family, or mixed use buildings real estate markets. The proposed regulations are assumed to increase the investment (capital costs) in existing OTNWSs at multifamily residential, commercial, and mixed use buildings in City and County of San Francisco and County of Los Angeles. This

increased investment should be met through increased production by in-state companies, mostly manufacturers of equipment and material for treatment trains. Thus, existing manufacturers of equipment and material for treatment trains, including manufacturers of electrical and plumbing fixtures and chemical manufacturers, will potentially expand production in the short term as a result of the proposed regulations. Similarly, businesses that provide support, maintenance, and repair of treatment trains might experience some expansion. However, this expansion is not expected to be significant statewide, nor are new businesses expected to be created.

- Expansion of businesses currently doing business within the state (Gov. Code, §11346.3(b)(1)(C)): Existing manufacturers of equipment and material for treatment trains, including manufacturers of electrical and plumbing fixtures and chemical manufacturers, will potentially expand production in the short term as a result of the proposed regulations. Similarly, businesses that provide support, maintenance, and repair of treatment trains might experience some expansion. However, this expansion is not expected to be significant statewide, nor are new businesses expected to be created.

- Statewide adverse economic impact directly affecting business, including ability to compete (Gov. Code, §11346.2(b)(5)): The proposed regulations will not have a significant, statewide adverse economic impact directly affecting business, including the ability of California businesses to compete with businesses in other states.

- Fiscal impact on local or state government (Gov. Code, §11346.5(a)(6)): State Board staff estimated fiscal impact of the proposed regulations for the first seven years after the regulation is effective. Fiscal impact is expected to be incurred by local governments that own existing alternate water systems that will be impacted by the proposed regulations. State Board staff do not anticipate any fiscal impact on state government and federal funding of state programs. There are a total of 15 existing installed alternate water systems owned by local government in Los Angeles County that will be impacted by the proposed regulations. The estimated fiscal impact, which include capital and operations & maintenance costs, are expected to range between $1.2 million and $1.6 million per year in the first five years. Costs for subsequent years beyond year five are limited to annually incurred operations and maintenance cost of $0.5 million. Cost for the first seven years of regulatory implementation for local government-owned systems is presented in **Table 8**.

Table 8: Cost estimate for the first 7 years of regulatory implementation for all local government owned systems

Year	Capital Cost	O&M Cost	Total Cost
1	$ 1,135,000	$ 101,700	$ 1,236,700
2	$ 1,135,000	$ 203,400	$ 1,338,400
3	$ 1,135,000	$ 305,100	$ 1,440,100
4	$ 1,135,000	$ 406,800	$ 1,541,800
5	$ 1,135,000	$ 508,500	$ 1,643,500
6	$ 0	$ 508,500	$ 508,500
7	$ 0	$ 508,500	$ 508,500

The proposed regulations would not affect any other local entity or program or any State agency or program. Lastly, the proposed regulations would not affect any federally funded State agency or program.

- Benefits of the regulations to the health and welfare of California residents, worker safety, and the state's environment(Gov. Code, §11346.3(b)(1)(D)): The health and welfare of California residents will continue to be protected by preventing cross-connection of OTNWSs and public water supply, providing a health-protective risk-based water quality standards for the use of onsite treated nonpotable water, and offsetting uses of potable water from nonpotable water uses by making onsite treated nonpotable water available for nonpotable water uses.

REASONABLE ALTERNATIVES

(Gov. Code, §§11346.2(b)(4)(A), 11346.2(b)(4)(B))

Government Code section 11346.2, subdivision (b)(4) requires that the State Board consider reasonable alternatives to the regulation and the Board's reasons for rejecting those alternatives.

The State Board has determined that no reasonable alternative considered or otherwise identified and brought to its attention would be more effective in carrying out the purpose for which this action is proposed. Nor would any be as effective and less burdensome or more cost-effective to the regulated entities, while also being equally effective in implementing statutory requirements or other provisions of law, than the proposed action. The statutory mandate is explicit and does not provide the State Board with the discretion to consider any alternatives.

There are no alternatives to adopting the proposed regulation because the adoption of onsite treatment and reuse of nonpotable water regulations is mandated by law. The adoption of the regulations is mandated by Water Code section 13558, subdivision (a). The proposed regulations mandate the use of specific technologies and performance

standards, while allowing for the use of alternative technologies. In the absence of regulations, the same technologies and performance standards would also be mandated and the use of alternative technologies allowed.

DUPLICATION OR CONFLICTS WITH FEDERAL OR STATE REGULATIONS

(Gov. Code, §11346.2(b)(6))

The proposed regulations do not unnecessarily duplicate or conflict with federal regulations. A review of the Code of Federal Regulations did not indicate the existence of duplicative or conflicting law.

The State Board evaluated whether the proposed regulations are inconsistent or incompatible with existing California state regulations. This evaluation included a review of California's existing regulations, including the State Board's existing regulations related to water recycling.

Regulations addressing alternate water sources (graywater, rainwater, stormwater, cooling tower blow-down water, and foundation drainage, reclaimed [recycled] water) and rainwater for indoor and outdoor nonpotable applications exist in California Code of Regulations, title 24, part 2 (California Plumbing Code), chapters 15 and 16, respectively.

If adopted as building standards by CBSC and HCD in their future rulemaking, the proposed regulations will be incorporated into the California Plumbing Code requirements for graywater, stormwater, and rainwater, except for untreated graywater systems that are used exclusively for subsurface irrigation and untreated rainwater systems that are used exclusively for surface, sub-surface, or drip irrigations.

The State Board, CBSC, and HCD are required to consult with each other in developing the proposed regulations and future building standards to ensure that no inconsistencies or incompatibility occur across the regulations.

MANDATED BY FEDERAL LAW OR REGULATIONS

(Gov. Code, §11346.2(c))

The adoption of the proposed regulations is not mandated by federal law or regulations.

SAFE, CLEAN, AFFORDABLE WATER

(Wat. Code, §106.3)

In establishing and adopting the proposed regulations, the State Board considered the statewide policy set forth in section 106.3 of the Water Code and determined the proposed regulations will further the stated policy. The proposed regulations will not

result in increased costs to those served by a public water system and will result in a continued protection of the health and welfare of California residents, worker safety, and the state's environment by preventing cross-connection of an OTNWS and public water supply, providing health-protective risk-based water quality standards for the use of onsite treated nonpotable water, and offsetting uses of potable water from nonpotable water uses by making onsite treated nonpotable water available for nonpotable water uses.

SCIENTIFIC PEER REVIEW (CALIFORNIA HEALTH AND SAFETY CODE SECTION 57004)

(Health & Saf. Code §57004(b))

Health and Safety Code section 57004, subdivision (b) requires that the scientific portions of any regulation proposed by the California Environmental Protection Agency (CalEPA), or any board, department or office within CalEPA, be submitted to an external scientific peer review entity for evaluation. "Scientific basis" and "scientific portion" means "those foundations of a rule that are premised upon, or derived from empirical data or other scientific findings, conclusions, or assumptions establishing a regulatory level, standard, or other requirement for the protection of public health or the environment." Where there is no underlying scientific basis for the proposed rule, no peer review is required. Similarly, where the underlying scientific basis for the proposed rule has already been peer reviewed, additional peer review is not required. CalEPA's Unified California Environmental Protection Agency Policy and Guiding Principles for External Scientific Peer Review, March 13, 1998 (CalEPA Guiding Principles) recognizes that external scientific peer review processes are not warranted where there are no underlying scientific bases at issue, or where the underlying scientific basis has already undergone review.

Coordination and oversight of the scientific peer review was conducted by CalEPA External Scientific Peer Review Program. The scientific peer review was completed on July 28, 2023, as required by law. Documentation of the scientific peer review is provided in **Appendix D.**

APPENDIX A – DOCUMENTS INCORPORATED BY REFERENCE

The following documents are incorporated by reference in the regulations as it would be too cumbersome, unduly expensive, or impractical to publish these documents into regulation.

1. NSF/ANSI 55-2022 - Ultraviolet Microbiological Water Treatment Systems (2022), available at: https://webstore.ansi.org/standards/nsf/nsfansi552022

APPENDIX B – DOCUMENTS RELIED UPON

APPENDIX C – ECONOMIC IMPACT ASSESSMENT

APPENDIX D – HEALTH AND SAFETY CODE SECTION 57004 SCIENTIFIC PEER REVIEW