

# Resilient water supply, resilient operators.

Empowering a resilient workforce -  
panel discussion



# Acknowledgement of Country

I would like to acknowledge the traditional owners of the lands and waters that we are meeting on today, and pay my respects to their elders past and present. I extend that respect to any Aboriginal or Torres Strait Islander people here today.



# Agenda

**1** | Introducing  
the session

**2** | Introducing  
the panel

**3** | Technical  
Competency  
Benchmark

**4** | Panelist  
presentations

**5** | Panel  
discussion/  
audience Q&A

**6** | Closing words

# **Resilient water supply, resilient operators.**

Water Research Australia has led the development of a National Technical Competency Benchmark (Project 1139).

This panel discussion will present the experience of regulators and utilities in implementing the benchmark and identify future initiatives to build a skilled and resilient operator workforce.

The discussion will explore programs to support the skills and training needed to operate advanced treatment plants with multiple highly technical treatment processes.

# Let's meet the panelists...



**Chris Owens**  
(Veolia)

Provides water quality risk management guidance for 27 water treatment facilities

Developing and delivering related training programs to build operational excellence



**Lisa Andersons**  
(NSW DCCEEW)

Supports NSW LWUs in a holistic approach to workforce development. Focus on attracting, training and retaining staff to ensure a competent, diverse and sustainable workforce.

# Let's meet the panelists...



**Andrew Salveson**  
(Carollo)

27 Years of PRW  
Experience

Working globally on  
PRW projects from 0.4  
to 800 MLD



**Brian Bernados**  
(Ex Ca Regulator)

31 years regulating  
water and reuse in Ca

SME on regulations &  
advanced treatment

Bernados Water  
Engineering is  
consulting on 7  
projects in Ca

# WaterRA Project 1139

Technical Competency Benchmark

# Water Industry Operations Technical Competency Benchmark

- The aim of this project was to bring water utilities, regulators and water associations together, to develop technical competency benchmarking tools for water industry operations.
- This was to facilitate a more consistent approach towards addressing water industry operator training needs, as well as raise awareness and promote the need for more fit-for-purpose learning & development (L&D) programs, for the benefit of the water industry.

# Who is it for?

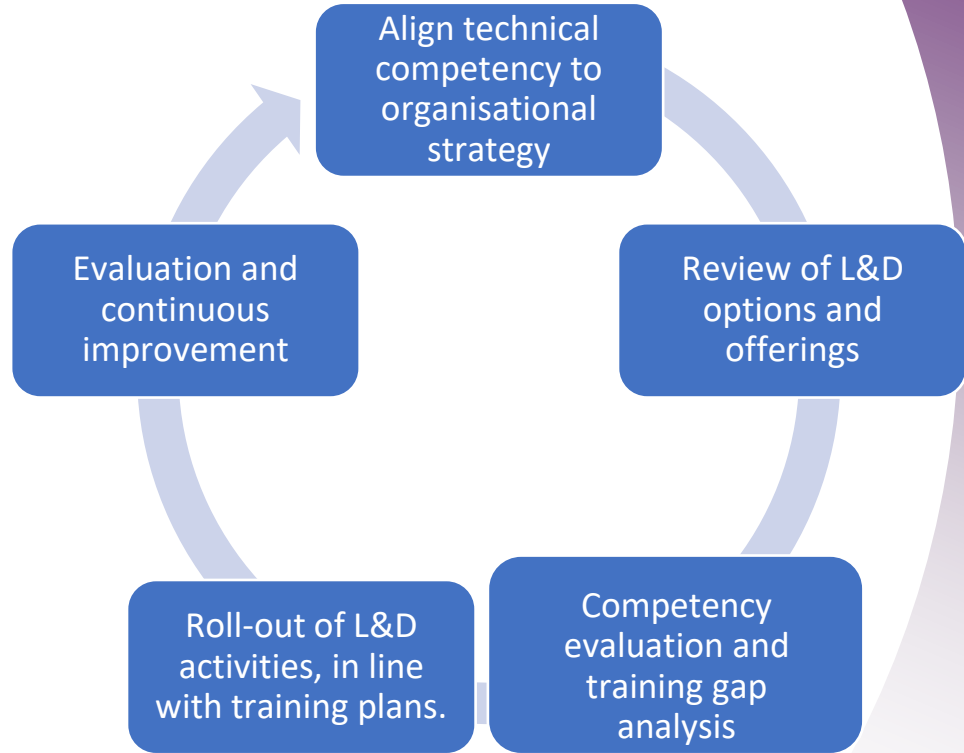
The Benchmark is intended for:

- water utilities- to self-assess, develop and deliver technical competency programs for water industry operators, and
- regulators (via audits) - to review and assess the efficacy of technical competency programs for water industry operators.

It has been written considering the specific roles and responsibilities, training and technical competency requirements of water industry operators.

# Benchmark Structure

**Guiding Principle 1:  
Adopt a technical  
competency  
management planning  
cycle approach.**



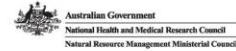
# Theme 1 - Technical competency systems & processes

Element:

1.1 Alignment of technical competency with Acts, Regulation, Guidelines

1.2 Alignment of technical competency with organisational goals and strategy

1.3 Integration of technical competency with HR systems and processes



BUILDING  
A HEALTHY  
AUSTRALIA

National Water Quality Management Strategy  
**Australian Drinking Water Guidelines 6  
2011**

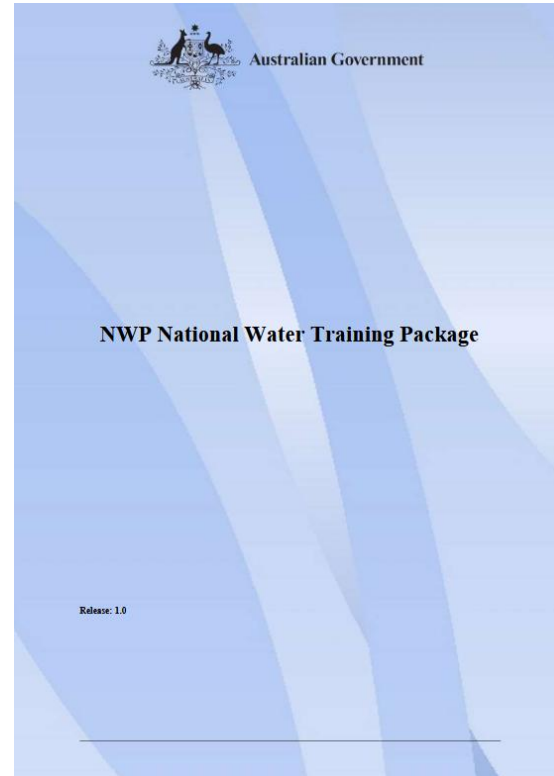
Version 3.9 Updated December 2024



# Theme 2 - Developing and maintaining technical competency

Element:

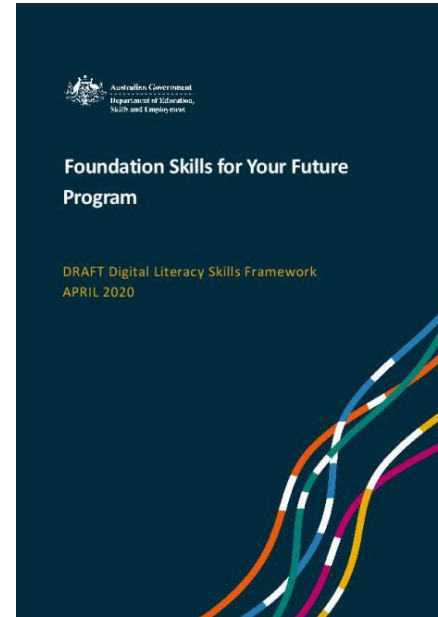
- 2.1 Definition of water industry operator roles and responsibilities
- 2.2 Minimum skills and knowledge requirements
- 2.3 Competency evaluation and training gap analysis
- 2.4 Site specific competency evaluation
- 2.5 Operator technical competency self-evaluation



# Theme 3 - Addressing specific training needs and challenges

Element:

- 3.1 Process to evaluate and identify specific training needs.
- 3.2 Selecting and engaging training providers
- 3.3 Managing training budgets.
- 3.4 Technology and digital literacy



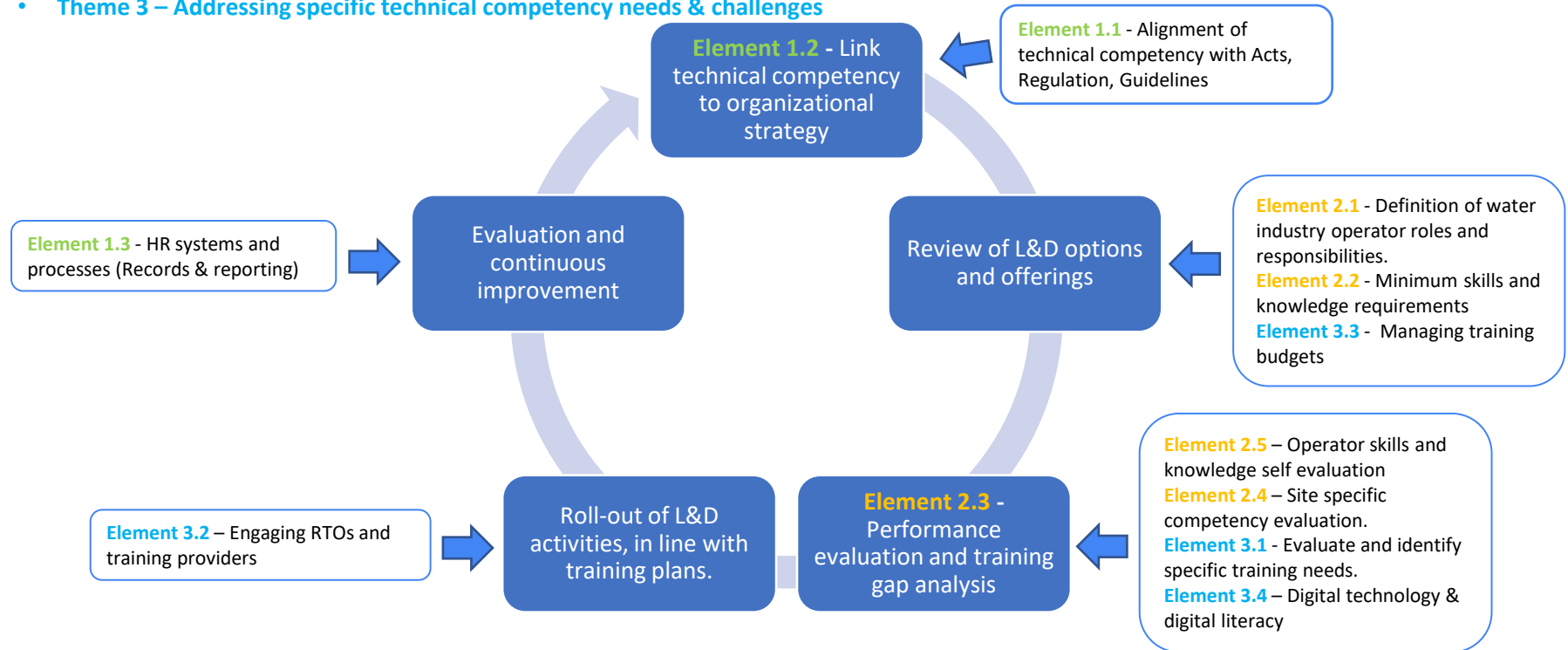
**Guiding Principle 2 : Technical competency programs are aimed at ensuring that there are appropriately trained and competent staff on duty at all times, and under all operating scenarios.**

# Technical Competency Benchmark

## Bringing together Guiding Principle 1, Themes and Elements

A **Benchmark** including **12 Elements**, grouped into **3 Themes**:

- **Theme 1 – Technical competency systems and processes**
- **Theme 2 – Developing and maintaining technical competency**
- **Theme 3 – Addressing specific technical competency needs & challenges**



# Interpretation of the Benchmark tables

1. Element	2. Rationale	3. Assessment Criteria	4. Additional Information
2.1 <b>Definition of water industry operator roles and responsibilities</b>	<p>The first step in developing technical competency is defining the water industry operator roles and responsibilities.</p> <p>There should be a role or position description which outlines:</p> <ul style="list-style-type: none"> <li>-Key Responsibilities.</li> <li>-Skills set.</li> <li>-Qualifications/accreditations.</li> <li>-Other relevant skills (e.g., drivers licence, first aid etc.).</li> </ul>	<p><b>Water utilities:</b> Identification of all water industry operator roles across the organisation. Role or position descriptions for all water industry operator roles within the organisation.</p> <p><b>Frequency:</b> review and update all water industry operator role/position descriptions at a minimum interval of every 3 years.</p>	<p>Good resources for development of operator role descriptions are:</p> <ul style="list-style-type: none"> <li>-The Australian Water Occupations Framework</li> <li>-The WaterNZ Competency Framework</li> </ul> <p>The role description does not need to be specific to a site or a person. It can be generic and outline the main tasks and activities of a role (e.g., water treatment operator).</p> <p>An operator role description should be written in such a way to make it possible to create a skills matrix for that role (See Element 2.2).</p>

# Auditing Tool

The Technical Competency Benchmark – Auditing Tool is to review technical competency programs. It comprises a list of questions:

- Which map across to the **Themes and Elements**, as set out in the Technical Competency Benchmark
- Are intended to support the **Assessment Criteria** (what, when, who).
- Which can be used by water utilities for self-assessment of performance of technical competency programs for water industry operators.
- Which can be used by regulatory auditors to audit water utility compliance obligations to training and competency according to regulations and guidelines.

# Interpreting the Auditing Tool

	Question	1. Y/N		Evidence (Document title, section, page #)	2. Remarks (e.g., Explain if different from Benchmark and why)
1.2	<b>Alignment of technical competency with organisational goals and strategy</b>				
	Documentation of the key skills and knowledge required by employees, relating to organisational priorities, strategic plans, and goals.	Y	N		

# Upskilling operations staff through in-house technical training

Chris Owens (Veolia ANZ)

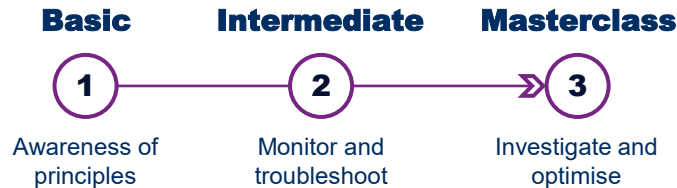


# Veolia ANZ in-house technical training

**Target audience** - water industry operators, process support (engineers, technicians)

**Delivered by** - Veolia ANZ subject matter experts

**Training at three levels:**



**Practical and applied** - apply concepts *now*

**Tailored format** - online or face-to-face to suit learning needs

# Training topics

## General

Blue-green algae  
Emerging contaminants  
Wastewater sampling & testing  
Water sampling & testing  
Lab testing  
Jar testing  
Environmental risk management  
***Water quality risk management***

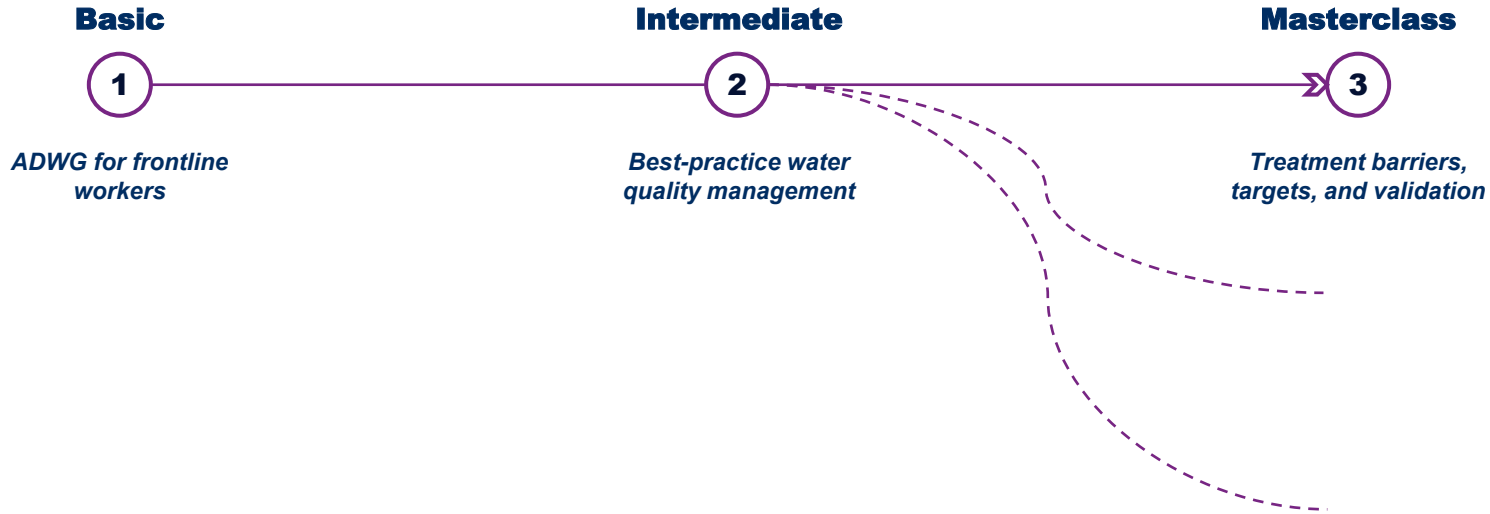
## Drinking & recycled water treatment

Chemical dosing  
Coag/flocculation  
Clarification/settling/DAF  
Granular media filters  
Membranes - MF/UF  
Membranes - NF/RO  
Adsorption/IX  
Activated carbon  
Chlorination / Chloramination  
Ozone  
Ozone-BAC  
Sludge handling  
UV  
AOP

## Wastewater treatment

Primary treatment  
Activated sludge  
Biological nutrient removal  
Sludge handling  
Odour management  
Digestion processes  
Lagoons  
Chlorine disinfection  
Chemical dosing  
Coagulation/flocculation  
Granular media filters  
Membranes - MF/UF  
UV

# Water quality risk management training



# ***ADWG for frontline workers***

## ***Basic***

Covers:

- Importance of water quality and public health
- Australian guidelines
- Six guiding principles
- Critical Control Points and Critical Limits

All water personnel

Online, any time

### Guiding principle 1

The greatest risks to consumers of drinking water are pathogenic microorganisms.

Protection of water sources and treatment are of paramount importance and must never be compromised.



to  
to

22

# Best-practice water quality management

## Intermediate

Covers:

- History and public health significance
- ADWG Framework / food safety management
- Ending complacency
- Emerging practices

Process engineers, plant managers

Site visits & online

**ADWG Framework for management of drinking water**

**HACCP assessment**

**ISO 22000 Food safety management**

**ISO 31000 Risk management**

**CHOLERA OUTBREAK**  
1850s LONDON, ENGLAND

**Chemical contamination of drinking water still occurs**

**Thousands Without Water After Spill in West Virginia**

**Sanders, Clinton take on Flint water crisis in Democratic debate**

Norm de la profession

# Treatment barriers, targets, and validation

## Masterclass

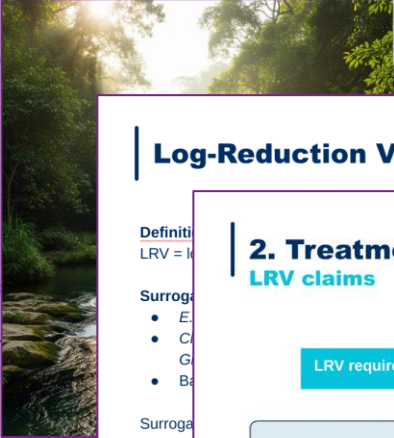
Covers:

- Barriers and removal mechanisms
- Pathogens, indicators, surrogates
- Log-reduction values - requirements and claims
- Validation approaches

Process engineers, plant managers  
(self-selected / nominated)

In-person regional workshops &  
online

### Bacteria



Definition  
LRV =  $\log_{10} \left( \frac{N_0}{N_t} \right)$

(Subsp...  
Lorem ipsum dolor

Surrog...

- E
- C
- G
- B

Surroga...

- S
- R
- L

Lorem ipsum dolor

### Log-Reduction Values

## 2. Treatment performance


### LRV claims

	Protozoa	Viruses	Bacteria
LRV requirements	4.0 Tier 2	6.0 Default	6.0 Default

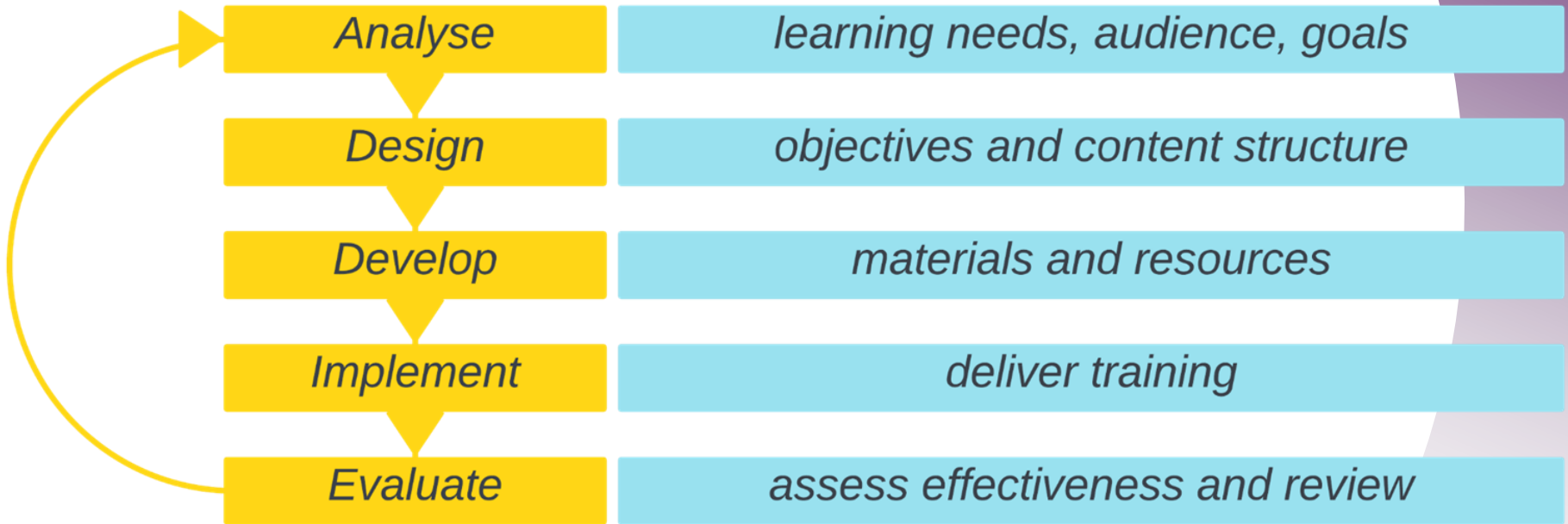
Water treatment assessment

Literature-based LRV claims ↔ and/or ↔ Validation / unit process verification

Lorem ipsum dolor



# Instructional design framework



# **The Technical Competency Benchmark – a national approach with state implementation**

**Lisa Andersons (NSW DCCEEW)**



Department of Climate Change, Energy, the Environment and Water



# Technical competency benchmark

National approach with state implementation

Lisa Andersons  
Manager Workforce Futures

October 2025



# Alignment with national technical benchmark

Department of Climate Change, Energy,  
the Environment and Water



Competency benchmark  
for local water utility  
operators in NSW

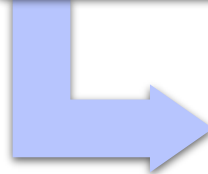
Revised competency benchmark with  
implementation actions



July 2025 [dcceew.nsw.gov.au](http://dcceew.nsw.gov.au)

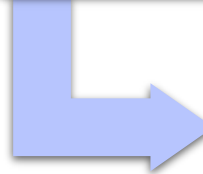
Theme 1:  
Technical  
competency  
systems and  
processes

- Alignment with Acts, regulations, guidelines



Theme 2:  
Developing and  
maintaining  
competency






- Definition of roles, responsibilities, minimum skills and knowledge requirements



Theme 3:  
Specific training  
needs and  
challenges

- Working with RTOs and training providers

# How was it developed?

- 
- |   |                       |   |
|---|-----------------------|---|
|  | Job roles             | Assess and define job roles in LWUs       |
|   | Job functions         | List job functions performed by operators |
|  | Skills                | Map job functions to core skills          |
|   | Training              | Map skills to training package            |
|   | Industry consultation | Water and training focus group            |



# Online induction modules



## Aqua card

Drinking water risks,  
responsibilities, public  
health



## Brown card

Wastewater and  
recycled water risks,  
responsibilities,  
environmental health



## Green card

Environmental  
requirements and  
minimising environmental  
harm



## Work safety card

Life saving rules in the  
water industry



# Safety training required by legislation



Store and handle  
dangerous goods  
and hazardous  
substances  
(TLID0021)



Working safely  
at heights  
(RIIWH5204E)



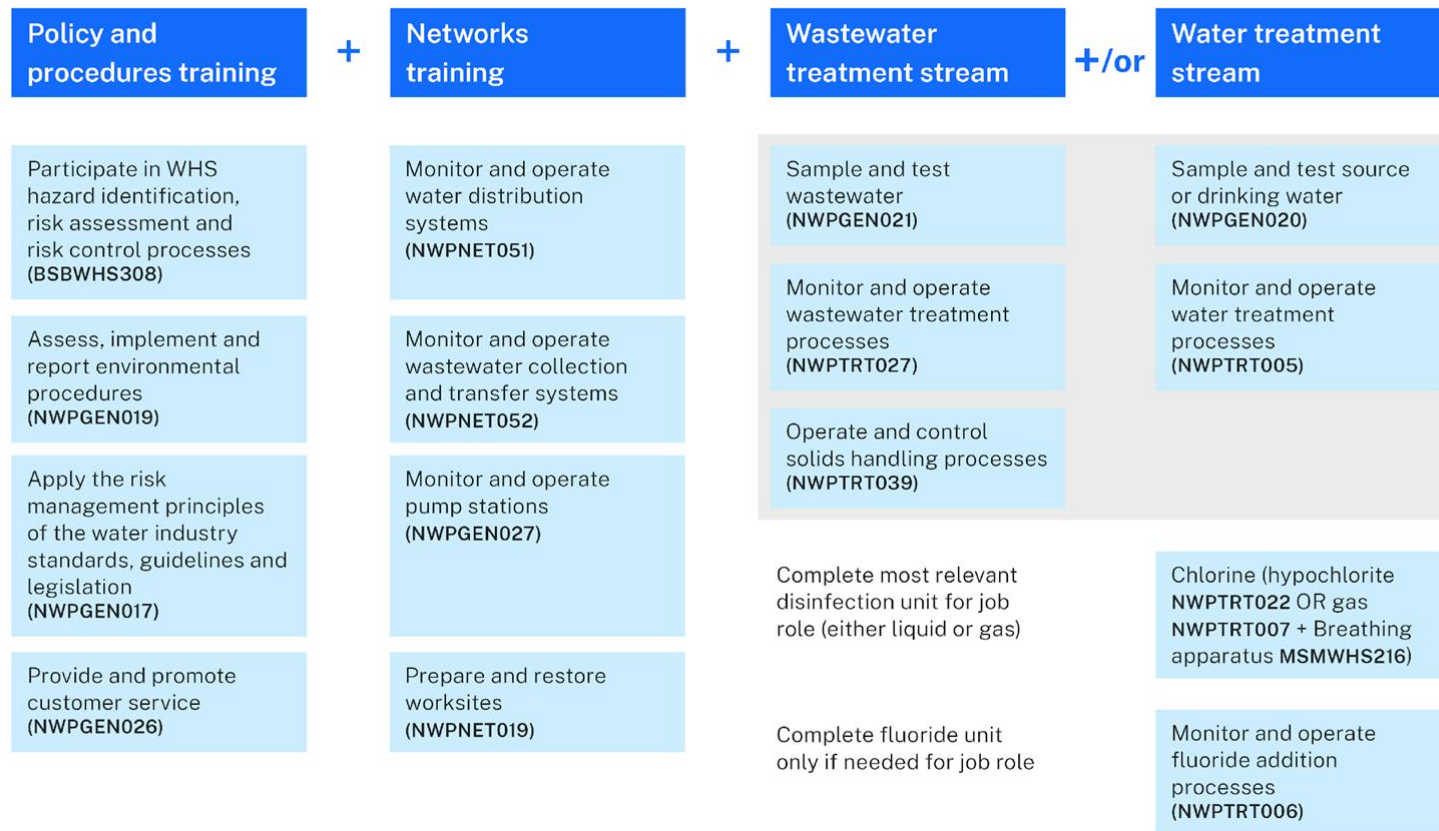
Enter and work in  
confined spaces  
(RIIWH5202E)



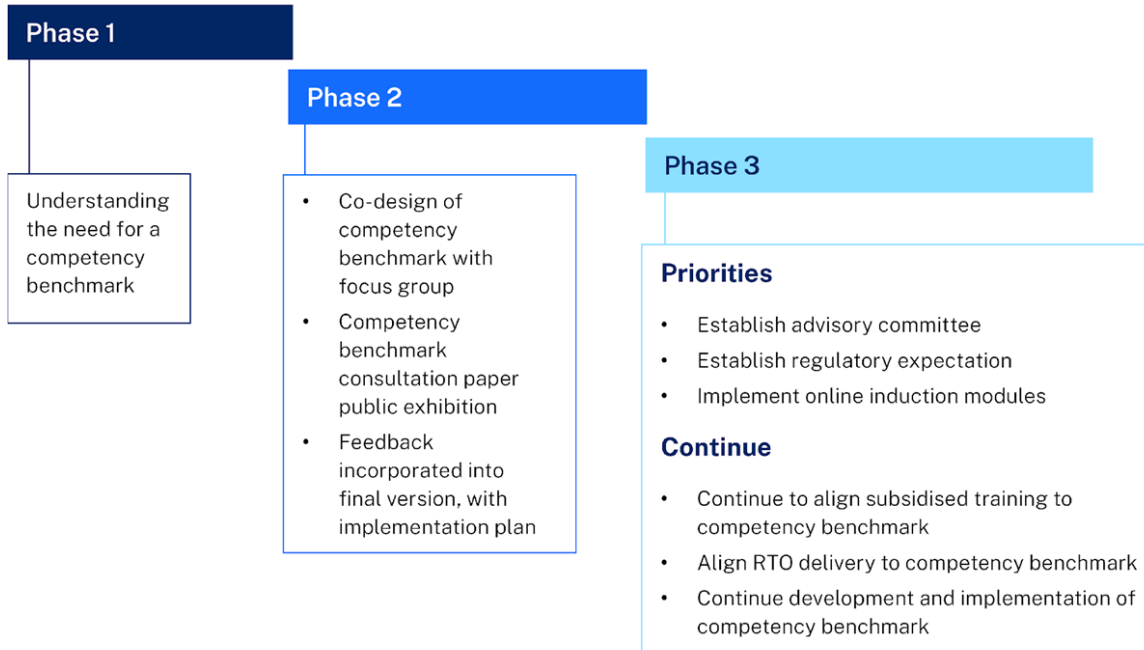
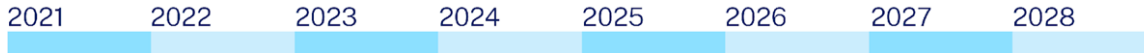
Control electrical risk  
on network pipes  
(NWPNET064)



# Fundamental training program



# Timeline for implementation



Long term – Support implementation of qualification reform

# International approaches to achieving technical competency

Andy Salveson, Brian Bernados (CalVal)

# Need For Advanced Water Treatment Operators - Technology

- Testing for WWTP & DWTP do not cover technologies for IPR and DPR
- WWTP (USEPA Clean Water Act)
  - Primary
  - Secondary
- DWTP (surface water filtration)
  - Media Filtration
  - Chlorine Disinfection
- IPR (groundwater injection “subsurface application”)
  - Membrane Filtration
  - Reverse Osmosis
  - UV Advanced Oxidation
- DPR - add ozone / BAC

# Need For Advanced Water Treatment Operators – Public Acceptance

Ca statues required the formation of an Advisory Group consisting of utilities and consumer groups. Their 2016 Report states,

- “A training and certification program is needed for operators employed at advanced water treatment facilities (AWTF) to ensure that potable reuse projects are operated properly to **protect public health** and to gain **public acceptance** of DPR.
- Also, **public acceptance and trust** are necessary to receive the support needed to use this resource as a drinking water supply. A statewide AWTF operator certification program would help to **build and maintain confidence** in the quality of water produced at an AWTF.”

# DPR Advisory Group continues

“In addition to topics related to the operations of wastewater treatment and advanced water treatment technologies, the certification program should include public health components, emergency response procedures, drinking water regulations, and other water supply issues.

Certification should be offered as an add-on license available to both water and wastewater operators who are already certified at a specified level (i.e., a minimum of Level III is suggested for drinking water operators and Grade III for wastewater operators).

It is important for the State Water Board to be involved in the development and implementation of the certification process to establish the public’s trust that trained and qualified operators are running the AWTFs.”

# Committee on Developing Advanced Water Treatment Operators

- A diverse group worked on AWTO certification program, including experts from various utilities and consultants



# Technical, Managerial & Financial Advanced Water Treatment Operators

- California requires Technical, Managerial & Financial Capacity (TMF)
- Technical, e.g., operator training
  - Water quality analysis
- Managerial, e.g., response plans,
  - preventative maintenance,
  - spare parts
- Financial, e.g., sustainable budget,
  - audits,
  - \$\$ set aside for membrane & UV lamps replacement

# Advanced Water Treatment Operators - Projects

- There are 14 ongoing or permitted IPR projects (which amount to ~800 MLD total)
- There are number of developing projects (which are more than two dozen and will more than double production)

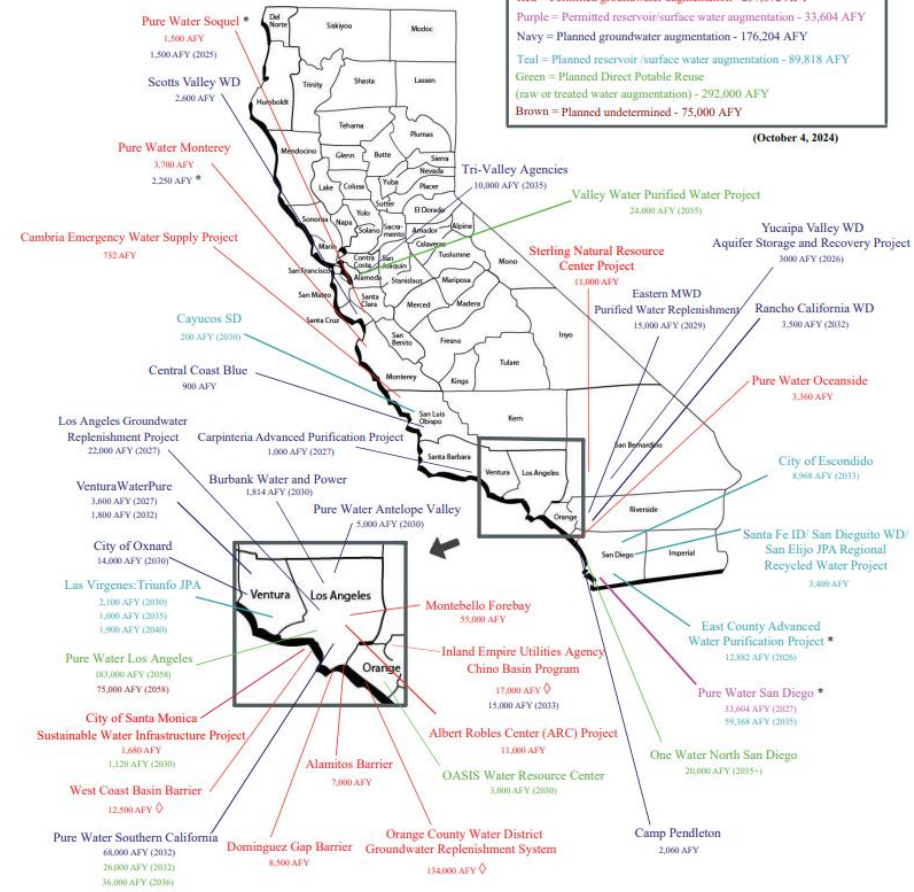
Working 2024 Potable-Reuse-Map



## Potable Reuse Projects

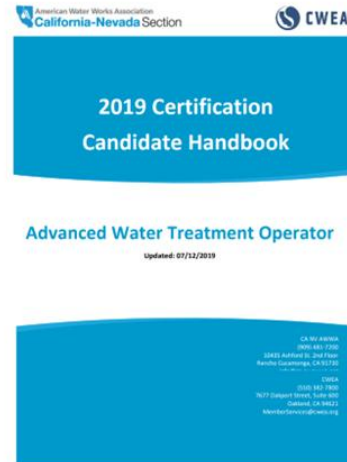
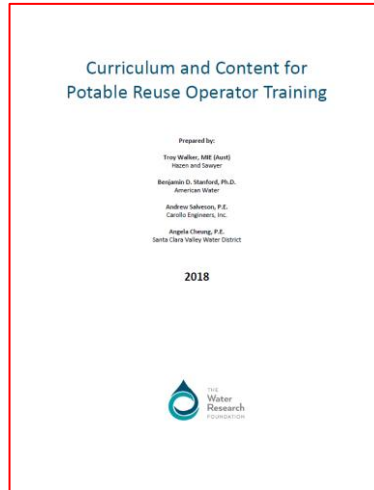
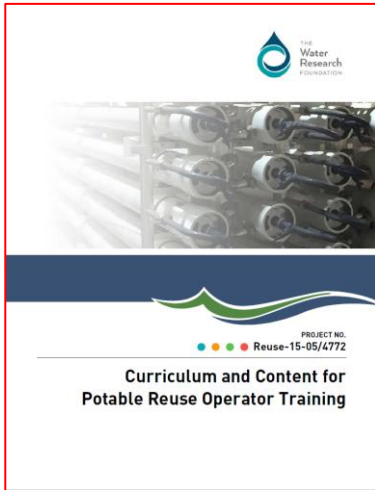
Red = Permitted groundwater augmentation - 257,072 AFY  
 Purple = Permitted reservoir/surface water augmentation - 33,604 AFY  
 Navy = Planned groundwater augmentation - 176,204 AFY  
 Teal = Planned reservoir/surface water augmentation - 89,818 AFY  
 Green = Planned Direct Potable Reuse (raw or treated water augmentation) - 292,000 AFY  
 Brown = Planned undetermined - 75,000 AFY

(October 4, 2024)



# AWTO Training Modules and Certification Handbook

- Training modules were developed, some of these are on the AWTO web site. Some were from Water Research Foundation



<https://www.awtoperator.org/handbook-download-form/>

# Application of AWTOs in California – Regulatory Requirements

- Nothing in IPR Regulations for AWT
- Long History of Success with Wastewater and Water Certified Operators

*NOTE: This publication is meant to be an aid to the staff of the State Board's Division of Drinking Water (DDW) and cannot be relied upon by the regulated community as the State of California's representation of the law. The published codes are the only official representation of the law. Refer to the published codes—in this case, Title 17 and 22 CCR—whenever specific citations are required.*

## State Water Resources Control Board

### Regulations Related to Recycled Water

**October 1, 2018**

*Sections amended, adopted, repealed, or not included in the previous version are highlighted in yellow. This revision includes adoption of the Surface Water Augmentation regulations, effective on October 1, 2018. If the text in a section, subsection, or paragraph is highlighted, it is new. If only the section/paragraph number is highlighted, it was amended or repealed. Some nonsubstantive revisions may not be shown.*

<b>TITLE 17 CODE OF REGULATIONS</b> .....	6
<b>Division 1. State Department of Health Services</b> .....	6
Chapter 5. Sanitation (Environmental) .....	6
Group 4. Drinking Water Supplies .....	6
Article 1. General.....	6
§ 7583. Definitions.....	6
§ 7584. Responsibility and scope of program.....	7
§ 7585. Evaluation of hazard.....	8
§ 7586. User supervisor .....	8
Article 2. Protection of Water System .....	8
§ 7601. Approval of backflow preventers.....	8
§ 7602. Construction of backflow preventers.....	9
§ 7603. Location of backflow preventers.....	9
§ 7604. Type of protection required .....	9
§ 7605. Testing and maintenance of backflow preventers.....	11
<b>TITLE 22 CODE OF REGULATIONS</b> .....	13
<b>Division 4. Environmental Health</b> .....	13
Chapter 1. Introduction .....	13
Article 1. Definitions .....	13
§ 60001. Department.....	13
§ 60003. Director .....	13
Chapter 2. Regulations for the Implementation of the California Environmental Quality .....	13
Article 1. General Requirements and Categorical Exemptions .....	13
§ 60100. General requirements.....	13
§ 60101. Specific activities within categorical exempt classes .....	13
Chapter 3. Water Recycling Criteria.....	14
Article 1. Definitions .....	14
§ 60301.050. 24-hour Composite Sample.....	14
§ 60301.080. Added Tracer .....	14
§ 60301.100. Approved laboratory .....	14

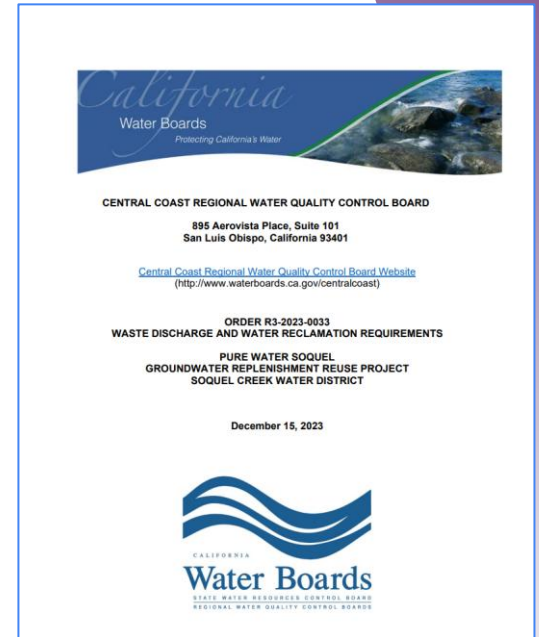
# Application of AWTOs in California – IPR Regulatory Requirements

Expect AWT Certification Requirements for CPO and Lead Operations Staff

1.9. Soquel Creek Water District must adequately staff the AWPf with operators and describe the staffing hours, shifts and certificates in the OOP. The AWPf must be supervised and operated by staff possessing certificates of appropriate grade as required by the Central Coast Water Board. Soquel Creek Water District must track the expiration dates for all certified operators to ensure valid certifications are maintained. In addition, Soquel Creek Water District must staff the AWPf with operators that possess valid California-Nevada Section of the American Water Works Association/California Water Environment Association, Advanced Water Treatment Operator (AWTO™) certifications as follows:

1.9.1. Upon start-up of the Project, Soquel Creek Water District must staff the AWPf with at least one AWT3™ certified chief plant operator and with at least one AWT3™ or higher certified operator, available always for on-call support for each operating shift.

1.9.2. Within 36 months of permit adoption, Soquel Creek Water District must staff the AWPf with at least one AWT5™ certified chief plant operator and with at least one AWT3™ or higher certified operator, available always for on-call support for each operating shift.



[Order No. R3-2023-0033 Waste Discharge and Water Reclamation Requirements for Pure Water Soquel Groundwater Replenishment Reuse Project, Soquel Creek Water District \(ca.gov\)](https://www.waterboards.ca.gov/centralcoast/Orders/2023/0033/0033.pdf)

# Application of AWTOs in California – IPR Regulatory Requirements

- 6.4. The OOP must include a staffing plan for manned and unmanned operations that includes information on operator staffing hours, shifts, responsibilities, and certification classes. Soquel Creek Water District must staff the AWPf with operators that have obtained or are working to obtain an **AWTO** certification. Soquel Creek Water District must provide for on-going training program to ensure that each operator has been trained in the following during manned and unmanned shifts:
- 6.4.1. The proper operation of all treatment processes utilized to achieve pathogen and chemical reduction.
  - 6.4.2. Maintenance, calibration, and verification of instrumentation and analyzers.
  - 6.4.3. Control systems, data trending, and the control strategy of plant systems.
  - 6.4.4. Incident response and investigation.
  - 6.4.5. Hazard Analysis Critical Control Point systems approach.
  - 6.4.6. The California Safe Drinking Water Act, its implementing regulations, and all other relevant regulations.

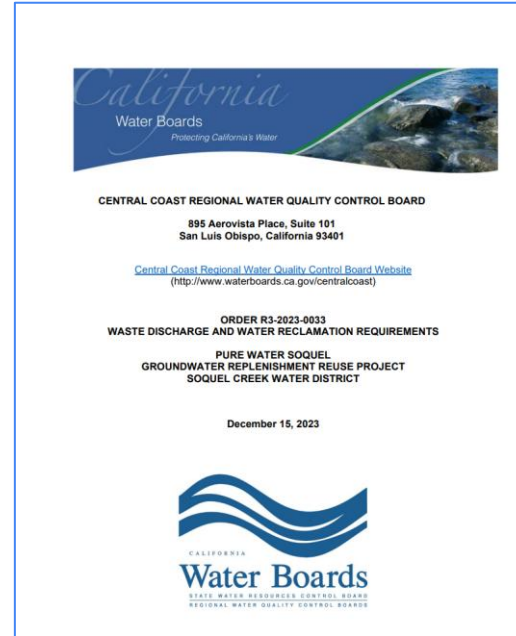
Attachment D – Water Reclamation Requirements

D-16

Soquel Creek Water District  
Pure Water Soquel

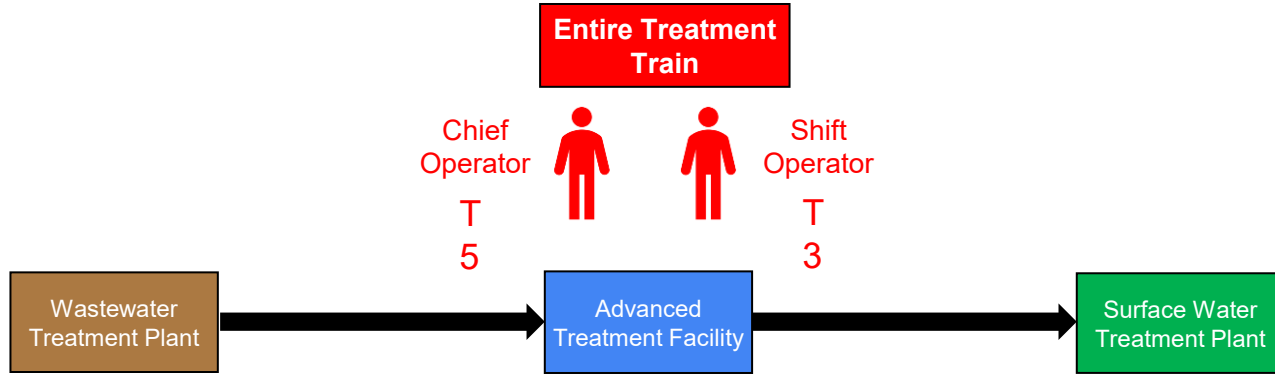
Order R3-2023-0033

- 6.4.7. The potential adverse health effects associated with the consumption of drinking water that does not meet California drinking water standards.
- 6.5. Soquel Creek Water District must update the OOP to incorporate any future revisions to chemical monitoring lists (e.g., MCLs, notification levels).



[Order No. R3-2023-0033 Waste Discharge and Water Reclamation Requirements for Pure Water Soquel Groundwater Replenishment Reuse Project, Soquel Creek Water District \(ca.gov\)](http://www.waterboards.ca.gov/centralcoast)

# Operator Certification



Operator Requirement	If pathogen control provided	If chemical control provided	If corrosion control provided
Drinking Water T-Certification	Chief T-5 Shift T-3	Chief T-5 Shift T-3	Chief T-5 Shift T-3
AWT-Certification	✗	Chief AWT-5 Shift AWT-3	✗
24/7 Staffing	✓	✓	✗

# Application of AWTOs in California – DPR Regulatory Requirements

Adopt Section 64669.35 as follows:

## § 64669.35. Operator Certification.

(a) Any facility that provides treatment pursuant to section 64669.45, 64669.50, or 64669.110 is a water treatment plant pursuant to Health and Safety Code section 116275(w) and is subject to operator certification requirements contained in Title 22, Division 4, Chapter 13, in addition to any other operator certification requirements required by law.

(b) A DiPRRA shall designate at least one chief operator who holds a valid grade T5 water treatment operator certification pursuant to Title 22, Division 4, Chapter 13 to oversee the operations of the entire treatment train used to comply with the requirements in this Article. The DiPRRA shall designate at least one shift operator who

SBDDW-23-001  
Direct Potable Reuse  
October 4, 2023

### TITLE 22, CALIFORNIA CODE OF REGULATIONS

Division 4, Environmental Health  
Chapter 17, Surface Water Treatment  
Article 10, Direct Potable Reuse

Adopt Section 64669.00 as follows:

#### § 64669.00. Application.

In addition to meeting the requirements of this Chapter, a public water system that uses municipal wastewater to produce water to augment a source of supply for a public water system's drinking water treatment plant or placed into a public water system's drinking water distribution system shall meet the requirements of this Article.

NOTE: Authority cited: Sections 13521 and 13551.2, Water Code, and Sections 116271, 116350 and 116375, Health and Safety Code. Reference: Sections 13520, 13560, 13561.2, 13563, 13566 and 13567, Water Code, and Sections 116270, 116275, 116350, 116360, 116365, 116375, 116525, 116527, 116530, 116535, 116540, 116545, 116550, 116555, 116559 and 116735, Health and Safety Code.

Adopt Section 64669.05 as follows:

#### § 64669.05. Definitions.

- (a) For the purposes of this Article, the following definitions shall apply:
- (1) "Acute exposure threat" means the increased imminent risk of adverse health effects, including infectious disease and toxic effects from short-term exposures to contaminants in water.
  - (2) "Advanced treated water" means municipal wastewater that has undergone treatment for chemical control pursuant to section 64669.50.
  - (3) "AWTO™" means the Advanced Water Treatment Operator certification program of the California-Nevada Section of the American Water Works Association and the California Water Environment Association.

[Draft Resolution with Regs- Direct Potable Reuse \(ca.gov\)](#)

# Application of AWTOs in California – DPR Regulatory Requirements

SBDDW-23-001  
Direct Potable Reuse  
July 21, 2023

holds at least a valid grade T3 water treatment operator certification pursuant to Title 22, Division 4, Chapter 13 to oversee the operations of the entire treatment train used to comply with the requirements in this Article for each operating shift.

(c) A DiPRRA shall require that the chief operator(s) for each water treatment plant that provides treatment pursuant to section 64669.50 each holds a valid Advanced Water Treatment Operator (AWTO™) grade AWT5™ certificate issued by the California-Nevada Section of the American Water Works Association and the California Water Environment Association. A DiPRRA shall require that the shift operator(s) for each water treatment plant that provides treatment pursuant to section 64669.50 each holds at least a valid grade AWT3™ certificate. If the AWTO™ program is not available, a certificate issued by an equivalent training and certification program approved by the State Board that assures the same operator knowledge, skills, and abilities may be used to meet the requirement of this subsection.

(d) A designated chief operator or shift operator shall be on-site at all times when a water treatment plant that provides treatment pursuant to section 64669.45 and/or section 64669.50 is operating.

(e) After 12 months of operation pursuant to subsection (d), a DiPRRA may apply to the State Board to waive the requirement in subsection (d) if an operations plan or amended operations plan, submitted to the State Board pursuant to section 64669.80, demonstrates an equivalent degree of operational oversight and treatment reliability with either unmanned operation or operation under reduced operator oversight. If the State Board issues such a waiver, the chief operator or shift operator is not required to be on-site at all times but shall be able to monitor operations and exert physical control over the water treatment plant within the period specified in the operations plan, or one hour, whichever is shorter.

SBDDW-23-001  
Direct Potable Reuse  
October 4, 2023

## TITLE 22, CALIFORNIA CODE OF REGULATIONS

Division 4. Environmental Health  
Chapter 17. Surface Water Treatment  
Article 10. Direct Potable Reuse

Adopt Section 64669.00 as follows:  
**§ 64669.00. Application.**

In addition to meeting the requirements of this Chapter, a public water system that uses municipal wastewater to produce water to augment a source of supply for a public water system's drinking water treatment plant or placed into a public water system's drinking water distribution system shall meet the requirements of this Article.

NOTE: Authority cited: Sections 13521 and 13561.2, Water Code; and Sections 116271, 116350 and 116375, Health and Safety Code. Reference: Sections 13520, 13560, 13561.2, 13563, 13566 and 13567, Water Code; and Sections 116270, 116275, 116350, 116360, 116365, 116375, 116525, 116527, 116530, 116535, 116540, 116545, 116550, 116555, 116655 and 116735, Health and Safety Code.

Adopt Section 64669.05 as follows:  
**§ 64669.05. Definitions.**

- (a) For the purposes of this Article, the following definitions shall apply:
- "Acute exposure threat" means the increased imminent risk of adverse health effects, including infectious disease and toxic effects from short-term exposures to contaminants in water.
  - "Advanced treated water" means municipal wastewater that has undergone treatment for chemical control pursuant to section 64669.50.
  - "AWTO™" means the Advanced Water Treatment Operator certification program of the California-Nevada Section of the American Water Works Association and the California Water Environment Association.

# Application of AWTOs in California – DPR Regulatory Requirements

- (3) "AWTO™" means the Advanced Water Treatment Operator certification program of the California-Nevada Section of the American Water Works Association and the California Water Environment Association.
- (4) "AWT5™" means a specific advanced water treatment certificate issued by the AWTO™ certification program.
- (c) A DiPRRA shall require that the chief operator(s) for each water treatment plant that provides treatment pursuant to section 64669.50 each holds a valid Advanced Water Treatment Operator (AWTO™) grade AWT5™ certificate issued by the California-Nevada Section of the American Water Works Association and the California Water Environment Association. A DiPRRA shall require that the shift operator(s) for each water treatment plant that provides treatment pursuant to section 64669.50 each holds at least a valid grade AWT3™ certificate. If the AWTO™ program is not available, a certificate issued by an equivalent training and certification program approved by the State Board that assures the same operator knowledge, skills, and abilities may be used to meet the requirement of this subsection.

SBDDW-23-001  
Direct Potable Reuse  
October 4, 2023

## TITLE 22, CALIFORNIA CODE OF REGULATIONS

Division 4, Environmental Health  
Chapter 17, Surface Water Treatment  
Article 10, Direct Potable Reuse

Adopt Section 64669.00 as follows:

### § 64669.00. Application.

In addition to meeting the requirements of this Chapter, a public water system that uses municipal wastewater to produce water to augment a source of supply for a public water system's drinking water treatment plant or placed into a public water system's drinking water distribution system shall meet the requirements of this Article.

NOTE: Authority cited: Sections 13521 and 13561.2, Water Code; and Sections 116271, 116350 and 116375, Health and Safety Code. Reference: Sections 13520, 13560, 13561.2, 13563, 13566 and 13567, Water Code; and Sections 116270, 116275, 116350, 116360, 116365, 116375, 116525, 116527, 116530, 116535, 116540, 116545, 116550, 116555, 116655 and 116735, Health and Safety Code.

Adopt Section 64669.05 as follows:

### § 64669.05. Definitions.

(a) For the purposes of this Article, the following definitions shall apply:

(1) "Acute exposure threat" means the increased imminent risk of adverse health effects, including infectious disease and toxic effects from short-term exposures to contaminants in water.

(2) "Advanced treated water" means municipal wastewater that has undergone treatment for chemical control pursuant to section 64669.50.

(3) "AWTO™" means the Advanced Water Treatment Operator certification program of the California-Nevada Section of the American Water Works Association and the California Water Environment Association.

# Application of AWTOs in California – DPR Regulatory Requirements

SBDDW-23-001  
Direct Potable Reuse  
July 21, 2023

holds at least a valid grade T3 water treatment operator certification pursuant to Title 22, Division 4, Chapter 13 to oversee the operations of the entire treatment train used to comply with the requirements in this Article for each operating shift.

(c) A DiPRRA shall require that the chief operator(s) for each water treatment plant that provides treatment pursuant to section 64669.50 each holds a valid Advanced Water Treatment Operator (AWTO™) grade AWT5™ certificate issued by the California-Nevada Section of the American Water Works Association and the California Water Environment Association. A DiPRRA shall require that the shift operator(s) for each water treatment plant that provides treatment pursuant to section 64669.50 each holds at least a valid grade AWT3™ certificate. If the AWTO™ program is not available, a certificate issued by an equivalent training and certification program approved by the State Board that assures the same operator knowledge, skills, and abilities may be used to meet the requirement of this subsection.

(d) A designated chief operator or shift operator shall be on-site at all times when a water treatment plant that provides treatment pursuant to section 64669.45 and/or section 64669.50 is operating.

(e) After 12 months of operation pursuant to subsection (d), a DiPRRA may apply to the State Board to waive the requirement in subsection (d) if an operations plan or amended operations plan, submitted to the State Board pursuant to section 64669.80, demonstrates an equivalent degree of operational oversight and treatment reliability with either unmanned operation or operation under reduced operator oversight. If the State Board issues such a waiver, the chief operator or shift operator is not required to be on-site at all times but shall be able to monitor operations and exert physical control over the water treatment plant within the period specified in the operations plan, or one hour, whichever is shorter.

SBDDW-23-001  
Direct Potable Reuse  
October 4, 2023

## TITLE 22, CALIFORNIA CODE OF REGULATIONS

Division 4, Environmental Health  
Chapter 17, Surface Water Treatment  
Article 10, Direct Potable Reuse

Adopt Section 64669.00 as follows:

### § 64669.00. Application.

In addition to meeting the requirements of this Chapter, a public water system that uses municipal wastewater to produce water to augment a source of supply for a public water system's drinking water treatment plant or placed into a public water system's drinking water distribution system shall meet the requirements of this Article.

NOTE: Authority cited: Sections 13521 and 13561.2, Water Code; and Sections 116271, 116350 and 116375, Health and Safety Code. Reference: Sections 13520, 13560, 13561.2, 13563, 13566 and 13567, Water Code; and Sections 116270, 116275, 116350, 116360, 116365, 116375, 116525, 116527, 116530, 116535, 116540, 116545, 116550, 116555, 116559 and 116735, Health and Safety Code.

Adopt Section 64669.05 as follows:

### § 64669.05. Definitions.

- (a) For the purposes of this Article, the following definitions shall apply:
- (1) "Acute exposure threat" means the increased imminent risk of adverse health effects, including infectious disease and toxic effects from short-term exposures to contaminants in water.
  - (2) "Advanced treated water" means municipal wastewater that has undergone treatment for chemical control pursuant to section 64669.50.
  - (3) "AWTO™" means the Advanced Water Treatment Operator certification program of the California-Nevada Section of the American Water Works Association and the California Water Environment Association.

# AWTO Staffing Comparison

Facility	Type	Status	Flow (MGD)	Key Processes	# FTE FT-Full time/PT-Part time	Shift
Soquel	IPR	Late 2024	1.1	Ozone, UF, RO, UVAOP	6 FT / 3 PT	5 days/week, 8 hours/day (Ops staff available for emergency response)
Pure Water Oceanside	IPR	2020	4.5	MF, RO, UVAOP, Post Treatment	14 FT	24/7
OCWD	IPR	2008	130	MF, RO, UVAOP, Post Treatment	25 FT	24/7
M1W	IPR	Operational	7.6	Ozone, UF, RO, UVAOP	2 FT	5 days/week, 8 hours/day
LVMWD	IPR	Demo	6	UF, RO, UVAOP	2 FT	7 days/week, 10 hours/day
SFPUC	DPR	Planning	P1: 2.5 P2: 7.5	O3/BAC, UF, RO, UVAOP	Phase 1: 7 FT / 1 PT Phase 2: 14 FT / 2 PT	24/7 for 1 <sup>st</sup> 18 months 5 days/week, 10 hours/day
BTCSD	IPR DPR	Planning	0.1	MBR, O3/BAC, UF, RO, UVAOP	IPR: 4 FT (Decentralized) 3 FT / 1 Part-time (Centralized) DPR: 6 FT	IPR: 5 days/week, 8 hours/day DPR: 24/7 for 1 <sup>st</sup> 18 months 5 days/week, 8 hours/day

# IPR Staffing Details (Example)

Staff	Certification Notes	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Water Quality Analyst and Instrument Technician								
AWTO 5: Operations Manager	Must be T or G certified							
AWTO 3/4	Must be T or G certified							
Operator	Must be T or G certified							

## DPR – Decentralized (Require 24/7 for the 1<sup>st</sup> 18 months)

Staff	Certification Notes	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Water Quality Analyst and Instrument Technician								
AWTO 5: Operations Manager	Must be T or G certified							
AWTO 3/4	Must be T or G certified							
AWTO3/4	Must be T or G certified							
AWTO3/4	Must be T or G certified							
AWTO3/4	Must be T or G certified							

## DPR – Decentralized (After 18 months)

Staff	Certification Notes	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Water Quality Analyst and Instrument Technician								
AWTO 5: Operations Manager	Must be T or G certified							
AWTO 3/4	Must be T or G certified							
AWTO 3/4	Must be T or G certified							
AWTO 3/4	Must be T or G certified							

# DPR Staffing Details (Example)

Staff	Certification Notes	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Water Quality Coordinator								
AWTO 5: Operations Manager	Must be T or G certified							
AWTO 3/4	Must be T or G certified							
AWTO3/4	Must be T or G certified							
AWTO3/4	Must be T or G certified							
AWTO3/4	Must be T or G certified							
Mechanical Technician								
Instrumentation Technician								

## DPR – Phase 1 (After 18 months)

Staff	Certification Notes	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Water Quality Coordinator								
AWTO 5: Operations Manager	Must be T or G certified							
AWTO 3/4	Must be T or G certified							
AWTO 3/4	Must be T or G certified							
Mechanical Technician								
Instrumentation Technician								

# DPR Staffing Details (Example)

Staff	Certification Notes	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
<b>Water Quality Analyst</b>								
<b>AWTO 5: Operations Manager</b>	Must be T or G certified							
<b>AWTO 3/4</b>	Must be T or G certified							
<b>AWTO 3/4</b>	Must be T or G certified							
<b>AWTO 3/4</b>	Must be T or G certified							
<b>AWTO 3/4</b>	Must be T or G certified							
<b>Operator</b>	Can be T or G certified							
<b>Operator</b>	Can be T or G certified							
<b>Operator</b>	Can be T or G certified							
<b>Operator</b>	Can be T or G certified							
<b>Operator</b>	Can be T or G certified							
<b>Senior Mechanical Technician</b>								
<b>Mechanical Technician</b>								
<b>Mechanical Technician</b>								
<b>Senior Instrumentation Technician</b>								
<b>Instrumentation Technician</b>								

## DPR – Phase 2 (After 18 months)

Staff	Certification Notes	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
<b>Water Quality Coordinator</b>								
<b>AWTO 5: Operations Manager</b>	Must be T or G certified							
<b>AWTO 3/4</b>	Must be T or G certified							
<b>AWTO 3/4</b>	Must be T or G certified							
<b>AWTO 3/4</b>	Must be T or G certified							
<b>Senior Mechanical Technician</b>								
<b>Mechanical Technician</b>								
<b>Senior Instrumentation Technician</b>								
<b>Instrumentation Technician</b>								

# Development of AWTO Staff Using a Demonstration Facility



## OPERATIONS

*Develop and Train  
Operations Staff*

- 1) Overall projected staff needs for full scale IPR
- 2) Timeline for training staff from different starting points
- 3) Approach to training/developing staff using the Demo
- 4) General thoughts on excitement and job satisfaction for the newly minted AWTs.

# Development of AWTO Staff Using a Demonstration Facility



# Panel discussion, audience Q&A

## Discussion topics:

- Regulatory drivers [for water industry operator training and competency]
- Business drivers
- Setting KPIs - recording, tracking, and reporting on training
- Minimum skills requirements for water industry operators
- Training delivery methods
- Overcoming barriers to accessing training
- Finding training providers
- Funding for training
- Digital literacy

# Acknowledgements, closing words



Water  
Research  
AUSTRALIA



# Thank you