

WWS CCP PROCEDURE

Disinfection - Marian WTP



Issue Date: 19 April 2016
To be Revised: 19 April 2017

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 raw water supplies.

1.1 Purpose and Scope

The purpose of this procedure is to describe the management requirements for disinfection by chlorination of drinking water supplies at Marian WTP. 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
- Treatment Plant Operations Manual
- MRC Monitoring Program
- DWQ Incident Reporting Process

2 Definitions

- Disinfection - Chemical dosing of chlorine 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 |
|---|---|
| Operator | <ul style="list-style-type: none"> • Monitor and optimise treatment processes • Respond to alert and critical limit alarms • Record and report information to Supervisor and Treatment Engineer |
| Supervisor | <ul style="list-style-type: none"> • Organise resources • Make decisions about treatment processes • Record and report information to Treatment Engineer |
| Treatment Engineer | <ul style="list-style-type: none"> • Assist Supervisor in analysis and decision making • Communicate issues to Manager Treatment and other MRC staff • Make decisions about treatment processes • Assist with follow-up sampling and further investigations |
| 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 Treatment | <ul style="list-style-type: none"> • Ensure correct procedures and protocols have been followed by operational staff • Assist with communication to external stakeholders • Communicate issues to Management Team |

4 Monitoring

Monitoring of the Marian WTP chlorine dosing system 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 or from an online chlorine meter.

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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 |
|----------------------|------------|--------------|---|---|
| Treated water outlet | Daily | 1.8 mg/L | <1.3 mg/L >2.0 mg/L In any one sample | <0.5 mg/L >5.0 mg/L In any one sample |
| | Continuous | 1.8 mg/L | <1.3 mg/L >2.0 mg/L | <0.5 mg/L >5.0 mg/L |

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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 Supervisor and Treatment 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). | Operator |
| 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. | Operator |
| | 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> | Operator |

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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. | Operator, Supervisor, Treatment Engineer |
| 5. Report and record incident details | <ul style="list-style-type: none"> Notify the Supervisor and Treatment Engineer of the incident. Record the details of the CCP limit incident in the logbook/spreadsheet. | Operator |
| | Communicate with other staff as required to organise follow-up sampling and further investigation and rectification of cause of incident. | Supervisor, Treatment Engineer, Manager Treatment |
| | <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> | Treatment Engineer, Manager Treatment, Senior Environmental Officer & Environmental Officer |

5 Records

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

- Written in the logbook/spreadsheet; and
- Written (email) or verbal (telephone) notification to Treatment Engineer and/or Manager Treatment.

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 – Operator

Step 2
 Investigate cause of incident
 Responsibility – Operator

Step 3
 Address cause of incident
 Responsibility - Operator

Step 4
 Assess need for shutdown/
 isolation
 Responsibility – Operator,
 Supervisor, Treatment Engineer

Step 5
 Report and record incident
 details
 Responsibility – Operator,
 Supervisor, Treatment
 Engineer, Manager Treatment,
 Senior Environmental Officer,
 Environmental Officer

