

Governance, Legislation and Regulatory Frameworks		Kaiwhakamahi whakapai wai	Kaiwhakamahi Matua Whakapai wai	Kaiārahi wheketere whakapai wai	Kaiwhakahaere wheketere whakapai wai	Unit Standard
		Junior Water treatment operator	Senior Water treatment operator	Water Treatment Plant Team leader	Water treatment plant manager	29994
Needs to be able to	Operate the Water Treatment Plant in a manner that follows the Water Safety Plan for the supply and meets the Drinking Water Standards	✓	✓	✓		
	Provide information to the appropriate people regarding the performance of the Water Treatment Plant to facilitate asset management planning as required under the Local Government Act.	✓	✓	✓	✓	
	Operate the Water Treatment Plant within any requirements that have been set out in the local Bylaws specific to their territorial authority.	✓	✓	✓		
	Operate the Water Treatment Plant within the conditions set in the Resource Consent(s) for the water take, and any waste and air discharges for the plant	✓	✓	✓		
	Safely operate the Water Treatment Plant in a manner that addresses health and safety risks, including the correct use and storage of hazardous substances.	✓	✓	✓	✓	
Needs to know	About the Health Act, which requires Drinking Water suppliers to meet the Drinking Water Standards, and to have and implement, a Water Safety Plan for each supply		✓	✓	✓	
	Water sector regulation covering Water Safety Plan requirements, Operational Compliance Rules, Acceptable Solutions, and the requirement to give effect to Te Mana o te Wai.		✓	✓	✓	
	About the Resource Management Act which regulates the source of water and requires the taking of water and the discharge of wastewater		✓	✓	✓	
	About Local Government Act		✓	✓	✓	
	About Building Code		✓	✓	✓	
	About the Building Act		✓	✓	✓	
	About the Health and Safety of Work Act which is concerned with the Health and Safety of workers and visitors to the site		✓	✓	✓	
	About the Health and Safety at Work (Hazardous Substances) Regulations 2017		✓	✓	✓	
	About the Health and Safety in Employment (Pressure Equipment, Cranes and Passenger Ropeways) Regulations 1999.		✓	✓	✓	
The Principles of Safe Drinking Water		Kaiwhakamahi whakapai wai	Kaiwhakamahi Matua Whakapai wai	Kaiārahi wheketere whakapai wai	Kaiwhakahaere wheketere whakapai wai	Unit Standard
		Junior Water treatment operator	Senior Water treatment operator	Water Treatment Plant Team leader	Water treatment plant manager	29995
Needs to be able to	Embrace a high standard of care in the work undertaken	✓	✓	✓	✓	
	Risks to source water: <ul style="list-style-type: none"> Understand Manage Address 	✓	✓	✓ ✓ ✓	✓ ✓	
	Understand how the treatment processes provide multiple barriers to contamination and the importance of maintaining these barriers against failure	✓	✓	✓	✓	
	Monitor treatment processes for any changes and respond accordingly and inform team leader/supervisor/treatment plant manager	✓	✓			
	Maintain a personal sense of responsibility and dedication to providing consumers with safe drinking water	✓	✓	✓	✓	
	Understand the risks to the water supply and how these risks are managed, and the control measures that are used and monitoring the performance of each barrier	✓	✓	✓	✓	
	Management of the risks to the water supply is occurring properly			✓	✓	

Needs to know	Principle 1: A high standard of care must be embraced	✓	✓	✓	✓	
	Principle 2: Protection of source water is of paramount importance	✓	✓	✓	✓	
	Principle 3: Maintain multiple barriers against contamination	✓	✓	✓	✓	
	Principle 4: Change precedes contamination	✓	✓	✓	✓	
	Principle 5: Suppliers must own the safety of drinking water	✓	✓	✓	✓	
	Principle 6: Apply a preventive risk management approach	✓	✓	✓	✓	
	Development of Water Safety Plans	Kaiwhakamahi whakapai wai	Kaiwhakamahi Matua Whakapai wai	Kaiārahi wheketere whakapai wai	Kaiwhakahaere wheketere whakapai wai	Unit Standard
		Junior Water treatment operator	Senior Water treatment operator	Water Treatment Plant Team leader	Water treatment plant manager	24907
Needs to be able to	Assist with identifying the Critical Control Points for supply	✓	✓	✓	✓	
	Assist with identifying and documenting the corrective action required when critical limits are reached	✓	✓	✓	✓	
	Use operational knowledge to help identify improvement items to include		✓	✓		
	Assist with reviewing customer complaints	✓	✓	✓		
	Manage customer complaints			✓		
	Involvement in long term engagement plans on awareness and involvement in safe and secure drinking water	✓	✓	✓	✓	
Needs to know	What their role is in the development of the water safety plan (WSP) and the requirements of the New Zealand Drinking Water Safety Plan Framework	✓	✓	✓	✓	
	The principles of Safe Drinking Water in New Zealand	✓	✓	✓	✓	
	The characteristics of the drinking water supply system, what and how hazards may arise, and create risks, and the processes and practices that affect drinking water quality	✓	✓	✓	✓	
	The available water quality information and be able to analyse and interpret this information which identifies actual and potential water quality issues		✓	✓		
	What the contamination barriers are for the Water Treatment Plant, so that if one barrier fails, what the effective operation of the remaining barriers are.	✓	✓	✓		
	What Critical Control Points are	✓	✓	✓		
	How the New Zealand Drinking Water Standards provide requirements for drinking water safety by specifying maximum amounts of substances, organisms/contaminants/residues that may be present, criteria for demonstrating compliance with the standards and remedial action to be taken in the event of noncompliance	✓ ✓	✓ ✓ ✓	✓		
	About the Guidelines for Drinking Water Quality Management in New Zealand	✓	✓	✓		
	The commitment to drinking water quality management from their employer and the relationship of the WSP to organisational policy and strategy	✓	✓	✓	✓	
	The Role of the Drinking Water Standards for New Zealand	Kaiwhakamahi whakapai wai	Kaiwhakamahi Matua Whakapai wai	Kaiārahi wheketere whakapai wai	Kaiwhakahaere wheketere whakapai wai	Unit Standard
		Junior Water treatment operator	Senior Water treatment operator	Water Treatment Plant Team leader	Water treatment plant manager	18456
Need to be able to	Operate the Water Treatment Plant in a manner that ensures that the supply meets the operational requirements associated with the treatment processes and does not exceed 50% of the MAV's and keep manager informed	✓	✓	✓		
	Operate the Water Treatment Plant in a manner that ensures that the supply does not exceed the guideline values (GV's)	✓	✓	✓		
	Verify the overall performance of the Water Treatment Plant by confirming that the following has occurred:	✓	✓	✓		

	<p>The concentration of a determinant in a sample does not exceed 50% of the MAV or GV more often than is permitted</p> <ul style="list-style-type: none"> An operational requirement does not move outside its limit for more than it's allowed frequency/duration of the compliance monitoring period The number of measurements made for each compliance criterion is equal to or greater than that specified Sampling, standardising, testing and reporting procedures meet DWSNZ standards The requirements of the compliance criteria have been met throughout the previous 12 months The remedial actions specified in the DWSNZ and WSP have been carried out when there has been a transgression / excursion beyond an operational requirement 	✓	✓	✓	✓	
Need to know	<p>How the New Zealand DWS provide requirements for drinking-water safety by specifying the:</p> <ul style="list-style-type: none"> Maximum amounts of substances/organisms/contaminants/residues that may be present Criteria for demonstrating compliance with the standards and remedial action to be taken in the event of non-compliance 		✓	✓		
	About the guidelines for DW Quality Management in New Zealand	✓	✓			
	That the drinking water supply requires an approved WSP and implemented by the operator	✓	✓			
	The requirements for verification monitoring within the drinking water compliance monitoring plan referenced in the WSP			✓		
	Actions that need to be taken in event of an exceedance of an operational target value and inform manager	✓	✓	✓	✓	
	Implications and consequences of regulatory water quality sample failures and actions to be taken as detailed in the Incident and Emergency response plan		✓	✓	✓	
	The importance of investigation process in the event of water quality incidents and the regulatory requirements regarding the reporting of these	✓	✓			
	That the water supply they operate should be included on the Register of Drinking-Water Supplies in New Zealand which provides information on who is registered as a drinking-water supplier	✓	✓			
	That the compliance monitoring data about the water supply must be provided to Taumata Arowai via Hinekōrako – the self-service portal for drinking water suppliers.		✓	✓		
	That the compliance of the water supply they operate will be reported to the public via the Annual Report on Drinking-Water Quality		✓			
	That the Health Act requires that only recognised laboratories may be used to carry out tests and analysis of raw water and drinking water to demonstrate compliance with standards	✓	✓			
What the roles and powers of Taumata Arowai, the Water Services Regulator and Drinking Water Assessors are	✓	✓				
	Te Mana o te Wai	Kaiwhakamahi whakapai wai	Kaiwhakamahi Matua Whakapai wai	Kaiārahi wheketere whakapai wai	Kaiwhakahaere wheketere whakapai wai	
		Junior Water treatment operator	Senior Water treatment operator	Water Treatment Plant Team leader	Water treatment plant manager	
Need to be	Te Hauora o te Taiao - Drinking Water Treatment Operators help to protect the health of the environment by ensuring that the conditions of any resource consent relating to the discharge of contaminants from the site are adhered to	✓	✓	✓	✓	

able to	Te Hauora o te Wai - Drinking Water Treatment Operators help to protect the health of the waterbody by ensuring the conditions of the resource consent to take water from the source are adhered to.	✓	✓	✓	✓	
	Te Hauora o te Tangata - Drinking Water Treatment Operators protect the health of the people by operating the Water Treatment Plant in a manner that reflects the Water Safety Plan for the supply.	✓	✓	✓	✓	
Need to know	The meaning of Te Mana o te Wai as set out in the National Policy Statement for Freshwater Management	✓	✓	✓	✓	
	What Te Mana o te Wai means to their community	✓	✓	✓	✓	
	The conditions of all resource consents related to the operation of the Water Treatment Plant: <ul style="list-style-type: none"> Any decisions that will impact on the freshwater must be made in a way that prioritises the health and wellbeing of the freshwater body Freshwater is managed in a manner ensuring it can sustain present and future generations That they have a responsibility to care for freshwater as it impacts on the health of the community 	✓	✓	✓	✓	
	The WSP for the supply will detail what Drinking Water Treatment Operators must do to deliver safe drinking water protecting the health of the people connected to the supply	✓	✓	✓	✓	
	Water New Zealand guide to Te Mana o te Wai and what this means in relation to water services infrastructure	✓	✓	✓	✓	
	The Water regulator, Taumata Arowai are required to provide advice and guidance on how to give effect to Te Mana o te Wai and how to enable mātauranga Māori, Tikanga Māori and kaitiakitanga to be exercised	✓	✓	✓	✓	
	That the Ministry of the Environment have produced a factsheet to provide further information about Te Mana o te Wai, the ventral concept for freshwater management	✓	✓	✓	✓	

Asset Management Decision Making

<u>Critical Control Points (CCP)</u>		Kaiwhakamahi whakapai wai	Kaiwhakamahi Matua Whakapai wai	Kaiārahi wheketere whakapai wai	Kaiwhakahaere wheketere whakapai wai	Unit Standard	
		Junior Water treatment operator	Senior Water treatment operator	Water Treatment Plant Team leader	Water treatment plant manager	29966	
Need to be able to	Undertake operational monitoring and inspections of CCP	✓	✓	✓			
	Undertake corrective actions when routine monitoring, and inspections indicate that a CCP is deviating from its expected performance and is reaching it's action limit which may include: <ul style="list-style-type: none"> ▪ Adjustments or process control changes ▪ Communicating and notifying others of the issue ▪ Additional monitoring and inspection to confirm that the corrective action has been effective ▪ Keeping records of changes 	✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓			
	Activate incident and emergency response procedures when critical limits for a CCP is reached /because the corrective action at the trigger level has not improved CCP performance		✓	✓	✓	✓	
	Have input into a review into the underlying cause of why the corrective action or incident and emergency response procedures were needed. This includes identifying: <ul style="list-style-type: none"> ▪ How effective the monitoring and inspection plan was ▪ How effective the corrective action was ▪ Whether the WSP needs to be updated as a result 		✓ ✓ ✓ ✓	✓ ✓ ✓ ✓			
Need to know	What the CCP for the water supply are	✓	✓		✓		
	The defined values documented in the CCP for target, action and critical limits	✓	✓		✓		
	The corrective actions listed in the Water Safety Plan which are necessary when the control limit is reached	✓	✓		✓		
	Where to find the documented procedure, e.g., in the operations and maintenance manual for the treatment plant	✓	✓	✓			
	The health-based targets/MAV's for any parameter being monitored.	✓	✓	✓			
<u>Operational Monitoring and Inspection for Process Control</u>		Kaiwhakamahi whakapai wai	Kaiwhakamahi Matua Whakapai wai	Kaiārahi wheketere whakapai wai	Kaiwhakahaere wheketere whakapai wai	Unit Standard	
		Junior Water treatment operator	Senior Water treatment operator	Water Treatment Plant Team leader	Water treatment plant manager	24904 29999	
Need to be able to	Obtain, review, and interpret trends on SCADA and telemetry systems	✓	✓		✓		
	Identify target and action limits which identify when intervention may be required	✓	✓		✓		
	Inform supervisors when a change in trend is noticed	✓	✓				
	Carry out key calibration/instrument checks of equipment using the results to identify issues with performance	✓	✓	✓			
	Assess the condition of the instrument and any supply tubing – Cleaning may be required	✓	✓	✓			
	Identify whether equipment has deteriorated and whether it is no longer operating in accordance with its design	✓	✓	✓			
	Take representative samples of water from key points within the treatment process, safely using appropriate sampling equipment	✓	✓	✓			
	Carry out bench top analysis of samples for process performance monitoring, record and interpret the results	✓	✓	✓			

	Review and analyse the performance of the water process by using laboratory, site and network quality reports	✓	✓	✓		
Need to know	The monitoring and inspection plans referenced in the Water Safety Plan and detailed in the Operations and Maintenance manual for the water supply system including knowledge of: <ul style="list-style-type: none"> The parameters to monitor/inspect The purpose of each parameter The method of monitoring including instrument used, location, timing, frequency, by whom and what needs to be recorded What actions to take in response to monitoring/inspection results and the limits of their responsibility to make changes to processes Procedures for reporting anomalies, including at what stage they need to flag changes to their supervisor 	✓	✓	✓		
	The instruments used to monitor variables in the water treatment process and the basic scientific principles of these key analytical instruments.	✓	✓			
	The care and maintenance of monitoring equipment including instrument condition assessments and calibration records	✓	✓			
	The need for accurate and precise recording and reporting of process performance, in line with the Water Safety Plan requirements	✓	✓			
	Which of the parameters being monitored are CCPs	✓	✓		✓	
	Apply a knowledge of Science to Water Treatment Processes	Kaiwhakamahi whakapai wai	Kaiwhakamahi Matua Whakapai wai	Kaiārahi wheketere whakapai wai	Kaiwhakahaere wheketere whakapai wai	Unit Standard
		Junior Water treatment operator	Senior Water treatment operator	Water Treatment Plant Team leader	Water treatment plant manager	17874 19200 30008 17892 19199
Need to be able to	Perform mathematical calculations used in the water industry, for example to calculate: volumes, levels, flow rates, and chemical concentrations	✓	✓	✓		
	Use their understanding of chemistry to operate and control chemical methods of water treatment	✓	✓	✓		
	Use their understanding of physics to operate and control the hydraulics at the Water Treatment Plant and any physical methods of treatment	✓	✓	✓		
	Use their understanding of microbiology to reduce the risk of contamination	✓	✓	✓		
	Select and use appropriate equipment to measure performance of different parameters	✓	✓	✓		
	Take water samples to monitor for the presence of indicator micro-organisms	✓	✓	✓		
Need to know	The basic principles of physics which impact on water treatment including understanding hydraulics, pressure and head, water hammer, surges, and head loss	✓	✓	✓	✓	
	The basic principles of how physical treatment of water works including the use of membranes, filtration, sedimentation, and clarification	✓	✓	✓	✓	
	The chemistry of drinking water supplies and chemicals of public health significance that may be found in drinking water supplies, and the water treatment processes used to reduce chemical risks	✓	✓	✓	✓	
	The basic principles of how chemical treatment of water works including activated carbon, coagulation and flocculation processes, fluoridation, ion exchange and softening processes, pH and adjustment, chlorine demand, free available chlorine, disinfection by-products, and plumbosolvency	✓	✓	✓	✓	
	The risks involved with chemical treatment including what will happen if chemicals are mixed inappropriately, and the impact of decomposition related to the storage of water treatment chemicals	✓	✓	✓	✓	
	The microbiology of drinking water and the relationship between drinking water and public health. Operators need to understand the characteristics of microbiological risks such as bacteria, viruses, protozoa, cyanobacteria and cyanotoxins, how these microbiological risks are detected and what treatment processes are used to reduce microbiological risks to the drinking water supply	✓	✓	✓	✓	

Lifecycle Delivery

Technical Standards Related to Water Treatment		Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard
Need to be able to	Follow the appropriate technical standards that relate to the operation and maintenance of the Water Treatment Plant. This may include: <ul style="list-style-type: none"> ▪ Internal standards developed by the Water Supplier ▪ The Drinking Water standards, guidelines and publications produced by the Ministry of Health relating to drinking water ▪ Technical documents, guidelines and publications developed by industry groups like Water New Zealand ▪ New Zealand Standards and Guidelines published by NZ Standards, or by government organisations like Worksafe ▪ International standards and guidelines e.g. those published by International Organisation for Standardization (ISO) or the American Water Works Association (AWWA) 	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓	✓ ✓	✓ ✓ ✓ ✓ ✓	
Need to know	Which technical standards relate to the work that they are responsible for. These should be identified on applicable operational and maintenance procedure documentation	✓	✓	✓	✓	
Need to know	Where to find the technical standards, e.g., through a subscription to NZ Standards	✓	✓	✓	✓	
Safe Isolation of Plant and Equipment		Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard 24917
Need to be able to	Identify the equipment that is to be worked on, including the point of isolation. There are occasions where this is not clear, e.g., a switchboard may not isolate all equipment in the vicinity, and some plant, e.g., actuators, may require isolating elsewhere	✓	✓	✓		
Need to be able to	Identify the hazards that might need to be controlled to isolate the plant or equipment. This might include hazards from the likes of: Confined Spaces, Falling from heights, Mechanical equipment with moving parts, Electricity, Pressure, Chemical hazards	✓	✓	✓	✓	
Need to be able to	Identify any other areas of the plant that might be affected by the isolation. The Water Treatment Operator must be able to clearly understand and communicate the effects of the isolation	✓	✓	✓		
Need to be able to	Be able to select and use the correct equipment to safely isolate the plant to be worked on e.g., valves, isolating locks and tags, locking pins etc	✓	✓	✓		
Need to be able to	Where electrical isolations are required the Drinking Water Treatment Operator will need to make sure this is procedure has been completed by an electrician	✓	✓	✓		
Need to be able to	Safely remove any hazardous substances from the system by draining, venting, purging, or flushing		✓	✓		
Need to be able to	Follow approved procedures to confirm that the isolation has been successful to ensure that the isolated equipment is safe to work on	✓	✓	✓		
Need to be able to	Undertake the safe removal of isolation equipment to return the plant into service	✓	✓	✓		
Need to be able to	The permit to work system in use	✓	✓	✓		
Need to be able to	The procedures for installing isolations including: <ul style="list-style-type: none"> ▪ Electrical isolation and tagging/locking out 	✓ ✓	✓ ✓	✓	✓ ✓	

Need to know	<ul style="list-style-type: none"> Proving electrical equipment is dead to ensure the correct piece of equipment has been isolated Immobilisation techniques such as valves, chains, locking pin etc Bleeding off pressure, isolating and bypassing process equipment Cooling requirements, e.g., the time electric motors take to cool Neutralisation of chemicals (e.g., chlorine and caustic soda) 	✓	✓		✓	
	How to adequately identify, test and confirm that the isolation has made the plant or equipment safe	✓	✓	✓	✓	
	The procedures for draining, venting, purging, and flushing	✓	✓	✓	✓	
	The procedures for removing isolations and returning plant and equipment	✓	✓	✓	✓	
	The risks associated with isolating a piece of plant or equipment and how to minimise the impacts associated with these and as documented within the Water Safety Plan	✓	✓	✓	✓	
	Communication, reporting, and record keeping requirements associated with isolating a piece of plant and equipment. This includes ensuring the work meets the requirements of the Health and Safety at Work Act	✓	✓	✓	✓	
Drinking Water Hygiene Requirements		Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard 24906
Need to be able to	Prevent the pollution or contamination of drinking water by following hygiene procedures	✓	✓	✓	✓	
	Disinfect tools, equipment, fittings, and materials used in maintenance with chlorine and correctly dispose of the chlorine solution	✓	✓	✓		
	Keep Personal Protective Equipment (PPE) and boots clean	✓	✓	✓	✓	
	Keep all fittings carried in vehicles or stored at site boxed, capped, or sealed with plastic wrapping. These items should not be uncovered until immediately before use	✓	✓	✓		
	Have current inoculations and pass health screening requirements for waterborne illnesses	✓	✓	✓	✓	
	Follow the Incident and Emergency Response Plan associated with the water treatment plant after any contamination incidents	✓	✓	✓	✓	
Need to know	How to identify potential sources of contamination	✓	✓	✓		
	The importance of personal hygiene	✓	✓	✓	✓	
	About the potential for contamination from workers Personal Protective Equipment (PPE) and the need for clean equipment and boots	✓	✓	✓	✓	
	Chlorine/disinfection procedures, both for the water itself and other hygiene purposes i.e., how chlorine is used to wash boots, clean tools and in repairs, and the correct disposal of chlorine solution	✓	✓	✓	✓	
	The risks of multi-functional working between water and wastewater assets, including the need to have separate tools and equipment for water and wastewater works. Separate vehicles must be used for water and wastewater maintenance works. Drinking Water Treatment Operators must be mindful of where their vehicle has been e.g., wastewater treatment plants	✓	✓	✓	✓	
	The potential for, and implications of, contamination of the water supply from items such as fuel and chemical contamination. What Treatment Operators need to know what procedures to follow after a contamination incident.	✓	✓	✓		
	The potential for, and implications of, contamination of the water supply from waterborne microorganisms	✓	✓	✓	✓	
	Sampling and audit processes for the work that they are undertaking	✓	✓	✓	✓	
	That the Water New Zealand Good Practice Guide – Hygiene Practices to Prevent Water Supply Contamination provides best practice guidance	✓	✓	✓	✓	

Maintenance and Repairs of Water Treatment Equipment		Kaiwhakamahi whakapai wai	Kaiwhakamahi Matua Whakapai wai	Kaiārahi wheketere whakapai wai	Kaiwhakahaere wheketere whakapai wai	Unit Standard
		Junior Water treatment operator	Senior Water treatment operator	Water Treatment Plant Team leader	Water treatment plant manager	19357
Need to be able to	Respond to water treatment plant maintenance / repair emergencies	✓	✓	✓		
	<p>Perform planned and unplanned maintenance on the equipment at the Water Treatment Plant in accordance with job instructions detailed in operations and maintenance procedures that are identified in the Operations and Maintenance Manual. This will require Drinking Water Treatment Operators to: (in conjunction with contractors)</p> <ul style="list-style-type: none"> ▪ Complete the instructions/organisational procedures for the maintenance task in question e.g., as recorded in maintenance procedures ▪ Identify any environmental, safety and water quality hazards and how they are to be mitigated. Obtain a permit to work, where this is required for the procedure ▪ Identify any distribution network impacts on the work and inform the appropriate people e.g., if there is to be a supply interruption ▪ Safely isolate the plant and equipment ▪ Ensure materials, pipes and fittings are clear of any contaminants before installing ▪ Sterilise fittings and repair materials ▪ Check that the completed maintenance and repairs meets the specification detailed in the maintenance procedure before returning the equipment to service ▪ Document what work has been undertaken, including identifying any costs (including time) and spare parts used 	✓	✓	✓		
Need to know	The required planned, scheduled, and reactive maintenance tasks and procedures for each piece of equipment used at the Water Treatment Plant	✓	✓	✓		
	How the equipment typically operates. Drinking Water Treatment Operators need to observe the equipment while it is in use so that they can recognize unusual sounds, vibrations or leaks that indicate that reactive maintenance is necessary.	✓	✓	✓		
	What maintenance frequency is required for each task. This will be based on the suggestions of the equipment manufacturer but may also be a factor of the reliability and criticality of the equipment.	✓	✓	✓		
	How to identify any environmental, safety and water quality hazards, and appropriate mitigation methods	✓	✓	✓	✓	
	How to safely shut down and isolate equipment before performing maintenance	✓	✓	✓		
	The hygiene requirements and procedures	✓	✓	✓	✓	
	The requirements for documenting work which has been completed	✓	✓	✓	✓	
	The maintenance and asset replacement strategies for the Water Treatment assets that are recorded in the Asset Management Plan, so that Operators are aware of what should be maintained and what should be replaced	✓	✓	✓		
	That differentiating between planned and unplanned maintenance is important because an increasing incidence of unplanned maintenance might indicate that the assets at the treatment plant are deteriorating and becoming unreliable	✓	✓	✓		
	That routine (planned) maintenance comprises the periodic inspections and tests performed on equipment at regular intervals. Included are daily, weekly, monthly, quarterly etc., inspections during which minor routine maintenance tasks are carried out, e.g., cleaning, lubrication, vibration tests, adjustments replacements and calibrations	✓	✓	✓		
That scheduled (planned) maintenance is also carried out on a time basis but is based on wear and the expected life cycle of the equipment's individual components. It involves the systematic and periodic removal from service of a piece of equipment for the replacement of parts, reconditioning or overhaul	✓	✓	✓			
That reactive (unplanned) maintenance amounts to repairing equipment that has broken down or abandoning it and replacing it with new equipment	✓	✓	✓			

Validation and Calibration of Monitoring Equipment		Kaiwhakamahi whakapai wai	Kaiwhakamahi Matua Whakapai wai	Kaiārahi wheketere whakapai wai	Kaiwhakahaere wheketere whakapai wai	Unit Standard
		Junior Water treatment operator	Senior Water treatment operator	Water Treatment Plant Team leader	Water treatment plant manager	
Need to be able to	Carry out key calibration or instrument checks of online equipment and identify issues with their performance	✓	✓	✓		
	Understand the operation of control systems and how to operate each instrument in various control states	✓	✓	✓		
	Carry out the practice of maintaining online instruments in line with supplier recommendations, standard operating procedures and record keeping as referenced in the Water Safety Plan and detailed in the Operations and Maintenance Manual for the Water Treatment Plant	✓	✓	✓		
	Review and analyse the performance of the water instruments by reviewing site and telemetry data to ensure the results are correct and accurate	✓	✓	✓		
Need to know	The validation and calibration procedures documented within the Error! Reference source not found. for the supply	✓	✓	✓		
	What the critical control points for the Water Treatment Plant are	✓	✓	✓	✓	
	The correct type and use of various analytical equipment for water quality measurement, including the levels at which the instruments operate, and their limitations are understood e.g., the accuracy and sensitivity of the equipment	✓	✓	✓		
	The requirement and need for online monitoring of water processes, including the key performance criteria for the water treatment works	✓	✓	✓		
	The use and care of online equipment, including record keeping	✓	✓	✓		
	The equipment required to maintain the instrument and its use	✓	✓	✓		
	The calibration of the instruments including understanding the expected results	✓	✓	✓		
	Communications, reporting, and record keeping requirements, associated with maintenance of monitoring equipment. These will be referenced in the Water Safety Plan for the supply	✓	✓	✓		
	Monitoring, the identification of instrument performance, including troubleshooting, such as flat lining	✓	✓	✓		
	The need for accurate and precise analysis and risks associated with incomplete or inaccurate analysis or results	✓	✓	✓		
	Contingency plans associated with the water treatment works when monitoring equipment is unavailable or incorrect	✓	✓	✓	✓	
	The requirements for validation and monitoring in the New Zealand Drinking Water Standards	✓	✓	✓	✓	
The Guidelines for Drinking-water Quality Management for New Zealand particularly for online water quality reporting, and control systems	✓	✓	✓	✓		
Inventory Management		Kaiwhakamahi whakapai wai	Kaiwhakamahi Matua Whakapai wai	Kaiārahi wheketere whakapai wai	Kaiwhakahaere wheketere whakapai wai	Unit Standard
		Junior Water treatment operator	Senior Water treatment operator	Water Treatment Plant Team leader	Water treatment plant manager	
Need to be able to	Proactively identify what spare parts are needed to maintain and repair equipment	✓	✓	✓		
	Monitor the level of parts that are held in stock	✓	✓	✓		
	Identify which parts are to be used first (i.e., the oldest)	✓	✓	✓		
	Proactively order adequate quantities of parts and consumables from the supplier, in accordance with the Procurement policies of the water supplier	✓	✓	✓		
	Follow the Water New Zealand Good Practice guides when ordering chemical supplies, paying regard to the chemical specification, quality control, and certification requirements.	✓	✓	✓	✓	

	Drinking Water Operators need to be able to reject any chemicals supplied which do not meet the specified standard					
Need to know	What spare parts are held in storage at the Water Treatment Plant	✓	✓	✓		
	How to store spare parts correctly	✓	✓	✓		
	That spare parts should be used on a “first in, first out” basis	✓	✓	✓		
	What supplier provides spare parts and how to follow the organisations procurement procedures to obtain them	✓	✓	✓		
	That standardisation of equipment and parts reduces the level of risk of equipment failure, because fewer types of each part need to be stocked which makes stock management easier and because it reduces the number of skills which need to be learnt to correctly install each part by the operators	✓	✓	✓		
	The correct specification of the chemicals they need to order and the quality control, testing, certification requirements that they need to meet in accordance with the following: <ul style="list-style-type: none"> Water New Zealand Good Practice Guide for the supply of polyelectrolytes for use in drinking-water treatment Water New Zealand Good Practice Guide for the supply of chlorine for use in drinking-water treatment Water New Zealand Good Practice Guide for the supply of hydrated lime for use in drinking-water treatment Water New Zealand Good Practice Guide for the supply of aluminium sulphate for use in drinking-water treatment Water New Zealand Good Practice Guide for the supply of fluoride for use in drinking-water treatment Water New Zealand Good Practice Guide for the supply of polyaluminium chloride for use in drinking-water treatment 	✓	✓	✓	✓	
	Cranes and Lifting Equipment	Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard
Need to be able to	Understand and comply with the written instructions relating to the safe operation of the crane	✓	✓	✓		
	Calculate the load to be lifted and confirm that this is within the safe loading limit of the crane		✓	✓		
	Use, and understand, hand signals for the operation of the crane	✓	✓	✓		
	Exercise the required level of care when operating the crane, including wearing the correct Personal Protective Equipment (PPE)	✓	✓	✓		
	Notify the controller of any unsafe equipment or process as soon as practicable	✓	✓	✓		
	Readily locate all documentation and information related to the crane	✓	✓	✓		
	Engage an Inspector to certify that the crane is safe		✓	✓		
Need to know	That they cannot operate the crane until they have been trained in its safe use	✓	✓	✓		
	That the crane cannot be used unless it has a certification of inspection	✓	✓	✓		
	The design loading limits of the crane	✓	✓	✓		
	That the Approved Code of Practice for Cranes [8] covers the operation, maintenance and inspection requirements of any cranes located at the Water Treatment Plant	✓	✓	✓	✓	
	That a general guide to the health and safety in employment (pressure equipment, cranes and passenger ropeways) Regulations 1999 provides guidance on regulations around the duties of equipment controllers, designers, manufacturers and suppliers, as well as workers	✓	✓	✓	✓	

Maintaining Specified Building Systems		Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard
Need to be able to	Obtain a compliance schedule where one is required under the Building Act [9]			✓		
	Publicly display a compliance schedule statement in their building for the first 12-month period from the issue of the compliance schedule		✓	✓		
	Ensure all the inspection, maintenance and reporting procedures for the specified systems stated in the compliance schedule for their building have been carried out and that those systems are performing, and will continue to perform, to the performance standards		✓	✓		
	Engage an Independent Qualified Person (IQP) to undertake the inspection, maintenance and reporting procedures listed on the compliance schedule and obtain a Certificate of Compliance with Inspection, Maintenance and Reporting Procedures (Form 12A)		✓	✓		
	Provide the BWoF annually to the building team of the council (ensuring the Form 12A certificates from the IQP(s) are attached) and publicly display a copy of this for the next 12 months		✓	✓		
	Obtain and keep reports detailing inspections, maintenance and repairs from the people who have carried out the work. These need to be kept with the compliance schedule for at least two years after they have been issued		✓	✓		
Need to know	That the Ministry of Building, Innovation and Employment has published a Compliance Schedule Handbook to provide guidance on the requirements of Compliance Schedules and Building Warrants of Fitness	✓	✓	✓	✓	
Root Cause Analysis		Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard
Need to be able to	Be involved, with others where appropriate, in the Root Cause Analysis processes. This involves helping to: <ul style="list-style-type: none"> Define the problem: <ul style="list-style-type: none"> What is happening? What are the specific symptoms? Collect data: <ul style="list-style-type: none"> How long has it been happening? What is the impact of the problem? Identify possible causal factors: <ul style="list-style-type: none"> what sequence of events led to the problem? what conditions allows it to occur Identify the Root Cause: <ul style="list-style-type: none"> Why does the causal factor exist? What is the real reason the problem occurred? Recommend and Implement Solutions <ul style="list-style-type: none"> What can you do to prevent this happening again? How do we implement the solution? Who will be responsible for this? What are the risks of implementing the solution? 	✓	✓	✓	✓	
	Update and have input into the Water Safety Plan			✓	✓	
	The basic cause of the problem (there can be more than one). Usually either a: Physical cause – a physical item failed in some way (for example a dose pump stopped working).	✓	✓	✓	✓	

Need to know	<ul style="list-style-type: none"> Human cause – somebody did something wrong or did not do something that was needed. Human causes typically lead to physical causes (for example nobody filled a dose tank, which led to the pump failing). Organisational cause - a system, process, or policy that people use to make decisions or do their work is faulty (for example, no one person was responsible for maintaining the dose tank, and everyone assumed someone else had done this). 	✓ ✓	✓ ✓	✓ ✓	✓ ✓	
Water Demand and Hydraulics		Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard 24975 24950
Need to be able to	<ul style="list-style-type: none"> Monitor the flow through the Water Treatment Plant and use knowledge of daily and seasonal demand variations to forecast what the future demand for water will be Perform calculations to determine changing chemical requirements in response to changes in plant flow Perform simple calculations using process flow to calculate residence times and velocities within filters Calculate chlorine contact time within the treatment process, demonstrating an awareness of the effect of flow and contact tank design on the disinfection process Review and analyse the performance of flow instruments Carry out procedures for maintaining flow instruments in line with supplier recommendations, operational procedures including paperwork and records keeping requirements 		✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓	✓ 	
Need to know	<ul style="list-style-type: none"> Hydraulic principles and understanding of how flow and hydraulic conditions can influence the water treatment plant throughput and quality Flow calculations and understand their significance for the treatment process The requirements of flow monitoring and reporting requirements to meet Resource Consent conditions The monitoring of hydraulic loading and control limitations The effects of the measurements on control systems such as dosing control The effect of flow or hydraulic changes on key process streams or equipment and the significance of these for water quality and plant performance The significance of design capacity of processes for plant performance Understand flow pacing and the effects this has on chemical dosing or pump operation Key flow control systems and operation of these in automatic or manual The risks associated with incomplete or inaccurate flow measurement Contingency plans associated with the water treatment plant when monitoring equipment is unavailable or incorrect 	✓ ✓ ✓ ✓ ✓ ✓ ✓ 	✓ ✓ ✓ ✓ ✓ ✓ ✓ 	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓	
Use Automated Systems to control the Process Plant and Collect Data		Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard 24913 29987
	<ul style="list-style-type: none"> Use the SCADA system, including: <ul style="list-style-type: none"> Logging into and navigating around the SCADA system Adjusting control set points and alarm levels for the different types of equipment used to control process operations Interpreting alarms 	✓	✓	✓ ✓ ✓ ✓	✓	

Need to be able to	<ul style="list-style-type: none"> Accepting, or overriding, alarms Viewing and understanding trend data and reporting any unusual trends Setting up ad-hoc records Interpreting mimic pages Undertaking basic maintenance of the SCADA system i.e., shutting down and restarting nodes 			✓ ✓ ✓ ✓		
	Interrogate the SCADA system to: <ul style="list-style-type: none"> Identify and control items of mechanical, electrical and instrumentation equipment Evaluate trend data differentiating normal operational cycles from developing fault conditions or emerging risks 	✓	✓	✓ ✓ ✓		
Need to know	The control philosophy for the Water Treatment Plant	✓	✓	✓		
	What SCADA systems are, and what functions they are used for, at Water Treatment Plants	✓	✓	✓	✓	
	How data acquisition is done from Remote Terminal Units (RTUs) or Programmable Logic Controllers (PLCs) which connect to sensors in the process and convert sensor signals to digital data, and which is then compiled and formatted so that Drinking Water Operators can make supervisory decisions to adjust or override normal automatic controls	✓	✓	✓		
	What the limitations of the SCADA system are, including an understanding of how the frequency of signals impacts the data	✓	✓	✓		
	What to do if the SCADA system fails	✓	✓	✓		
	The different types of equipment for process control and compliance monitoring	✓	✓	✓		
	How the radio/telemetry system at the plant works	✓	✓	✓		
	Operate the Source Water Abstraction Process	Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard 29981 29990
Need to be able to	Follow the operational procedures and first line maintenance tasks that are identified in the Operations and Maintenance Manual for the source water abstraction process	✓	✓	✓		
	Select the source or blend of sources that will give optimum raw water quality for the treatment works	✓	✓	✓		
	Monitor and control the operation of all assets associated with the raw water source or sources for the treatment works	✓	✓	✓		
	Control water abstraction at rates that meet the quality and quantity requirements for water treatment and the conditions of the Water Take Consent and the Water Safety Plan	✓	✓	✓	✓	
	Identify risks to treatment processes arising from raw water abstraction, such as weather events or local conditions	✓	✓	✓		
	Manage water abstraction to balance energy efficiency targets	✓	✓	✓		
	Maintain and repair source water abstraction assets	✓	✓	✓		
	The factors that influence raw water quality and the risks identified in the Water Safety Plan and the risks to Water Treatment processes from changes in raw water quality	✓	✓	✓	✓	
	The importance of catchment management and source protection. Drinking Water Treatment Operators need to have knowledge of the water supply catchment	✓	✓	✓		
	The objectives of abstraction processes and consequences of sub-optimal performance			✓		
	How to interrogate the SCADA system to identify: <ul style="list-style-type: none"> Normal trends or cycles for the works, and Atypical trends or changes and the underlying or root causes for the change 			✓ ✓ ✓		

Need to know	How to identify the root cause of raw water abstraction problems and the sequence of actions required to restore the process to steady-state conditions, taking account of all process variables and knock-on effects			✓		
	The types and qualities of raw water available to the water treatment plant			✓	✓	
	The strategies utilized to manage raw water quality and maximize yields from the sources available	✓	✓	✓		
	How water abstraction is regulated and consented with water take consents, implications of infringements and the role of the consenting authority	✓	✓	✓	✓	
	The design specification for the treatment processes in relation to raw water quality			✓		
	The range, operation, and maintenance of mechanical, electrical and instrumentation equipment utilized in raw water abstraction			✓		
	Alarms, action levels, authorization levels and consequences associated with the process of raw water abstraction		✓	✓		
	How to confirm the configuration, operation and performance of the raw water abstraction equipment corresponds to the information shown in SCADA			✓		
	Key process parameters and variables associated with raw water abstraction		✓	✓		
	That excessive starting and stopping of pumps should be avoided as this shortens the equipment's life and consumes more energy	✓	✓	✓		
Reactive and preventative Maintenance procedures and frequencies	✓	✓	✓			
	Operate Pre-treatment Processes	Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard 29981 29991
Need to be able to	Follow the operational procedures and first line Error! Reference source not found. that are identified in the Water Safety Plan for to the pre-treatment processes	✓	✓	✓		
	Identify all mechanical, electrical and instrumentation assets associated with the pre-treatment process on SCADA and at the Water Treatment Plant	✓	✓	✓		
	Monitor and control the pre-treatment process	✓	✓	✓		
	Calibrate equipment and instrumentation associated with the pre-treatment process	✓	✓	✓		
	Optimize the pre-treatment process based on test results and trend data	✓	✓	✓		
	Respond to alarms currently and instigate corrective actions to return the pre-treatment process to optimal conditions	✓	✓	✓		
Manage the safe disposal of any treatment residuals	✓	✓	✓			
Need to know	The objectives of the pre-treatment processes and consequences of sub-optimal performance. Refer to Chapter 12 of the Guidelines for Drinking Water Quality Management for New Zealand.	✓	✓	✓		
	Key process parameters and variables associated with pretreatment, including the influence of variable water quality, pH, temperature, and the design limitations of the plant	✓	✓	✓		
	How to interrogate the SCADA system to identify: <ul style="list-style-type: none"> Normal trends or cycles for the works, and Atypical trends or changes and the underlying or root causes for the change. 	✓	✓	✓ ✓ ✓		
	The range of mechanical, electrical and instrumentation plant used to monitor and control the pre-treatment process and their calibration requirements	✓	✓	✓		
	Alarms, action levels, authorization levels and consequences associated with the process or processes	✓	✓	✓		
	The safe storage, handling and use of chemicals associated with pre-treatment including personal protective equipment (PPE) requirements	✓	✓	✓		
	How to manage residuals from the water treatment process. Refer to the Management of Water Treatment Plant Residuals in New Zealand Handbook.	✓	✓	✓		
Reactive and preventative Maintenance procedures and frequencies	✓	✓	✓			

Operate Coagulation and Clarification Processes		Kaiwhakamahi whakapai wai	Kaiwhakamahi Matua Whakapai wai	Kaiārahi wheketere whakapai wai	Kaiwhakahaere wheketere whakapai wai	Unit Standard
		Junior Water treatment operator	Senior Water treatment operator	Water Treatment Plant Team leader	Water treatment plant manager	29983 29984
Need to be able to	Follow the operational procedures that are identified in the Water Safety Plan	✓	✓	✓		
	Identify all mechanical, electrical and instrumentation assets associated with coagulation and clarification processes on SCADA and at the Water Treatment Plant	✓	✓	✓		
	Control the coagulation and clarification processes. Depending on the quality of the source water, pH adjustment and / or alkalinity adjustment prior to coagulant addition may be required	✓	✓	✓		
	Calibrate, monitor and check coagulation and clarification performance	✓	✓	✓		
	Evaluate trend data from SCADA and test results to identify: <ul style="list-style-type: none"> Normal trends or cycles for the works, and Atypical trends or changes and the underlying or root causes for the change 	✓ ✓	✓ ✓	✓ ✓		
	Optimise the coagulation and clarification processes based on test results and trend data e.g., for filtrate turbidity	✓	✓	✓		
	Instigate corrective action to return the disinfection process to compliant condition (Junior and Sr operator to ensure that they advise the supervisor before taking any action)	✓	✓	✓		
	Safely carry out operational and first line maintenance tasks relating to the coagulation and clarification processes	✓		✓		
Manage the safe disposal of any treatment residuals	✓	✓	✓			
Need to know	The objectives of the coagulation and clarification processes and consequences of sub-optimal performance. Refer to Chapter 13 of the Guidelines for Drinking Water Quality Management for New Zealand for coagulation guidance and Chapter 8 for the associated guidance on Protozoal compliance	✓	✓	✓		
	Key process parameters and variables associated with coagulation and flocculation, including: <ul style="list-style-type: none"> the influence of variable water quality, chemical dose rates, mixing conditions, flocculation times, the selection of chemicals and their order of addition, pH, temperature, desludging and flow rates, and the design limitations of the plant 	✓		✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓		
	The procedures governing the utilization of returning wash water to the head of the plant and its impact or influence on the operation of the plant	✓		✓		
	Key compliance criterion from the New Zealand Drinking Water Standards relating to the coagulation and process including Maximum Acceptable Values (MAV)	✓	✓	✓	✓	
	How to interrogate the SCADA system to identify: <ul style="list-style-type: none"> normal trends or cycles for the works, and atypical trends or changes and the underlying or root causes for the change. 	✓	✓	✓ ✓		
The types of coagulants and coagulant aids used and the factors that influence their selection, to include: <ul style="list-style-type: none"> use interaction sequence of addition 	✓	✓ ✓ ✓	✓ ✓ ✓	✓		

	<ul style="list-style-type: none"> cost 			✓		
	The range of mechanical, electrical and instrumentation plant used to monitor and control the coagulation and clarification control processes and their calibration requirements	✓		✓		
	The range of plant used to store, mix, and pump chemicals and the methods of operation available	✓		✓		
	The safe storage, handling and use of chemicals associated with coagulation and clarification including PPE requirements	✓		✓		
	Alarms, action levels, authorization levels and consequences associated with the process or processes	✓		✓		
	How the de-sludging process relates to the operation of the wash water recovery system	✓		✓		
	How to complete jar tests to specification and any limitations, including analysis of results	✓		✓		
	How to identify the root cause of coagulation and clarification process problems and the sequence of actions required to restore the process to compliant conditions, taking account of all process variables and process lag times. Chapter 13 of the Guidelines for Drinking Water Quality Management for New Zealand provides troubleshooting and optimization guidance for coagulation and clarification processes.	✓	✓	✓	✓	
	Reactive and preventative Maintenance requirements and frequencies for the coagulation and clarification system	✓	✓	✓		
	How to manage residuals from the water treatment process. Refer to the Management of Water Treatment Plant Residuals in New Zealand Handbook .	✓	✓	✓	✓	
	<h2>Operate Filtration and Adsorption Processes</h2>	Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard 29988 29989 24950 17896
Need to be able to	Follow the operational procedures and first line maintenance tasks that are identified in the Operations and Maintenance Manual for filtration and adsorption processes	✓	✓			
	Identify all mechanical, electrical and instrumentation assets associated with filtration and adsorption processes on SCADA and at the Water Treatment Plant	✓	✓			
	Calibrate, monitor and check Filtration and adsorption performance, completing associated calculations	✓				
	Evaluate trend data from SCADA and test results to identify: <ul style="list-style-type: none"> Normal trends or cycles for the works, and Atypical trends or changes and the underlying or root causes for the change 	✓	✓			
	Optimise the filtration and adsorption processes based on test results and trend data e.g., for filtrate turbidity	✓	✓			
	Instigate corrective action to return the filtration and adsorption processes to compliant condition	✓	✓			
	Safely dispose of any treatment residuals	✓				
Need to know	The objectives of the filtration and adsorption processes and consequences of sub-optimal performance. Refer to Chapter 14 of the Guidelines for Drinking Water Quality Management for New Zealand for filtration and adsorption guidance, chapter 8 of the Guidelines for Drinking Water Quality Management for New Zealand for protozoal compliance and Chapter 10 of the Guidelines for Drinking Water Quality Management for New Zealand for the associated guidance on Chemical compliance	✓	✓			
	Key process parameters and variables associated with filtration and absorption, including the influence of variable water quality, design limitations of the plant, operating cycles, filter washing and return to service	✓	✓			
	Types of media used and the factors that influence their selection, use and performance		✓			

	Key compliance criterion from the New Zealand Drinking Water Standards relating to the filtration and absorption including Maximum Acceptable Values (MAV)	✓	✓			
	How to interrogate the SCADA system to identify: <ul style="list-style-type: none"> Normal trends or cycles for the works, and Atypical trends or changes and the underlying or root causes for the change. 	✓	✓			
	The range of mechanical, electrical and instrumentation plant used to wash filters and the methods of operation available	✓	✓			
	How the filter wash cycle relates to the operation of the wash recovery system where this exists	✓				
	Alarms, action levels, authorization levels and consequences associated with the process or processes	✓	✓			
	How to identify the root cause of filtration and absorption process problems and the sequence of actions required to restore the process to compliant conditions, taking account of all process variables and process lag times. Chapter 14 of the Guidelines for Drinking Water Quality Management for New Zealand provides troubleshooting and optimization guidance for filtration and absorption processes	✓	✓			
	Reactive and preventative maintenance requirements and frequencies for the filtration and absorption systems	✓	✓			
	How to manage residuals from the water treatment process. Refer to the Management of Water Treatment Plant Residuals in New Zealand Handbook .	✓	✓			
	Operate Sludge Dewatering and Disposal Processes	Kaiwhakamahi whakapai wai	Kaiwhakamahi Matua Whakapai wai	Kaiārahi wheketere whakapai wai	Kaiwhakahaere wheketere whakapai wai	Unit Standard
		Junior Water treatment operator	Senior Water treatment operator	Water Treatment Plant Team leader	Water treatment plant manager	30000
Need to be able to	Follow the operational procedures that are identified in the Operations and Maintenance Manual for sludge dewatering and disposal	✓	✓			
	Identify all mechanical, electrical and instrumentation assets associated with sludge dewatering and disposal processes on SCADA and at the Water Treatment Plant	✓	✓			
	Identify and locate any chemical, storage, mixing and pumping equipment used in the sludge dewatering and disposal processes	✓	✓			
	Identify critical control points applicable to the sludge dewatering and disposal operations, control the sludge dewatering and disposal processes	✓	✓			
	Calibrate, monitor and check the sludge dewatering and disposal process performance, completing associated calculations	✓	✓			
	Evaluate trend data from SCADA and test results to identify: <ul style="list-style-type: none"> Normal trends or cycles for the works, and Atypical trends or changes and the underlying or root causes for the change 	✓	✓			
	Optimize the sludge dewatering processes based on test results and trend data to efficiently achieve the required parameters	✓	✓			
	Respond to alarms and instigate corrective action to return the sludge dewatering and disposal processes to compliant condition					
	Deal with spillages or pollution events in accordance with the incident and emergency plan for the site	✓	✓			
	Safely carry out operational and first line maintenance tasks relating to the sludge dewatering and disposal processes including the safe isolation of equipment when required	✓	✓			
	Identify the root cause of sludge dewatering and disposal problems		✓			
	Record equipment condition and performance data to the appropriate people to assist in asset management decision making	✓	✓			
Safely transfer dewatered solids for disposal at the landfill (or approved equivalent) paying attention to health and safety requirements	✓	✓				

Need to know	How to manage residuals from the water treatment process. Refer to the Management of Water Treatment Plant Residuals in New Zealand Handbook .	✓	✓			
	The objectives of the sludge dewatering and disposal process, including an understanding of the design considerations and consequences of sub-optimal performance	✓	✓			
	Key process parameters and variables associated with sludge dewatering and disposal, including the flow rate for liquor return	✓	✓			
	How to interrogate the SCADA system to: <ul style="list-style-type: none"> Identify and control items of mechanical, electrical and instrumentation equipment Normal trends or cycles for the works, and Atypical trends or changes and the underlying or root causes for the change 	✓	✓			
	The range of mechanical, electrical and instrumentation plant used to monitor and control sludge dewatering and disposal assets and their calibration requirements. This may include: <ul style="list-style-type: none"> Centrifuges Belt Presses Picket-fence thickeners Mono pumps Plate Presses 	✓	✓			
	Where the sludge dewatering process is enhanced using chemicals, the Drinking Water Treatment Operator would also need to know the types of chemicals used in the process, the reason why, and the factors that influence their selection, use and sequence of addition. Drinking Water Treatment Operators also need to make sure that these potentially hazardous substances are to be safely stored, handled, and managed	✓	✓			
	Factors that can affect the sludge quality and supernatant liquor quality including operational, mechanical, chemical, and weather-related factors	✓	✓			
	The critical control points, alarms, action levels, authorization levels and consequences associated with the process or processes	✓	✓			
	How to identify the root cause of sludge dewatering and disposal process problems and the sequence of actions required to restore the process to compliant conditions, taking account of all process variables and process lag times	✓	✓			
	The operational and maintenance tasks for the sludge dewatering and disposal processes that will be outlined in the Operations and Maintenance Manual. Including the reactive and preventive maintenance procedures and frequencies	✓	✓			
	The health and safety hazards associated with the sludge dewatering and disposal processes and how these should be mitigated	✓	✓			
	How to optimise the sludge dewatering and disposal processes to minimise downstream treatment problems, based on process performance management, test results, analysis of trends and in accordance with each Drinking Water Treatment Operators level of authority	✓	✓			
	How to safely take the sludge dewatering and disposal equipment out of service	✓	✓			
What procedures to follow in an emergency situation	✓	✓				
<u>Operate Disinfection Processes</u>	Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard 29982 29985 29992 17897	
Need to be	Follow the operational procedures that are identified in the Implementing the Water Safety Plan	✓	✓			
	Identify all mechanical, electrical and instrumentation assets associated with the disinfection process on SCADA and at the Water Treatment Plant	✓	✓			
	Control the disinfection process	✓	✓			

able to	Calibrate, monitor and check disinfection performance, completing associated calculations, or utilizing look-up tables in DWSNZ	✓	✓			
	Evaluate trend data from SCADA and test results to identify: <ul style="list-style-type: none"> Normal trends or cycles for the works Atypical trends or changes and the underlying or root causes for the change 	✓	✓			
	Optimise the disinfection process based on test results and trend data	✓	✓			
	Instigate corrective action to return the disinfection process to compliant condition	✓	✓			
	Safely carry out operational and first line maintenance tasks relating to the disinfection processes	✓	✓			
Need to know	The objectives of the disinfection processes and consequences of sub-optimal performance. Refer to Chapter 15 of the Guidelines for Drinking Water Quality Management for New Zealand	✓	✓			
	Key process parameters and variables associated with disinfection, including the influence of variable water quality, pH, temperature, disinfection by-product formation, disinfectant residuals, contact time, FACe (Free Available Chlorine equivalent) and the design limitations of the plant	✓	✓			
	Key compliance criterion from the New Zealand Drinking Water Standards relating to the disinfection process including Maximum Acceptable Values (MAV)	✓	✓			
	How to interrogate the information system to: <ul style="list-style-type: none"> Identify and control items of mechanical, electrical and instrumentation equipment Evaluate trend data differentiating normal operational cycles from developing fault conditions How to confirm the configuration, operation and performance of the actual disinfection plant corresponds to SCADA 	✓	✓			
	The range of mechanical, electrical and instrumentation plant used to monitor and control the disinfection process and their calibration requirements	✓	✓			
	Alarms, action levels, authorization levels and consequences associated with the process or processes	✓	✓			
	The safe storage, handling and use of chemicals associated with disinfection including PPE requirements	✓	✓			
	How to identify the root cause of disinfection process problems and the sequence of actions required to restore the process to compliant conditions, taking account of all process variables and process lag times	✓	✓			
	Reactive and preventative Maintenance requirements and frequencies for the disinfection system	✓	✓			
	Operate Treatment Processes for Aesthetic Considerations	Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	
Need to be able to	Follow the operational procedures that are identified in the Operations and Maintenance Manual	✓	✓			
	Identify all mechanical, electrical and instrumentation assets associated with treatment processes put in place for aesthetic determinants on SCADA and at the Water Treatment Plant	✓	✓			
	Control the Aesthetic treatment processes	✓	✓			
	Calibrate, monitor and check the processes that provide aesthetic treatment performance, completing associated calculations	✓	✓			
	Evaluate trend data from SCADA and test results to identify: <ul style="list-style-type: none"> Normal trends or cycles for the works Atypical trends or changes and the underlying or root causes for the change 	✓	✓			

	Optimise the treatment processes based on test results and trend data	✓	✓			
	Respond to alarms and instigate corrective action to return the treatment processes to compliant condition	✓	✓			
	Safely carry out operational and first line maintenance tasks relating to the aesthetic treatment processes	✓	✓			
	Safely dispose of any treatment residuals	✓	✓			
Need to know	The objectives of the aesthetic treatment processes and consequences of sub-optimal performance. Refer to Chapter 18 of the Guidelines for Drinking Water Quality Management for New Zealand for guidelines on aesthetic considerations	✓	✓			
	Key process parameters and variables associated with the aesthetic treatment processes, including the influence of variable water quality and design limitations of the plant	✓	✓			
	The Guideline Values (GVs) from the New Zealand Drinking Water Standards relating to aesthetic determinants and how analysis is carried out to identify taste and odour problems	✓	✓			
	How to interrogate SCADA to: <ul style="list-style-type: none"> Identify and control items of mechanical, electrical and instrumentation equipment Evaluate trend data differentiating normal operational cycles from developing fault conditions How to confirm the configuration, operation and performance of the actual disinfection plant corresponds to the information system 	✓	✓			
	The range of mechanical, electrical and instrumentation plant used to treat for aesthetic considerations, their calibration requirements, and the methods of operation available	✓	✓			
	Alarms, action levels, authorization levels and consequences associated with the process or processes	✓	✓			
	How to identify the root cause of process problems and the sequence of actions required to restore the process to compliant conditions, taking account of all process variables and process lag times	✓	✓			
	Reactive and preventative Maintenance requirements and frequencies	✓	✓			
	How to manage residuals from the water treatment process. Refer to the Management of Water Treatment Plant Residuals in New Zealand Handbook	✓	✓			
	Operate Fluoridation Processes	Kaiwhakamahi whakapai wai	Kaiwhakamahi Matua Whakapai wai	Kaiārahi wheketere whakapai wai	Kaiwhakahaere wheketere whakapai wai	Unit Standard 29986
Need to be able to	Follow the operational procedures that are identified in the Operations and Maintenance Manual.	✓	✓			
	Identify all mechanical, electrical and instrumentation assets associated with the fluoridation process on SCADA and at the Water Treatment Plant	✓	✓			
	Oversee the delivery of chemicals to site and ensure that they are correctly labelled and stored	✓	✓			
	Control the fluoridation process including checking correct dosing rate.	✓				
	Calibrate, monitor and check the fluoridation processes and instrumentation including fluoride sensors	✓				
	Complete calculations to ensure that the fluoride has been prepared at the right concentration using the right chemical	✓				
	Take samples of the treated water to manually check on the fluoride concentration in the treated water	✓				
	Evaluate trend data from SCADA and test results to identify: <ul style="list-style-type: none"> Normal trends or cycles for the works Atypical trends or changes and the underlying or root causes for the change 	✓	✓			
	Optimise the treatment processes based on test results and trend data, in accordance with each Drinking Water Treatment Operators level of authority	✓	✓			

	Respond to alarms (e.g., for low / high fluoride levels) and instigate corrective action to return the treatment processes to compliant condition	✓				
	Safely carry out operational and first line maintenance tasks relating to the Fluoridation treatment processes	✓				
Need to know	That the Water New Zealand Code of Practice for the Fluoridation of Drinking-Water Supplies in New Zealand [11] specifies: <ul style="list-style-type: none"> Optimum fluoride levels for drinking-water Design of control limits for fluoridation plants Minimum design and operation requirements for the safe and effective addition of fluoride chemicals to drinking water supplies Monitoring and reporting requirements for fluoridation 	✓	✓			
	Key process parameters and variables associated with the fluoridation process, including the influence of variable water quality and design limitations of the plant	✓	✓			
	The Maximum Acceptable Value (MAVs) from the New Zealand Drinking Water Standards relating to fluoride	✓	✓			
	How to interrogate SCADA to: <ul style="list-style-type: none"> Identify and control items of mechanical, electrical and instrumentation equipment Evaluate trend data differentiating normal operational cycles from developing fault conditions How to confirm the configuration, operation and performance of the actual disinfection plant corresponds to the information system 	✓	✓			
	The range of mechanical, electrical and instrumentation plant used in fluoridation, their calibration requirements, and the methods of operation available	✓	✓			
	Alarms, action levels, authorisation levels and consequences associated with the process or processes	✓	✓			
	How to identify the root cause of problems and the sequence of actions required to restore the process to compliant conditions, taking account of all process variables and process lag times	✓	✓			
	Reactive and preventative Maintenance requirements and frequencies	✓	✓			
	Operate Water Storage Assets	Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	
Need to be able to	Follow the operational procedures and first line maintenance tasks relating to the water storage asset that are in the Operations and Maintenance Manual	✓	✓			
	Identify all mechanical, electrical and instrumentation assets associated with the water storage asset on SCADA and on site	✓	✓			
	Monitor and check reservoir storage volumes, completing associated calculations e.g., to determine disinfection contact times, retention, and turnover	✓	✓			
	Identify set-points (e.g., pump start and stop levels) applicable to the treated water storage assets	✓	✓			
	Identify the range of alarms associated with the treated water storage points (e.g., low level, high level, and hatch alarms)	✓	✓			
	Control treated water storage assets to meet energy efficiency targets	✓	✓			
	Evaluate trend data from SCADA and / or test results to identify: <ul style="list-style-type: none"> Normal trends or cycles for the works Atypical trends or changes and the underlying or root causes for the change 	✓	✓			
	Instigate corrective action to return the treated water storage points to normal operation, taking account of process lag time	✓	✓			
The objective of the water storage operations and consequence of sub-optimal operation	✓	✓				

Need to know	Key process parameters and variables associated with the water storage asset, including the influence of variable water quality and design limitations of the set-up	✓	✓			
	The operating and maintenance cycles for the treated water storage asset including routine inspections	✓	✓			
	The operation and control of associated pumping regimes	✓	✓			
	Water quality and sampling requirements at the water storage asset	✓	✓			
	The need to maintain reservoir integrity and how this can be compromised, including inspection requirements following a seismic event	✓	✓			
	The consequences of sub-optimal treat storage water asset performance on the distribution network and customers	✓	✓			
	How to interrogate SCADA to: <ul style="list-style-type: none"> Identify and control items of mechanical, electrical and instrumentation equipment Evaluate trend data differentiating normal operational cycles from developing fault conditions How to confirm the configuration, operation and performance of the actual water storage asset corresponds to the information system 	✓	✓			
	Security requirements for treated water storage assets	✓	✓			
	The range of instrumentation plant used to monitor and control the water storage asset and their calibration requirements	✓	✓			
	How levels and flows are controlled to maximise efficiency	✓	✓			
	Disinfection standards, operations, and requirements for using Hypochlorite dosing	✓	✓			
	Alarms, action levels, authorization levels and consequences associated with the process or processes	✓	✓			
How to identify the root cause of problems and the sequence of actions required to restore water storage to optimal volumes, taking account of all demand and process lag times	✓	✓				
Reactive and preventative Maintenance requirements and frequencies for the water storage asset, including safe entry procedures	✓	✓				
	Operate Pumping Systems	Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	
Need to be able to	Follow the operational procedures that are in the Operations and Maintenance Manual	✓	✓			
	Identify all mechanical, electrical and instrumentation assets associated with the pumps on SCADA and on site	✓	✓			
	Monitor and check flows and system pressures	✓	✓			
	Identify and adjust set-points (e.g., pump start and stop levels) applicable to the pumping operations	✓	✓			
	Identify the range of alarms associated with the pumps	✓	✓			
	Control pumping operations to meet energy efficiency targets	✓	✓			
	Evaluate trend data from SCADA and / or test results to identify: <ul style="list-style-type: none"> Normal trends or cycles for the works Atypical trends or changes and the underlying or root causes for the change 	✓	✓			
	Inspect pump components and identify maintenance needs, as per the manufacturer's recommendations e.g., to repair leaks and replace corroded parts	✓	✓			
	Schedule preventive maintenance, particularly lubrication and replacement of seals, diaphragms, tubing etc as per manufacturers recommendation	✓	✓			
	Instigate corrective action to return the pumps to normal operation	✓	✓			
Safely carry out operational and first line maintenance tasks relating to the pumping system	✓	✓				
Principle and purpose of the pump operation, the types of pumps and their operational function	✓	✓				

Need to know	Key process parameters and variables associated with the pumps and design limitations of the set-up	✓	✓			
	The system hydraulics, including both the Water Treatment Plant and network layout	✓	✓			
	The operating and maintenance cycles for the pumps including inspection requirements and how to safely isolate the pumps from both mechanical and electrical hazards	✓	✓			
	How to interrogate SCADA to: <ul style="list-style-type: none"> Identify and control items of mechanical, electrical and instrumentation equipment Evaluate trend data differentiating normal operational cycles from developing fault conditions How to confirm that the configuration, operation, and performance of the actual pumping system assets corresponds to the information system 	✓	✓			
	The range of instrumentation used to monitor and control the pumps and their calibration requirements	✓	✓			
	How pumps are controlled to maximize energy efficiency	✓	✓			
	Alarms, action levels, authorization levels and consequences associated with the process or processes	✓	✓			
	How to identify the root cause of problems and the sequence of actions required to restore water storage to optimal volumes, taking account of all demand and process lag times	✓	✓			
	Reactive and preventive maintenance procedures and frequencies	✓	✓			
	Operate Emergency Power Systems	Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	
Need to be able to	Follow the operational procedures relating to the emergency power system that are in the Operations and Maintenance Manual	✓	✓			
	Identify the voltage, load and phase of all assets associated with the treatment plant	✓	✓			
	Ensure that the generator is regularly serviced by a qualified technician as specified by the supplier		✓			
	Run the generator under full load for extended periods to test for any problems		✓			
	Ensure that the UPS is regularly tested and serviced by a qualified technician as specified by the supplier		✓			
	Arrange for fuel in storage tanks to be tested to ensure that it remains viable. Undertake fuel conditioning, or fuel replacement, on a regular basis to maintain the quality of the fuel in the tank		✓	✓		
	Implement the incident and emergency response plan for loss of power at the site, including informing their lines network provider of the loss of mains electricity supply		✓	✓		
	For sites which rely on portable emergency generators the drinking water operator needs to be able to select a generator which is suitable for the site and be able to safely transfer the load from the mains to the generator		✓	✓		
	Safely carry out operational and first line maintenance tasks relating to the emergency power system		✓	✓		
Need to know	The operating and maintenance cycles for the emergency power system components including inspection requirements	✓	✓			
	How much fuel is needed to operate the site, for the time period specified in the incident and emergency response plan and the on-site fuel capacity	✓	✓			
	If there is not a permanently installed generator the Drinking Water Operator needs to know what type of generator is needed and where this is to come from. The following variables will need to be known by the Drinking Water Operator to select an appropriate emergency generator: <ul style="list-style-type: none"> Voltage – the generator must have the appropriate voltage to match the motors it will be powering 	✓	✓			

	<ul style="list-style-type: none"> Load - the Full Load Amps of all motors that are to be run off the generator needs to be known Phase (rotation) - Phase is a requirement for a single or multiphase generator based on what the generator will be powering The power rating and load factor of the genset Where the load transfer switch is located 					
	Reactive and preventive maintenance procedures and frequencies	✓	✓			
	Water Treatment Plant Isolation / Shutdown / Re-commissioning of Process Streams	Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	
Need to be able to	Carry out the planning and actions required for the following types of shutdowns: <ul style="list-style-type: none"> An automatic plant shutdown A manual plant shutdown A controlled plant shutdown on discovery of process issues 	✓	✓	✓	✓	
	Shutdown the treatment plant in line with standard operating procedures	✓	✓	✓	✓	
	Identify the work area to be accessed using documentation, systems, and work instructions	✓	✓	✓	✓	
	Troubleshoot major components and their problems to identify the cause of an emergency shutdown	✓	✓	✓	✓	
	Re-start the treatment works in line with standard operating procedures, including: <ul style="list-style-type: none"> Reporting and recording Observing, sampling, and testing Information systems and manual checks 	✓	✓	✓	✓	
Need to know	The correct methods of starting, stopping, operating, and controlling each process including understanding the impact of plant shutdown on each treatment process and how to respond	✓	✓	✓	✓	
	The architecture of the process/production system including knowing the process control philosophy and process parameters and limits e.g., temperature, pressure, flow, ph	✓	✓	✓	✓	
	How to identify the cause of plant shutdown including relevant alarms and actions	✓	✓	✓	✓	
	Start-up procedures including standard operating procedures and local procedures	✓	✓	✓	✓	
	The range of water quality sampling and testing required in the event of a plant shutdown and re-start	✓	✓	✓	✓	
	Communications, reporting, and record keeping requirements associated with a plant shutdown. Including ensuring the response meets the requirements of the Drinking Water Standards of New Zealand	✓	✓	✓	✓	
	The risks associated with works shutdown and re-start and how to minimise the impacts associated with these and as documented within the Operations and Maintenance Manual	✓	✓	✓	✓	
	Contingency plans associated with the works shutdown	✓	✓	✓	✓	
How to respond in the event of an emergency in the workplace environment e.g., following an Incident and Emergency Response Plan	✓	✓	✓	✓		
	Incident and Emergency Response Plans	Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	
Need to be able to	Provide input into the development of the Incident and Emergency Response Plan	✓	✓			
	Implement the operational corrective actions, which may include process control adjustments or a plant isolation and shutdown to ensure that the supply of non-compliant water is prevented		✓	✓		
	Demonstrate that they have been trained in emergency situations	✓	✓	✓		
	Test response plans prior to an emergency arising	✓	✓	✓		

	Make use of "lessons learned" information by contributing to the implementation and continuous improvement of quality systems in the water industry	✓	✓	✓		
Need to know	Where to find the documented Incident and Emergency Response Plan	✓	✓			
	What potential incidents and emergencies will require an operational response	✓	✓			
	The triggers for activating the incident and emergency response plan, for example when a critical control point level has been reached	✓	✓			
	Communications, reporting and record keeping requirements associated with emergencies, including ensuring the response meets the requirements of the Drinking Water Standards of New Zealand	✓	✓			
	What civil defense obligations they have during an emergency	✓	✓			
	Assisting with the Process to Decommission, Dispose or Abandon Assets	Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard 30004
Need to be able to	Organise a risk assessment, prior to starting the decommissioning process, that is reflective of the scope and complexity of the decommissioning process. The risk assessment may need to include the following items to provide assurance that all hazards are identified, understood, and eliminated: <ul style="list-style-type: none"> An engineering assessment of the structural integrity of any associated building and structure carried out by a Chartered Structural Engineer A health and safety electrical assessment that identifies and marks out the power supply to, and the distribution of power in the work area, to identify the isolation requirements or protection of the supply to other areas of plant or equipment carried out by an Electrical Engineer or the plants Electrician A Health and Safety Fire Assessment if changes to fire protection systems might be required carried out by a Fire Engineer A Health and Safety Asbestos Assessment to establish if any asbestos is present and if so, how to deal with it Undertake the decommissioning process and dispose of water treatment assets at the end of their life once the risks above have been eliminated 		✓ ✓ ✓	✓	✓	
Need to know	The Decontamination and Demolition of Plant and Assets Procedure outlined in the Guidelines for Occupational Health & Safety in the New Zealand Water Industry	✓	✓	✓		

Asset Information

Provide Data to assist in Asset Management Decision Making		Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard 30005
Need to be able to	Undertake a systematic approach to collecting, recording, and reporting data		✓	✓		
	Follow the reporting requirements and procedures that are either referenced or documented within the Water Safety Plan		✓	✓		
	Follow reporting requirements and procedures for the performance measures and targets that are either referenced or documented within the Asset Management Plan		✓	✓		
	What mechanisms are in place for recording and reporting data to others within the organisation. This includes what reporting responsibilities and accountabilities the Drinking Water Operator will have		✓	✓		
Need to know	What higher level oversight, performance assessment against organisational goals and objectives is expected. This includes needing to know about: <ul style="list-style-type: none"> ▪ The required level of service for the drinking water supply ▪ The performance measures and targets that are to be used to assess compliance with the required level of service ▪ How performance is to be assessed and reported 	✓	✓	✓		
Provide Data to Taumata Arowai - The Water Services Regulator		Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard 30001
Need to be able to	Undertake a systematic approach to collecting, recording, and reporting data		✓	✓	✓	
	Follow the reporting requirements and procedures that are either referenced or documented within the Water Safety Plan	✓	✓	✓	✓	
Need to know	The compliance monitoring requirements within the Drinking-water Standards for New Zealand (DWSNZ), including which parameters are to be continuously monitored		✓	✓	✓	
	That compliance with the DWSNZ requires some determinants not to exceed a certain value for more a few minutes. This requires accuracy in time measurement and recording to ensure no short-term transgressions go unrecorded		✓	✓	✓	
	The reporting requirements and procedures that are either referenced or documented within the Water Safety Plan including what mechanisms are in place for recording and reporting data to Taumata Arowai, and what reporting responsibilities and accountabilities the Drinking Water Operator will have to provide this data		✓	✓	✓	

Risk and Review

Implementing the Water Safety Plan		Kaiwhakamahi whakapai wai	Kaiwhakamahi Matua Whakapai wai	Kaiārahi wheketere whakapai wai	Kaiwhakahaere wheketere whakapai wai	Unit Standard
		Junior Water treatment operator	Senior Water treatment operator	Water Treatment Plant Team leader	Water treatment plant manager	
Need to be able to	Operate the Water Treatment Plant in a manner that aligns with the operational procedures that are identified in the Water Safety Plan. Usually, these procedures are detailed in a separate Operations and Maintenance Manual	✓	✓			
	Undertake Operational monitoring and inspection of the Water Treatment processes, as documented in the Water Safety Plan. This includes undertaking corrective actions when monitoring and inspections indicate that a measure is deviating from expected performance and communicating this to the appropriate people	✓	✓			
	Monitor the Critical Control Points and undertake the corrective actions for the CCPs when the defined action and critical limits are reached	✓	✓			
	Verify the performance of the Water Treatment Plant performance in accordance with the Drinking-water Quality Compliance Monitoring Plan referenced in the Water Safety Plan	✓	✓			
	Implement the procedures that are documented in the Water Safety Plan that detail how to respond to transgressions and non-compliances with the Drinking-water Standards for New Zealand	✓	✓			
	Assist with reviewing customer complaints to help identify whether operational changes can be made to improve consumer satisfaction	✓	✓			
	Communicate with the appropriate people when updates to the Water Safety Plan are identified		✓	✓		
	Undertake any improvement items identified in the Water Safety Plan for which the Drinking Water Treatment Operator has been given responsibility for	✓	✓			
Need to know	The principles of drinking water safety in New Zealand	✓	✓			
	The characteristics of the drinking-water supply system, what hazards might arise, how these hazards arise and create risks, and the processes and practices that affect drinking-water quality	✓	✓			
	The available water quality information and be able to analyse and interpret this information which identifies actual and potential water quality issues	✓	✓			
	What the barriers to contamination are for the Water Treatment Plant, so that the failure of one barrier will be compensated for by the effective operation of the remaining barriers. Possible barriers might include: <ul style="list-style-type: none"> ▪ Hazards entering the raw water (e.g., source protection) ▪ Removing particles and hazardous chemicals from the water by physical treatment ▪ Killing, or inactivating pathogens by disinfection ▪ Maintaining the quality of the water within the distribution system 	✓	✓			
	What the Critical Control Points at the Water Treatment Plant are	✓	✓			
	How the The New Zealand Drinking-Water Standards provide requirements for drinking-water safety by specifying the: <ul style="list-style-type: none"> ▪ maximum amounts of substances or organisms or contaminants or residues that may be present in drinking-water ▪ criteria for demonstrating compliance with the Standards ▪ remedial action to be taken in the event of non-compliance with the different aspects of the Standards 	✓	✓			
	About the Guidelines for Drinking-Water Quality Management in New Zealand which complement the Drinking-Water Standards for New Zealand and provides advice for achieving high level of drinking-water quality management. The Guidelines will assist water	✓	✓			

	suppliers to achieve the Standards and are updated on an ongoing basis with new information					
	The commitment to drinking-water quality management from their employer and the relationship of the WSP to organisational policy and strategy	✓	✓			
	Health and Safety	Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard 17871 15189
Need to be able to	Identify hazards, risk assessment and control measures	✓	✓			
	Safely undertake their work and look after the health and safety of any other workers that they direct. To do this Drinking Water Treatment Operators need to be able to: <ul style="list-style-type: none"> Conduct a health and safety induction for visitors to the site Safely enter confined spaces Work alone, and in isolated areas Work with hazardous substances Work at heights Work in, and above, water 	✓	✓			
	Control plant and equipment hazards by: <ul style="list-style-type: none"> Wearing appropriate personal protective equipment Safely operating machinery Safely operating vehicles Safely operating mobile plant 	✓	✓			
	Implement Incident and Emergency response plans for the site	✓	✓			
Need to know	That the Health and Safety at Work Act 2015 (HSWA) [13] is New Zealand’s workplace health and safety legislation. Water Suppliers must look after the health and safety of their Drinking Water Treatment Operators and any other workers that they influence or direct	✓	✓			
	The Water New Zealand Good Practice Guide for Occupational Health and Safety in the New Zealand Water Industry [12] provides guidance and model procedures for how to comply with the HSWA from a water industry perspective	✓	✓			
	What “permits to work” and operational procedures are in place at the Water Treatment Plant that control the identified hazards	✓	✓			
	What Personal Protective Equipment (PPE) is required when operating and maintaining processes at the Water Treatment Plant	✓	✓			
	Hazardous Substances Management	Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard
Need to be able to	Manage an inventory of all chemicals and hazardous substances used at the site, including all consumable chemicals, process chemicals and laboratory chemicals. The inventory needs to be kept up-to-date, accurate and easily accessible to emergency workers	✓	✓			
	Ensure that Safety Data Sheets are available for all chemical and hazardous substances used at the site. Drinking Water Treatment Operators should always ask if they are unsure about any information recorded on the Safety Data Sheet	✓	✓			
	Safely work with chemicals and hazardous substances (both in terms of handling and storage requirements) including for: <ul style="list-style-type: none"> Asbestos Fuel Chemicals 	✓	✓			

	Use the correct Personal Protective Equipment (PPE) and other appropriate controls (e.g., ventilation) as indicated on the Safety Data Sheet when handling chemicals and hazardous substances	✓	✓			
	Drinking Water Treatment Operators may need to wear specific Respiratory Protective Equipment (RPE) to protect them from breathing in hazardous substances. If relevant Drinking Water Treatment Operators may need to undergo a medical examination to check that they can wear a respirator	✓	✓			
	Label containers containing hazardous substances correctly, including when they are decanted or transferred into smaller containers	✓	✓			
	Store hazardous substances safely	✓	✓			
	Ensure that correct signage is in place for hazardous substances	✓	✓			
	Follow the procedures detailed in the Incident and Emergency Plan for the Water Treatment Plant site in the event of a spill	✓	✓			
Need to know	What hazardous substances (i.e., any product or chemical that has explosive, flammable, oxidising, toxic, corrosive or ecotoxic properties) are stored or used at the Water Treatment Plant and the dangers that these substances pose	✓	✓			
	That they cannot work with or around hazardous substances until they have the knowledge and practical experience to do so safely	✓	✓			
	That they need to be trained in the use of any PPE and particularly RPE to ensure that they can use it properly. Many types of respiratory protective equipment rely in a tight seal and may not be suitable for Drinking Water Treatment Operators who have facial hair or wear glasses. Refer to Worksafe for more information on RPE requirements	✓	✓			
	That the Incident and Emergency Plan for the Water Treatment Plant site details the procedures to follow in the event of a spill at the site	✓	✓			
	That the Health and Safety at Work (Hazardous Substances) Regulations [14] identifies how the chemicals and hazardous substances such as those used in Water Treatment processes need to be managed	✓	✓			
	That the Water New Zealand Good Practice Guide for Occupational Health and Safety in the New Zealand Water Industry [12] provides guidance and model procedures for how to manage chemical and hazardous substances at Water Treatment Plants	✓	✓			
	That health and safety information is available for all chemicals on Safety Data Sheets (SDS) that must be provided at the time of supply	✓	✓			
	That the Water New Zealand National Asbestos Cement Pressure Pipe Manual [15] details the health and safety requirements when working with asbestos material containing pipes, i.e. for work involving cutting into, removal, storage or replacement of AC pipes Refer to the Water New Zealand Good Practice Guide for Occupational Health and Safety in the New Zealand Water Industry [12] for procedures for asbestos material not associated with pipes i.e. asbestos material present in switchboards or building materials	✓	✓			
	Depending on the type of hazardous substance and threshold requirements, a stationary container system compliance certificate, and location compliance certificate may be required from Worksafe. Note that these certificates may become invalid if tanks leak or are altered	✓	✓			
Drinking Water Treatment Operators need to be aware that any person who transports chemicals or hazardous substances must hold a Dangerous Goods endorsement on their license	✓	✓				
That depending on the type and quantity of hazardous substances stored at the site, a Water Treatment Plant might be considered a Major Hazard Facility . Where this is the case there will be additional requirements for the site to comply with the Health and Safety at work (Major Hazard Facilities) Regulations 2016 which the Drinking Water Operators will need to be aware of	✓	✓				

Plant Security and Asset Protection		Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard 30004
Need to be able to	Induct and supervise visitors to the Water Treatment Plant		✓			
	Lock and alarm all points of entry, including doors, windows, hatches, vents, and gates	✓	✓			
	Maintain a key register of who holds keys for each site			✓		
	Routinely perform visual examinations of the exterior of the Water Treatment Plant and remove objects that could be used to aid an intruder	✓	✓			
	Respond to security breaches at the Water Treatment Plant in accordance with the requirements of the incident and emergency response plan for the site		✓	✓		
Need to know	Who has access to the Water Treatment Plant, and where the keys are kept	✓	✓			
	How to induct and supervise visitors to site	✓	✓			
	How to implement the incident and emergency response measures for security breaches	✓	✓			
Source Water Protection and Catchment Management Plans		Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard 17894 24897 32314
Need to be able to	Implement the operational response in accordance with the Incident and Emergency Response Plan	✓	✓			
Need to know	That the National Environmental Standards for Sources of Human Drinking Water Regulations [16] (NES) requires Regional Councils to put conditions on consents within the supply catchment if there is the possibility of an event (e.g., spill) leading to a significant adverse effect on the drinking water supply. In this situation conditions of consent must be imposed that require the consent holder to notify the drinking water supplier if an adverse event occurs	✓	✓			
	The spatial extent of the drinking water supply catchment and any associated source protection zone	✓	✓			
	What potential incidents and emergencies within the catchment will require an operational response	✓	✓			
	Where to find the documented Incident and Emergency Response Plan	✓	✓			
Verification Monitoring		Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard
Need to be able to	Follow the drinking-water compliance monitoring plan that is referenced in the Water Safety Plan for the supply. This plan will detail the supply-specific requirements for compliance monitoring to meet the Drinking-water Standards for New Zealand. This might include being able to: <ul style="list-style-type: none"> Take representative samples of water from key points within the treatment process, accurately using appropriate sampling equipment Review and analyse the performance of the water treatment process by using laboratory, site, and network quality reports 	✓	✓			
	Follow the procedures referenced in the Water Safety Plan for responding to transgressions and non-compliances with the Drinking-water Standards for New Zealand	✓	✓			

	Review customer complaints, discuss them with other team members and use them to make improvements to the treatment process, within their level of authority		✓	✓		
	Review the results of both the drinking-water quality monitoring and the operational monitoring and communicate to identify target and action limits when intervention may be required and communicate this to the appropriate people		✓	✓		
	Assist in both internal and external audits of the drinking water treatment plant. Drinking Water Treatment Operators assist in the auditing process, inducting auditors onto site, demonstrating the work that they undertake and answering questions that the auditor may have that are within the remit of the work undertaken by the operator	✓	✓	✓		
Need to know	The Drinking-water compliance monitoring plan that is referenced in the Water Safety Plan. This details how the supply meets the compliance monitoring requirements within the Drinking-water Standards for New Zealand	✓	✓			
	The procedures for responding to transgressions and non-compliance with the Drinking-water Standards for New Zealand	✓	✓			
	The customer complaint process and how complaints are to be reviewed and used with helping to make improvements	✓	✓			
	What operational monitoring and inspection requirements are required including knowing how to instigate the updating of the Water Safety Plan where necessary	✓	✓			
	Audits are an independent and systematic check to confirm that the water treatment system is effective. Audits can be internal, or external	✓	✓			
	An internal audit is one that is carried out by people employed or contracted by the water supplier. Whenever possible, although not easy in practice, the internal auditor should not be directly involved in the operation of the Water Treatment Plant but should still have a technical background in water treatment systems	✓	✓			
	Internal audits are opportunities to identify where improvements can be made to the treatment system operations or maintenance procedures. They tend to focus on the water suppliers own quality control perspective. Internal audits can be used to: <ul style="list-style-type: none"> Verify the Water Safety Plan implementation Prepare for an external audit Confirm that the system meets its operational compliance requirements 	✓	✓			
	The World Health Organisation's A Practical Guide to Auditing Water Safety Plans [17] provides advice on undertaking audits, and the website includes templates and toolboxes to help with the auditing process	✓	✓			
	External audits can be instigated by Taumata Arowai, the water regulator and are used to confirm compliance with regulatory requirements	✓	✓			
	Contaminants of Emerging Concern	Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard
Need to be able to	Review the results of both the drinking-water quality monitoring and the operational monitoring to identify what is normal, and what is abnormal, for their supply		✓	✓		
	Where abnormal results are received for a water supply, Drinking Water Treatment Operators need to communicate this to the appropriate people, who will need to determine how this new risk is to be mitigated			✓		
Need to know	What drinking water quality monitoring results are considered normal for the supply and what results are abnormal	✓	✓			
	Who they must inform when they receive abnormal results for a water supply	✓	✓			

Resource Consent Compliance Monitoring and Reporting		Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard
Need to be able to	Fulfil the resource consent conditions related to the operation and maintenance of the Water Treatment Plant		✓	✓		
	Assist staff from the consent authority when they undertake site inspections, e.g., induct them onto the site		✓	✓		
	Provide operational data to the consent authority in accordance with the conditions of consent		✓	✓		
	Monitor the performance of the Water Treatment Plant, including trending data, and communicate with the appropriate people when conditions of consent are close to being breached so that action can be taken to prevent this before it occurs		✓	✓		
	Notify the appropriate people when the operation of the Water Treatment Plant fails to comply with the resource consent conditions and implement the operational response in accordance with the Incident and Emergency Response Plan		✓	✓		
Need to know	What resource consent conditions are in place for the Water Treatment Plant and the limitations these apply to the operation of the Water Treatment Plant (e.g., maximum flow rates)	✓	✓			
	What data needs to be collected and monitored to meet the conditions of the consent	✓	✓			
	What to do if the operation of the Water Treatment Plant fails to comply with the resource consent conditions, as detailed in the Incident and Emergency Response Plan	✓	✓			
Engage with Stakeholders		Kaiwhakamahi whakapai wai Junior Water treatment operator	Kaiwhakamahi Matua Whakapai wai Senior Water treatment operator	Kaiārahi wheketere whakapai wai Water Treatment Plant Team leader	Kaiwhakahaere wheketere whakapai wai Water treatment plant manager	Unit Standard 30007 30006
Need to be able to	Identify the stakeholders that they are required to engage with. This will include, but not be limited to, those identified in the Water Safety Plan		✓	✓	✓	
	Engage with stakeholders by following the mechanisms and documentation within the Water Safety Plan for stakeholder engagement		✓	✓	✓	
	Provide input into the long-term employee engagement plan (management and operational) on awareness and involvement in safe and secure drinking water		✓	✓	✓	
	Identify the contact list and communication plan for incidents and emergencies			✓	✓	
	Where Drinking Water Treatment Operators are dealing with customer complaints, these should always be discussed with other team members, including notifying what has been communicated to any complainants				✓	
Need to know	That the stakeholders who could affect, or be affected by, decisions or activities to do with drinking water will have been identified either in the Water Safety Plan , or in other communications plans referenced by the WSP	✓	✓			
	That the Water Safety Plan will also have documented the appropriate mechanisms that they should use to obtain input and involvement from the stakeholders	✓	✓			
	The long-term consumer engagement plan on awareness and involvement in safe drinking water	✓	✓			
	The Water Suppliers two-way communication programme to receive consumers' suggestions, complaints, and concerns	✓	✓			

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