

WWS CCP PROCEDURE

Disinfection - Mackay Rechlorination



Issue Date: 1 July 2016
To be Revised: 1 July 2016

1 Introduction

Mackay Regional Council (MRC) operates ten reticulated drinking water supply schemes.

To ensure drinking water meets the requirements of the Australian Drinking Water Guidelines and *Public Health Regulation 2005*, chlorine in the form of liquid (Cl) or gas (Cl₂) is added to the water supply to ensure effective disinfection as a barrier to potentially harmful pathogens that may be present in the water.

1.1 Purpose and Scope

The purpose of this procedure is to describe the management requirements for disinfection by chlorination of drinking water supplies in the Mackay reticulated distribution system. It also includes the hazards and controls that must be considered and addressed when carrying out this work.

1.2 References

- National Water Quality Management Strategy, Australian Drinking Water Guidelines, 2011, NHMRC/ NRMCC
- MRC Monitoring Program
- DWQ Incident Reporting Process

2 Definitions

- Disinfection - Chemical dosing of chlorine gas to inactivate disease-causing micro-organisms.
- DEWS - Department of Energy and Water Supply (formerly DERM – Department of Environment and Resource Management)
- CCP – Critical Control Point
- MRC – Mackay Regional Council
- HACCP – Hazard Analysis Critical Control Point
- OWSR – Office of the Water Supply Regulator
- QLD Health - Queensland Health Public Health Unit

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3 Responsibilities and Authorities

Position	Responsibilities and Authorities
Pump Attendant	<ul style="list-style-type: none">• Monitor and optimise treatment processes• Respond to alert and critical limit alarms• Record and report information to Transfer Systems Officer
Transfer Systems Officer	<ul style="list-style-type: none">• Organise resources• Make decisions about treatment processes• Record and report information to Network Engineer
Network Engineer	<ul style="list-style-type: none">• Assist Transfer Systems Officer in analysis and decision making• Communicate issues to Manager Water Network and other MRC staff
Senior Environmental Officer &/ Environmental Officer	<ul style="list-style-type: none">• Communicate issues to external stakeholders e.g. DEWS, QLD Health• Complete Incident Reports
Manager Water Network	<ul style="list-style-type: none">• Ensure correct procedures and protocols have been followed by operational staff• Assist with communication to external stakeholders• Assist with follow-up sampling and further investigations

4 Monitoring

Monitoring of the Mackay rechlorination chlorine dosing systems and disinfection processes is carried out as detailed in the MRC Monitoring Program.

For CCP purposes, the performance of the disinfection process is measured in terms of free chlorine residual analysis on a grab sample of chlorine gas dosed water collected after chemical dosing.

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4.1 Performance Targets

CCP monitoring, performance targets and the alert and critical limits set for this CCP are shown in Table 4-1.

The validation (background) for the selection of these performance targets is as follows:

- **Target** – Final water chlorine concentration target range is based on maintaining a chlorine residual within the reticulation, while limiting complaints due to high chlorine levels;
- **Alert Limit** – Based on readings outside target range;
- **Critical Limit** – Minimum limit based on Australian Drinking Water Guideline (2011) recommendations for chlorine levels of >0.5 mg/L. Maximum limit based on Australian Drinking Water Guideline (2011) recommendations that chlorine levels should not exceed 5 mg/L.

Table 4-1: Free Chlorine Residual Operational Targets

Location	Frequency	Target Limit	Alert Limit	Critical Limit
Post chlorine dosing – Golf Links Pump Station	Weekly	1.2 - 1.5 mg/L	<0.75 mg/L >2.0 mg/L In any one sample	<0.5 mg/L >5.0 mg/L In any one sample
Post chlorine dosing – Jane Creek Pump Station	Weekly	1.2 - 1.5 mg/L	<0.75 mg/L >2.0 mg/L In any one sample	<0.5 mg/L >5.0 mg/L In any one sample
Post chlorine dosing – Walkerston Pump Station	Weekly	1.2 - 1.5 mg/L	<0.75 mg/L >2.0 mg/L In any one sample	<0.5 mg/L >5.0 mg/L In any one sample
Post chlorine dosing – Mt Bassett Reservoir	Weekly	1.2 - 1.5 mg/L	<0.75 mg/L >2.0 mg/L In any one sample	<0.5 mg/L >5.0 mg/L In any one sample
Post chlorine dosing – Shoal Point Reservoir	Weekly	1.2 - 1.5 mg/L	<0.75 mg/L >2.0 mg/L In any one sample	<0.5 mg/L >5.0 mg/L In any one sample
Post chlorine dosing – Seaforth Rechlorination Facility	Weekly	1.2 - 1.5 mg/L	<0.75 mg/L >2.0 mg/L In any one sample	<0.5 mg/L >5.0 mg/L In any one sample

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4.2 Corrective Actions

If operational monitoring shows the CCP parameters are in the alert or critical limit range, the corrective actions to be followed are as outlined below:

Table 4-2: Corrective Actions

Step	Actions	Responsibility
1. Confirm result	<ul style="list-style-type: none"> • Undertake a follow-up grab sample analysis to confirm the measured level. <ul style="list-style-type: none"> i. If follow-up grab sample analysis confirms the CCP limit range, investigate the cause of the incident (Step 2). If the Critical Limit is confirmed as being breached cease supply to the town and notify the Transfer Systems Officer and/or Network Engineer immediately. ii. If discrepancy between readings, confirm correct sampling and analysis procedure and check settings and calibration of instrument then re-sample and repeat Step 1. iii. If follow-up grab sample analysis shows free chlorine residual is back within target range, continue to monitor process closely and record and report the incident (Step 5). 	Pump Attendant
2. Investigate cause of incident	<ul style="list-style-type: none"> • Check settings and performance of the dosing system. • Check whether dosing system control system is working. 	Pump Attendant
	For chlorine gas systems: <ul style="list-style-type: none"> • Check level of chemical left in drum / cylinder. • Check rotameter reading and setting. • Check service water flow rate and pressure to chlorinator. 	
	Check for changes in treated water quality or flow rate, potentially affecting chlorine levels.	
3. Address cause of incident	<p>Take the appropriate steps to rectify any problems.</p> <p>If, after the actions are undertaken, the free chlorine residual returns to the target level, continue to monitor process closely and record and report the incident (Step 5).</p>	Pump Attendant

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Step	Actions	Responsibility
4. Assess need for shutdown / isolation	If the correct free chlorine residual cannot be maintained, assess the need for shutdown or isolation of the treatment system.	Pump Attendant, Transfer Systems Officer, Network Engineer
5. Report and record incident details	<ul style="list-style-type: none"> Notify the Transfer Systems Officer and/or Network Engineer of the incident. Record the details of the CCP limit incident in MP-Field. 	Pump Attendant
	Communicate with other staff as required to organise follow-up sampling and further investigation and rectification of cause of incident.	Transfer Systems Officer, Network Engineer, Manager Water Network
	<p>If a critical limit incident, assess the need to communicate the incident to DEWS.</p> <p>If DEWS notification is required ensure notification occurs within 3 hours and complete an Incident Report Form that is to be submitted to DEWS within 24 hours.</p> <p>If DEWS notification is not required complete an internal incident record in the incident register.</p> <p>Follow the steps outlined in the DWQ Incident Reporting Process.</p>	Network Engineer, Manager Water Network, Senior Environmental Officer &/ Environmental Officer

5 Records

General records required to be kept for CCP alert limit or critical limit incidents are:

- Entries made in MP-Field; and
- Written (email) or verbal (telephone) notification to Transfer Systems Officer and/or Manager Water Network.

6 Process Map

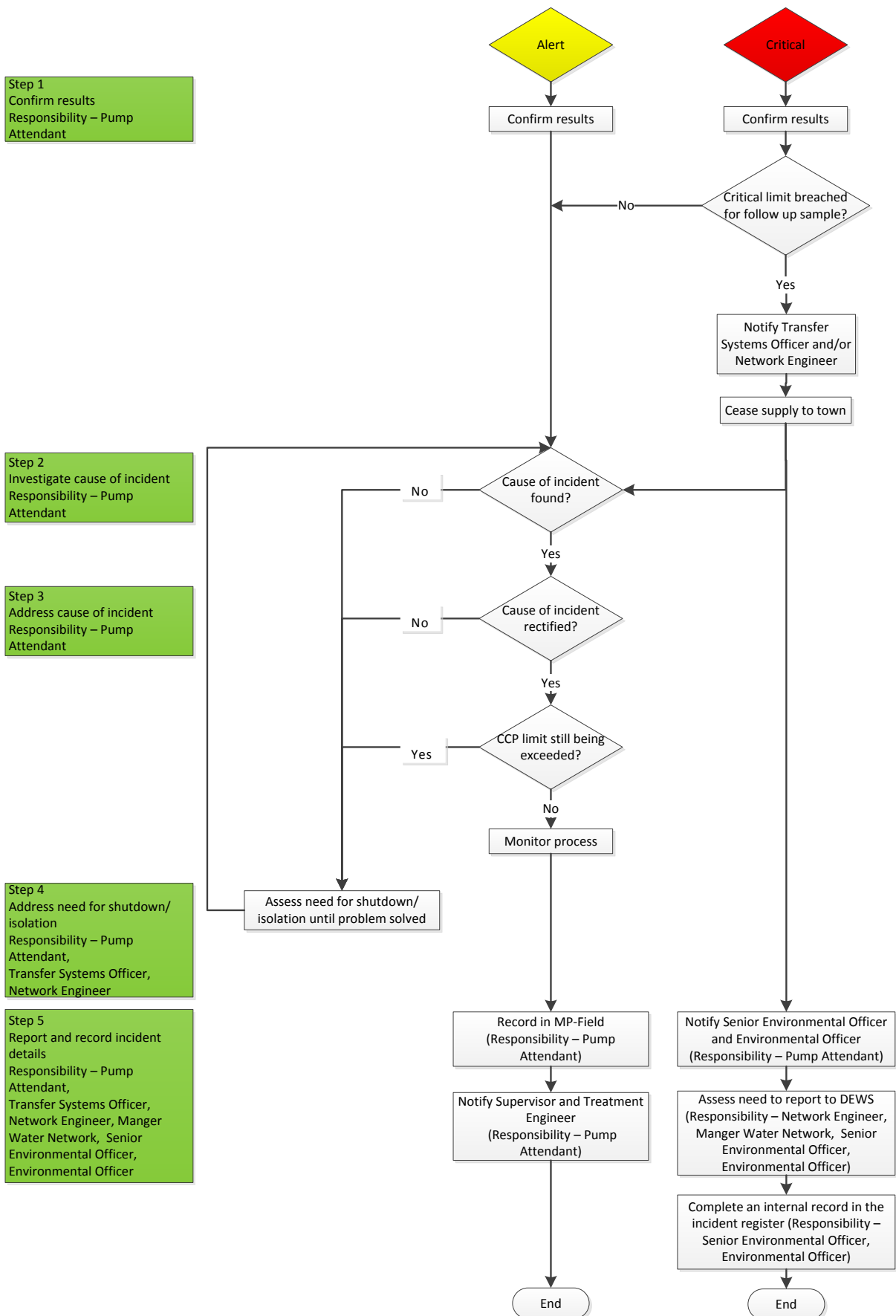
A process map for corrective actions outlined in this procedure is included below. Note that each major step shown in a process map corresponds to a step in the corrective actions table shown above.

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Step 1
Confirm results
Responsibility – Pump Attendant

Step 2
Investigate cause of incident
Responsibility – Pump Attendant

Step 3
Address cause of incident
Responsibility – Pump Attendant

Step 4
Address need for shutdown/isolation
Responsibility – Pump Attendant, Transfer Systems Officer, Network Engineer

Step 5
Report and record incident details
Responsibility – Pump Attendant, Transfer Systems Officer, Network Engineer, Manger Water Network, Senior Environmental Officer, Environmental Officer