IMPROVING OPERATIONAL RESPONSE TO WATER QUALITY EMERGENCIES Rosie O'Loughlin, Network Engineer, Yarra Valley Water Amira Haruwarta, Water Operations Specialist, Yarra Valley Water Sonia McIntyre, Senior Water Quality Engineer, Yarra Valley Water

ABSTRACT

This paper discusses Yarra Valley Water's (YVW) approach to improving the management of water quality (WQ) emergencies, especially after hours.

Previously, limited resources had led to fatigue issues, impacting our operational response. This was compounded by a growing complex network, climate change impacts and increasing regulatory expectations.

To address these challenges, a dedicated after hours WQ roster was formalised. Comprehensive training was provided on our emergency response plans, working with our customer contact centre and managing WQ issues. Formal Australasian Inter-service Incident Management System (AIIMS) training in Incident Control, Intelligence and Planning roles is also offered. A weekly operational handover meeting provides a debrief from the previous week and an opportunity for mock incidents and knowledge sharing. These meetings are a valuable learning opportunity for both rostered and non-rostered staff to develop their WQ knowledge.

To ensure a consistent approach to managing WQ incidents, we have developed and continually update our operational documentation. This includes decision making frameworks and 'catchment to meter' risk assessment templates, which have been created for a variety of incidents.

Since implementing these initiatives, staff are better supported in responding to incidents, fatigue management has improved and there has been a significant uplift of WQ knowledge across the business.

1. INTRODUCTION

YVW provides water and sanitation services to more than 2 million people across Melbourne's northern and eastern suburbs. YVW is responsible for the distribution of treated drinking water, which is supplied by Melbourne Water.

In 2020 and 2021, YVW managed two significant WQ emergencies. The first occurred in August 2020, due to a primary disinfection failure at Melbourne Water's Silvan Water Treatment Plant. The plant lost power during a storm, followed by a generator failure, which led to untreated water entering the network. A boil water advisory was issued to over 250,000 people for up to approximately 56 hours. The second incident involved a widespread depressurisation event at Sherbrooke Reservoir following wild weather in June 2021. A Do Not Drink advisory was issued due to the potential for contaminants to enter the drinking water network. A summary of the number of declared water quality incidents in subsequent years is shown below.



Figure 1 - Yearly summary of water quality incidents between 2022 and 2024

These incidents highlighted the growing impact of climate change on our operations and the need for resources available to respond after hours. At the time, YVW relied on limited staff for management of WQ emergencies. Fatigue management become a concern, particularly for multi-day events. This led YVW to formalise an after hours WQ roster with recruitment via expressions of interest. Following guidance in *Victorian Preparedness Framework 2022*, we sought to ensure the right people with appropriate technical skills were trained and supported with appropriate resources, systems and processes. In conjunction with implementing the roster, our emergency response documentation and guidance is continually updated and improved to ensure a consistent approach. This work ensures YVW can plan for, respond to and recover from water quality emergencies.

2. DISCUSSION

2.1 After Hours Roster Implementation

The WQ advisor roster generally consists of a 1 in 6 rotation, with members available on call after hours and on weekends. The roster complements and works with other roles where required, including an Incident Controller, Service Response representative and Network Duty Officer. Prior to implementation, rostered members were provided with training, including supporting work instructions and quick reference guides, which covered:

- Comprehensive overview of the WQ Emergency Response Plan. This plan includes response guidance for a variety of incidents including disinfection failure, widespread depressurisation, E. coli detection and widespread customer complaints.
- Regulatory reporting requirements to Department of Health under the Safe Drinking Water Act.
- Accessing and analysing laboratory sampling results from Business Intelligence (BI).
- Requesting contract partner works, including emergency sampling and flushing.
- Guidance on working with Service Response to manage customer notifications.

• How to use DMS (Distribution Management System) to visualise the location of customer complaints and find works which may be causing WQ issues.



Figure 2 - DMS (Distribution Management System) example

New members receive one on one training and support prior to their first rostered week. This includes reviews of previous incident response and documentation, such as Section 22 reports and risk assessments. A "buddy" system ensures a new member has someone for backup if needed during their initial rostered period.

2.2 Ongoing Management and Improvements

Each Thursday, an operational handover meeting provides a debrief from the previous week and an opportunity for learning. The debrief covers any WQ issues that have occurred during that time, including a detailed review of any incident or exceedance response. These meetings are well attended by both rostered and non-rostered staff, which helps with succession planning for the group.

Learning and development opportunities in these meetings have included:

- Mock incidents, including E. coli detection and widespread customer complaints. This has involved working in teams to complete both risk assessments and drinking water advisory rescind plans. During mock incident debriefs, participants can provide feedback on gaps in our existing plans and guides, which can then be updated. This feedback process creates an open dialogue within the group and promotes continuous improvement.
- Peer to peer fortnightly learning sessions, where each member has the opportunity to present on a topic of interest relevant to WQ. Topics have included incident case studies, opportunistic pathogens, chlorine sensor instrumentation and rainwater tanks.
- Training from YVW WQ Specialist on relevant topics including PFAS and regulatory reporting.
- Updates from Water Operations on laboratory changes and improvements, as well as key operational changes (e.g. new Water Treatment Plant brought online).
- Summary of changes and improvements to emergency response documentation.

Staff can actively participate in incidents both during business hours and after hours. Non rostered members are offered the opportunity to shadow experienced colleagues to gain hands on experience. Business wide exercises, which test inter-agency relationships, are another opportunity for learning.

Rostered staff also have the opportunity to attend external AIIMS training for Incident Control, Intelligence and Planning roles. Additionally, formal taste and odour (T&O) training has been provided, allowing staff to form part of T&O panels. This has been particularly beneficial when bringing new assets online or managing T&O related incidents.

2.3 Documentation and Systems Uplift

In conjunction with implementing an after hours roster, YVW has continually updated relevant emergency response documentation.

Our WQ Emergency Response Plan includes:

- 'Catchment to meter' risk assessment templates, which have been created for a variety of incidents. The templates include detailed guidance and useful links to find the relevant information for each part of the risk assessment. An example template is shown in Table 1 for an E. coli detection.
- Sampling exceedance limits and response actions.
- Decision making framework for assessing and responding to widespread depressurisation and backflow events.
- Guidance for risk assessing water quality complaint clusters to determine whether to classify as widespread. This includes assessing the number and type of complaints, trajectory of complaint numbers, root cause and potential impact to public health.

Several email notifications have been created to automatically notify staff about clusters of WQ and no water / low pressure complaints. The notifications provide a quick summary of relevant complaints and serve as an early warning for widespread issues. This enables early investigation into the cause and rapid implementation of mitigation actions.



Figure 3 - Email notifications for multiple WQ complaints

Table 1 - Rapid Risk Assessment template for E. coli Detections

Details of Water Sampling Locality
1. Name of water agency
2. Sampling locality name
3. Population served/number of customer connections
4. Identification of vulnerable customers and outline of the industry type
Source Water
5. Provide details on any changes to typical raw water quality or source
Water Treatment and Disinfection
6. Provide schematic of water supply pathway, including water treatment plant (WTP),
booster/secondary disinfection, tank(s), reservoir(s) providing the drinking water.
7. Provide description of WTP Process and Performance (i.e.: CCP breaches).
Storage and Distribution
8. Provide evidence on inspection of any tanks, reservoirs, basins confirming no ingress points.
9. Details of any recent works completed in the area.
Sampling
10. Provide fields tests (i.e.: free and total chlorine) in the distribution system and treated water
storage tanks from today and compare against target/typical values.
11. Provide a copy of the preliminary lab report with results for the sample detecting E. coli.
12. Provide any other sample results taken in the same locality.
13. Provide schematic of the sampling locality showing the location (sample point) of the E. coli
detection and any other samples taken in the sampling locality under routine and emergency
sampling. Ensure they include extremities of the sampling locality and list parameters.
14. Provide information about the sample collection process (i.e.: anything unusual).
Other relevant information
15. Provide other relevant information relevant to the potential health risk including environmental
factors, security, asset condition etc.
Public Health Risk Assessment

16. Provide assessment and understanding of whether there is a public health risk.

17. Consider follow-up actions required including Water Advisories, flushing and disinfection.

2.4 Roster Feedback

An annual review allows staff to provide feedback on their experience with the WQ roster. Results indicate high levels of satisfaction, with staff calling out the opportunity for learning and the supportive culture of the group as key benefits. There is a strong willingness to be part of the roster now and into the future.



Figure 4 - Annual Review Results

3. CONCLUSION

Since implementing these initiatives, YVW has significantly improved both documentation and WQ knowledge across the business. Fatigue management after hours is improved, and staff are better supported in responding to incidents. Documented processes ensure that we have a reliable response to incidents, including a consistent risk appetite. Repeat positive feedback indicates that the roster is a valuable learning opportunity for all members.

4. ACKNOWLEDGEMENTS

We would like to thank everyone involved in the WQ roster for their continued dedication to learning, and their commitment to ensuring we provide safe drinking water to our customers.