

Approved and issued by the
Fluoridation Committee
under the *Fluoridation Act 1968*

Tasmanian Code of Practice for the Fluoridation of Public Water Supplies (2022)

Containing legal requirements for the
fluoridation of drinking water supplies in
Tasmania

Effective 1 July 2022

Issuing Statement and Commencement Date

I, Paul Hunt, being and as the Chair of the Tasmanian Fluoridation Committee, acting pursuant to the *Fluoridation Act 1968*, hereby revoke previously issued code of practices relating to the fluoridation of public water supplies in Tasmania and issue this Code of Practice, being the *Tasmanian Code of Practice for the Fluoridation of Public Water Supplies 2022*.

I determine that this Code of Practice come into effect on and from the following date:

1 July 2022

Signed,



Paul Hunt
Chair of the Tasmanian Fluoridation Committee

Dated: 29 June 2022

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Foreword

This *Code of Practice for the Fluoridation of Public Water Supplies* (this Code) has been developed to set minimum requirements for fluoridation operation and service delivery. It is consistent with the requirements of the *Fluoridation Act 1968* and *Fluoridation Regulations 2019* and aims to ensure that the addition of fluoride to public water supplies in Tasmania is carried out in a safe and effective manner.

This Code is a document subject to a rolling review which will allow for the continual improvement of plant design and operational service delivery to achieve Australian and International best practice. This 2022 edition to the Code wholly replaces all previous versions of the Code.

This Code is approved by the Fluoridation Committee (the Committee) under Section 8(1)(d) of the *Fluoridation Act 1968*. Section 8 broadly allows for the Committee to make a recommendation to the Tasmanian Minister for Health to add fluoride to a public water supply. In making that recommendation, the Committee can impose conditions in relation to the addition of fluoride. It is the intention that when the Committee makes any recommendation to the Minister for Health it will be conditional to the regulated entity complying with any approved Code in force from time-to-time. The Minister for Health will then issue a Ministerial Direction under Section 10(3) to the regulated entity, legally obliging them to fluoridate a water supply in accordance with the Committee's recommendation, and ultimately this Code.

To ensure this Code meets best practice management and is consistent with those of other States and Territories, the following documents have been critically reviewed and where appropriate Clauses have been incorporated into this Code:

1. The Victorian Code of Practice for Fluoridation of Drinking Water Supplies under the *Health (Fluoridation) Act 1973*.
2. The NSW Code of Practice for Fluoridation of Public Water supplies under the *Fluoridation of Public Water Supplies Act 1957*; and
3. The Queensland Water Fluoridation Code of Practice under the *Water Fluoridation Act 2008*.

PART I INTRODUCTION

I. Introduction

Fluoride occurs naturally in varying concentrations in almost all public water supplies.

Fluoridation of water supplies is a public health measure that aims to replicate the benefits of reduced dental decay obtained where optimal concentrations of fluoride occur naturally. It involves the controlled addition of a fluoride compound to a public water supply to bring the fluoride concentration up to a level that effectively reduces tooth decay.

Fluoridation remains the most effective means of addressing this problem, particularly in areas with high levels of dental caries. Its benefits include its relatively low cost on a per capita basis, and the fact that it can reach an entire community. Where the level of fluoride in water supplies is optimal, recent studies have found that lifetime experience of decay in the crown and root surfaces of teeth is reduced by 20-40 per cent.

It is estimated that about 350 million people are currently receiving fluoridated water worldwide, in addition to those receiving naturally fluoridated water. Other countries with water fluoridation schemes include the United States, the United Kingdom, Ireland, Israel, New Zealand, Canada, Brazil, Chile, Malaysia, Singapore, and Hong Kong. In Australia, about 11.5 million people now receive fluoridated water.

Water fluoridation is supported by the Department of Health (DoH) and has been endorsed as a safe and effective public health measure by more than 150 science and health organisations, including the National Health and Medical Research Council (NHMRC), International Dental Federation (FDI), the International Association for Dental Research (IADR), and the World Health Organisation (WHO).

The National Health and Medical Research Council (NHMRC) undertook a review of water fluoridation during 2017 and concluded that the optimal concentration of fluoride for the prevention of dental caries under Australian conditions occurs between the range of 0.6 mg/L to 1.1 mg/L. It was concluded that there was no reliable evidence of these concentrations causing adverse health impacts. The lower end of the fluoridation range is designed to reflect consumption of fluoridated water by people in warmer climates, whereby they consume a larger volume than those in cooler climates. Tasmania ultimately determines the optimal Fluoride Concentration Range in their water supplies, and as is outlined in Part 5, it has been set as a range between 0.8 mg/L and 1.1 mg/L.

1.1. Legislative Framework

This Code is intended to complement, and should be read in conjunction with, but not limited to the following governing the fluoridation of public water supplies:

- *Fluoridation Act 1968*
- *Dangerous Goods Act 1998*
- *Environmental Management and Pollution Control Act 1994*
- *Public Health Act 1997*
- *Workplace Health and Safety Act 2012*
- *Fluoridation Regulations 2019*
- *Workplace Health and Safety Regulations 2012*
- *Australian Drinking Water Guidelines (ADWG)*

1.2. Terminology

A Glossary of Terms used through this Code can be found at Appendix B.

The use of the word “must” implies that there is a legislative requirement for the procedure or equipment and/or the requirement has been established as the minimum standard. The word “should” implies that the procedure or equipment is consistent with the best practice approach detailed in this Code.

The fluoridating agents¹ permitted under this Code are listed in Table 1 below, together with their alternative names.

Fluoride Compound	Formula	Alternative Names
Hydrofluosilicic acid	H ₂ SiF ₆	Hexafluorosilicic acid, fluorosilicic acid or FSA
Sodium fluoride	NaF	N/A
Sodium silicofluoride	Na ₂ SiF ₆	Disodium hexafluorosilicate or Sodium fluorosilicate

Table 1: Chemicals Recommended for Fluoridation (source: ADWG)

¹ Fluoridating agents recommended by the NHMRC *Australian Drinking Water Guidelines* .

PART 2 Fluoridation Committee

2. The Committee

The legislative framework establishes the Committee to oversee the implementation and management of the fluoridation of public water supplies. Membership to the Committee is defined by the *Fluoridation Act 1968* and is by appointment from the Minister for Health and comprises the following expertise:

- The Director of Public Health (The Director), or his or her delegate.
- A person with the expertise in the design or operation of urban water supply schemes.
- A person registered under the Health Practitioner Regulation National Law (Tasmania) in the dental profession as a dentist.
- A person with expertise in analytical chemistry; and
- A Medical Practitioner who holds specialist qualifications in medicine.

Personnel from the Tasmanian Water and Sewerage Corporation (the regulated entity) may be invited to discuss specific issues and can request a presence at Committee Meetings to raise and discuss specific issues.

PART 3 Structure of the Code

3. Structure

This Code covers several areas. Within each area there will be statements of **mandatory requirements**. These **mandatory requirements** are the fundamental intent of the controls required in this Code, and as such, should always remain the focus of the regulated entity. These **mandatory requirements** must be complied with unless the Director or a Public Health Officer has approved otherwise.

Under these **mandatory requirements** are *minimum standards* that are considered necessary to meet the **mandatory requirements**. All *minimum standards* must be complied with unless the Director or a Public Health Officer has approved otherwise.

Compliance with these *minimum standards* does not relieve the regulated entity from compliance with the **mandatory requirements**. Compliance with the *minimum standards* and the **mandatory requirements** are the basis on which DoH will assess whether the regulated entity meets the requirements of the Fluoridation Act and Regulations.

In some places there will be guide notes that are inserted to explain a specific requirement more fully. These guide notes may also include suggestions for improving performance or reducing risk beyond the **mandatory requirements** and *minimum standards*. Compliance with the *guide notes* is not mandatory, however the guide notes provide further clarification, record lessons learnt from experience; and give an indication of current best practice.

Within this document:

Mandatory Requirements are printed in bold typeface

Minimum standards are listed under mandatory requirements in italic typeface

Guide notes are in plain typeface.

3.1. Code Status and Authority

3.1.1. Pursuant to Section 8 (d) of the *Fluoridation Act 1968* the Committee may approve a Code for the Fluoridation of public water supplies. This Code has been approved by the Committee and subsequently must be complied with subject to Clause 3.2.

3.2. Compliance Improvement Plans

3.2.1. All fluoridation systems that do not comply with this Code must have a Compliance Improvement Plan outlining how compliance will be achieved and over what timeframe. These Plans must be reviewed and updated annually by the regulated entity and are subject to review by the Committee. These Plans must be made available to the Committee upon request from the Director or a Public Health Officer.

3.2.1.1. Consideration should be given to the cost of compliance with this Code and detailed in the Compliance Improvement Plan.

It is understood that significant capital investment may be required for the regulated entity to meet the requirements of this Code. The regulated entity should consider the enhancement of the operation of the fluoride system and the reduction of public health risks as the main drivers for establishing a capital investment program.

3.2.1.2. Upgrading of equipment and operational changes should be based on consideration of risk and outcomes.

3.2.2. All new and upgraded fluoridation systems must comply fully with this Code from the first day of operation, unless otherwise approved by the Director or a Public Health Officer.

A fluoridation system that has a current Compliance Improvement Plan addressing non-compliance against Clauses within this Code will be deemed to be compliant for those identified Clauses.

3.3. Outcomes

This Code has been designed to ensure that certain outcomes are met with respect to the fluoridation of public water supplies. These outcomes will be achieved by complying with the **mandatory requirements** and *minimum standards* outlined within this Code. The outcomes of this Code are listed below.

1. The optimal fluoride level for public health is consistently maintained in the water supply to the community by the regulated entity.
2. Public health is not put at risk through the way fluoride is added by the regulated entity to the water supply.
3. The Fluoridation plants are designed and maintained to provide a safe working environment and facilitate working practices to protect operational staff and damage to the environment.
4. Fluoridation plants are designed and operated with safeguards to minimise the risk of overdosing.
5. Detailed quality assurance records are maintained by the regulated entity to demonstrate diligent operation of fluoridation plants including the proper monitoring of fluoride concentration in treated water.
6. Fluoridation plants and fluoridation processes comply with all relevant legislative requirements.

PART 4 Fluoridation of Water Supplies

4. Fluoridation of Water Supplies

4.1. Legislative and Related Requirements for Fluoridation Plants

4.1.1. All new structures and installations must be designed and constructed in accordance with current Standards and legislative requirements.

4.2. Compliance and Auditing

4.2.1. The regulated entity must comply with the requirements of the *Fluoridation Act 1968*, *Fluoridation Regulations 2019*, and this Code on an on-going basis.

4.2.2. The regulated entity must carry out and document audits to assess compliance with the latest version of the *Fluoridation Act 1968*, *Fluoridation Regulations 2019*, this Code, and any Compliance Improvement Plans under Clause 3.2 at a minimum frequency and scope consistent with the *Tasmanian Drinking Water Quality Guidelines 2015*. These audits must be made available to the Director or a Public Health Officer within 14 days of being completed.

4.2.2.1. The Director or a Public Health Officer may from time to time carry out independent audits of the regulated entity's compliance. The regulated entity should provide any assistance as may be required.

PART 5 General Requirements for the Regulated Entity

5. General Requirements

5.1. Fluoridation Dosing Requirements

The fluoridation plant is operated to maintain a consistent fluoride concentration throughout the distribution system. The fluoride concentration range is specified rather than a target dose or dose rate to allow for background concentration of fluoride in the raw water. Fluoride occurs naturally and may be present in the raw water. It is the responsibility of the regulated entity to ensure that any fluoride already present is considered when determining the required dose rate for the fluoridation plant.

5.1.1. The regulated entity must:

- a) **Meet a compliance exposure target over a reporting year, that the average exposure fluoride concentration of all fluoride samples taken within a reticulation network (Clause 9.3.2) fall within the fluoride concentration range of 0.8 mg/L to 1.1 mg/L.**

This is designed to measure the average exposure of fluoride to consumers over a reporting year. Reticulation results generated during times when a dosing system is non-operational are to be included in the determination of the average fluoride concentration for this compliance metric. A system with an average fluoride concentration falling outside of this range will be assessed as non-compliant for that reporting year.

- b) **Never allow the fluoride concentration to exceed 1.5 mg/L in any of the samples taken from within the reticulation network (Clause 9.3.2).**

A system that records a fluoride concentration greater than 1.5mg/L will be assessed as being non-compliant against the fluoridation dosing requirements for that reporting year.

The metrics contained in Clause 5.1.1 a) and 5.1.1 b) will be the two compliance measures used by the DoH to assess the performance of each fluoridation system and the exposure of the serviced population to fluoride. A compliant system is one that meets both regulatory requirements for that reporting year.

5.2. Flow Measurement of Water to be Fluoridated

5.2.1. For dosing control, all fluoridation systems must have a primary flow measuring device² appropriately located to measure the flow rate and the volume of water fluoridated.

5.2.2. The accuracy of the flow meter must be within ± 3.0 per cent over the range of use. All flow meters and dosing equipment must be serviced and maintained in accordance with manufacturer's specifications and calibrated at the required frequency.

5.2.2.1. The fluoridation plant should be designed to ensure that fluoride dosing is consistently accurate to within $\pm 5\%$ of the operating target.

5.2.3. Water flow meter(s) must be provided to measure flow where fluoride is to be dosed and integrate the water flow, and to pace the fluoride dosing equipment where the plant design calls for such, over the full water flow rate range.

5.2.3.1. Any water supply should have a backflow prevention device fitted upstream of where the fluoridating agent is diluted (e.g. mixer tanks) or injected (e.g. dosing pumps). Where relevant the device should comply with the current Australian Standard.

5.2.4. The regulated entity must provide all plant operational staff with systems to accurately measure and control the fluoridation process (and equipment) accurately and consistently.

The plant design should provide ability to measure:

- The instantaneous water flow.
- The total amount of treated water and fluoridating agent used over a 24-hour period (for sodium fluoride saturator or batching systems this shall be calculated. For saturator systems the amount dosed can be obtained from dosing pump operation).

² A primary flow-measuring device measures both the rate of flow and the total volume of flow (e.g. but not limited to, orifice plate, Dall Short insert, magnetic flow meter).

5.3. Operation of Fluoridation Equipment

5.3.1. The fluoride feed system must be fail-safe and shall be electrically interlocked to ensure that it cannot operate unless water is flowing.

5.3.2. Signals from two independent flow detection devices must be provided to stop/start the dosing equipment automatically.

A level transmitter located within a treated water well can be used as the secondary flow detection device as it does achieve the safety in operation intended in Clause 5.3.2.

5.3.3. The flow detection devices must be wired in series in the control circuit loop so that the absence of a signal from either one will automatically prevent the fluoride equipment from operating.

5.3.4. One of the signals must be from the actual flow to which the fluoridating chemical is added.

5.3.4.1. The fluoridation plant should be fully automated by a treatment plant-based control system, that is, programmable logical controller.

5.3.4.2. The fluoridation plant should ensure dependable automatic operation with reliable stopping and starting of the system during plant shutdown and startup.

5.3.4.3. The fluoridation plant should have alarms, including afterhours alarms to the duty operator and automatic shutdowns.

The regulated entity should determine the location(s) of Critical Control Points (CCPs) within each fluoridation station.

5.3.5. On-line fluoride analysers must not be used for the regulatory measurement of fluoride under Clause 9.4.2 unless approved by the Director or a Public Health Officer.

5.3.5.1. On-line fluoride analysers may be used as part of the fail-safe system through the automated operation and as part of the fluoride CCPs resulting in automatic shutdowns at critical high alarms.

5.3.6. All components of the fluoridation feeding or control equipment must be hard-wired directly into the control panel or switchboard and never manually plugged into standard electrical outlets for continuous operation.

5.3.6.1. *The manual/testing switch for the fluoride agent feeding equipment should be spring loaded or a time limited device to prevent continuous operation. The switch should be linked to an alarm light activated when the switch is on.*

Manual operation of equipment for testing needs to be carefully controlled as it is totally reliant on the human factor. For example, the ability to plug a dosing pump directly into a power outlet and operate it manually creates a high risk of overdosing should the plant flow stop, and the operating staff be unaware of it, or they simply forget to turn it off.

5.4. Fluoride Dosing Requirement

5.4.1. The fluoride dose rate must be directly proportional to the rate of flow of the water.

5.5. Dosing Point

5.5.1. The fluoride dosing point must be located where all the water to be treated passes and allows complete mixing of the fluoride chemical with the water prior to it reaching the first consumer.

5.6. Fluoride Supply

5.6.1. Fluoridation plants must not run out of fluoridating agent.

5.6.2. Fluoridating agents must be appropriately stored to minimise deterioration.

PART 6 Notifications and Obligations

6. Notifications and Obligations

6.1. Notifications

6.1.1. The regulated entity must notify as a:

a) Class 1 Notification:

To the Director or a Public Health Officer within 24 hours and in the subsequent monthly report required under Clause 10.2.1 if the fluoride concentration measured under Clause 9.3.1 or Clause 9.3.2 is above 1.5 mg/L³ and undertake immediate corrective action upon detection stating which Clause the sample result was generated under.

b) Class 2 Notification:

To the Director or a Public Health Officer within in the subsequent monthly report required under Clause 10.2.1 if the fluoride concentration measured under Clause 9.3.1 or Clause 9.3.2 is below 0.8 mg/L or greater than 1.1 mg/L for more than 7 days stating which Clause the sample result was generated under.

c) Class 3 Notification:

To the Director or a Public Health Officer within the subsequent monthly report required under Clause 10.2.1 if the fluoridation system has been offline (non-operational) for a period of 14 days or less.

³ Based on health considerations the concentration of fluoride in drinking water should not exceed 1.5 mg/L (ADWG).

d) Class 4 Notification:

To the Director or a Public Health Officer within two business days and within the subsequent monthly report required under Clause 10.2.1 as soon as it is suspected or known that a fluoridation system will be off-line (non-operational) for a period greater than 14 days.

In the case of Class 1, Class 2, Class 3 and Class 4 notifications an account of the corrective and preventative actions undertaken should be included in the proceeding Monthly Report required under Clause 10.2.1 or provided in writing to the Director or Public Health Officer.

If a Class 3 notification is made under the belief that the temporary shut-down will be for 14 days or less, the requirement is to report that in the subsequent monthly report. It is understood that a shut-down of this type may exceed 14 days. In these instances, the regulated entity is then required to make a Class 4 notification. In cases where the regulated entity is aware or suspects that a shut-down will be longer than 14 days, they should make a Class 4 notification initially.

e) Class 5 Notification:

To the Director or a Public Health Officer within two business days and within the subsequent monthly report required under Clause 10.2.1 once a fluoridation system subject to a previous Class 1 or Class 4 notification becomes operational.

The regulated entity should give preference to notifications via email to create a record of the event. Phone call notifications can be made in the first instance when staff may not ordinarily have access to a computer.

6.2. Obligations

- 6.2.1. The regulated entity must not permanently cease fluoridating a water supply without the approval of the Director or a Public Health Officer.**
- 6.2.2. The regulated entity must not add fluoride to a water supply to which it does not have a current Ministerial Direction to do so.**

Ministerial Directions are issued by the Tasmanian Minister for Health under the *Fluoridation Act 1968*. It is illegal to add fluoride to a public water supply without holding a Ministerial Direction. It is a legal requirement that a Ministerial Direction be followed and as such the permanent cessation of fluoridation is not allowable.

6.2.3. The regulated entity must immediately adjust and/or temporarily cease fluoride dosing following a detection of greater than 1.5 mg/L of fluoride until overdosing is corrected. This would trigger a Class I Notification.

6.2.4. The regulated entity must immediately adjust and/or temporarily cease fluoride dosing if there is a risk or likely to be a risk to public health or worker safety. This may trigger a Class 3 or 4 Notification.

Risks to public health should be discussed with the Director or a Public Health Officer prior to the cessation of fluoride unless the fluoride concentration is greater than 1.5mg/L in accordance with Clause 6.2.3 or immediate risk to life or public health is identified by the regulated entity.

Shutdowns that can be initiated by the regulated entity to improve reliability or optimise operations may include planned or scheduled maintenance or matters pertaining to worker health and safety. Shutdowns of greater than 14 days require written correspondence to the Director or a Public Health Officer as a Class 4 Notification.

Notification requirements are summarised below.

DoH Notification						
Class 1	Class 2	Class 3	Class 4	Class 5	Repair Time	
Clause 6.1.1a	Clause 6.1.1b	Clause 6.1.1c	Clause 6.1.1d	Clause 6.1.1e	Clause 6.3	
[F]>1.5mg/L	[F]<0.8 mg/L or [F]>1.1 mg/L for greater than 7 days	Plant offline for 14 days or less	Plant offline for greater than 14 days	Reinstatement of plant subject to Class 1 or Class 4 notification	Provide information to the Director for Class 1 and Class 4 notifications	
Notification Requirements	Within 24 hours via email	N/A	N/A	Within 2 business days via email	Within 2 business days via email	Class 1 – within 24 hours. Class 4 – within 2 business days
In the subsequent Monthly Report required under Clause 10.2.1 and to include an account of the corrective and preventative actions undertaken.						

Table 2: Notification Requirements and Repair Times

6.3. Repair Times

6.3.1. Repair times for systems shut down under Clause 6.2.3 and Clause 6.2.4 must be provided to the Director or a Public Health Officer.

6.3.1.1. The regulated entity should provide detail on the issues identified that warrant a shutdown a system along with a proposed time for implementation of corrective and preventative measures.

6.3.1.2. The regulated entity should provide regular updates to the Director or a Public Health Officer as to the progress of the corrective and preventative measures on at least a monthly basis.

6.4. Customer Information

6.4.1. The regulated entity must issue information to the public advising them:

- a) **Of any non-dosing of fluoride for greater than three months; or**
- b) **When an event occurs that reasonably could be expected to cause a cessation of fluoride for more than three months.**
- c) **The date of reinstatement of any fluoride dosing after an event described in Clause 6.4.1a) or Clause 6.4.1b).**
- d) **When required by the Director or a Public Health Officer.**

Instances whereby the Director or a Public Health Officer may require communication by the regulated entity to their customers may include, but not be limited to incidents of overdosing. That is, when the fluoride concentrations are or may be over 1.5 mg/L in the reticulation network.

6.4.2. Before issuing the information, the regulated entity must obtain approval from the Director or a Public Health Officer on the:

- a) Content of the communication.**
- b) Means of communicating the information.**

There may be instances where the regulated entity will be unsure of how long fluoridation of a supply will be interrupted. In these instances of indefinite timeframes, the public should be notified and updated as the works progress.

6.4.2.1. The regulated entity shall provide a copy to the Director or a Public Health Officer of the final communication sent to the public.

PART 7 System Requirements

7. Fluoride System Requirements

7.1. General

7.1.1. All liquid fluoride storage tanks must be contained within a bunded area of sufficient volume to retain all fluoride spills to protect the environment.

7.1.2. Backflow prevention must be provided on the water service to the fluoridation system.

For example, an air gap should be provided between the inflow water line and any dissolving tank or dose line.

7.1.3. The maximum physical dosing capacity of the fluoridation chemical feeding equipment must be limited by design to a maximum value equivalent to 110 per cent of the operating target dose rate and at the maximum water flow rate.

The pump can be of higher capacity but should be code locked to the maximum dose rate. The dose rate should be based on the maximum water flow at the dosing point and not the average water consumption demand. The regulated entity should consider the background fluoride concentration when establishing the maximum design dose.

7.1.4. All equipment must be fail-safe.

For example, solenoids close on power failure, appropriate measures to prevent siphoning.

7.1.5. Piping/valves/pumps must have appropriate measures to prevent siphoning between storage and day tanks and between day tanks and injection points.

7.1.6. All fluoride plant system components must be clearly labelled to assist in their identification.

7.1.7. As a minimum all plants must have onsite checks conducted twice a week and not on consecutive days. Mitigation measures must be in place to ensure system operation and dosing accuracy when the plant is being operated.

Mitigation measures to reduce the risk of overdosing should be applied by the regulated entity to achieve the requirements identified in this CoP. These measures are likely to include a range of automation and manual checks, which may change over time based on combinations of automation and monitoring. Individual measures may include fully automated PLC operated dosing systems, CCP and automatic shutdowns at a critical high fluoride concentration, 24/7 monitoring of alarms, procedures to highlight fluoride dosing from trends. The extent of reliance on daily checks should be based on sound risk management processes that are adopted and documented by the regulated entity. It is recognised that some systems will have more frequent daily checks than others.

7.1.7.1. Records should be maintained evidencing risk assessments for each system, a list of mitigation measures and the frequency of visits to each fluoridation station. These records should be made available to the Committee upon request from the Director or a Public Health Officer.

7.2. Sodium Fluoride Batching Systems

This batching system should be discontinued when plants upgrades are planned. New sodium fluoride system should consider the use of saturator systems (Section 7.3).

7.2.1. Batching systems must include:

- a) **Two batching tanks mechanical mixers.**
- b) **A make-up water meter.**
- c) **A potable or filtered make-up water source.**
- d) **A graduated calibration tube⁴.**
- e) **A metering pump with pressure relief and a loading valve on the delivery side of the pump.**

7.2.2. The maximum fluoride solution strength used must be less than 4%.

⁴ A calibration tube allows for initial pump calibration and instantaneous operational pump rate checks. An accurately calibrated dip-stick is another method for cross checking dose rates over longer periods (hours).

7.2.3. The capacity of the tanks must be sufficient at all times to ensure there is no interruption to fluoridation of the water supply.

7.3. Sodium Fluoride Saturator Systems

This system uses granular sodium fluoride in pre-packed plastic containers or normal bags. New sodium fluoride plants should use this type of system.

7.3.1. Fluoride saturator systems must include a saturator tank with saturated sodium fluoride solution flowing upwards or downwards in the tank. For upflow saturator systems there must be two external cartridge filters connected in series upstream of a metering pump to remove any sodium fluoride particles.

Upflow systems should be used in new sodium fluoride plants to minimise operational and maintenance issues which cause interruptions to the fluoridation of the water supply.

7.3.2. Sodium fluoride granules are added to a saturator tank by a vacuum transfer system for granules in a bag or directly to a saturator tank from a bottle.

7.3.3. The system must contain a:

- a) **Make-up water meter.**
- b) **Potable or filtered make-up water source.**
- c) **Graduated calibration tube.**
- d) **Filter strainer and a metering pump with relief, back pressure/anti-siphon valve.**
- e) **Flow switch to the delivery side of the pump.**

7.3.4. If the total hardness of the make-up water source exceeds 25 mg/L as CaCO₃, an ion exchange softener must be provided to reduce total hardness to below this concentration.

7.3.5. The make-up water must not by-pass the softening unit.

7.3.6. The saturator tank must incorporate the ability to visually check the level of undissolved fluoridating agent in the tank.

7.4. Hydrofluosilicic Acid Systems

7.4.1. For large plants where bulk hydrofluosilicic acid is used, the dosing system must consist of a:

- a) **Bulk storage tank.**
- b) **Day tank and weighing platform for the day tank,**
- c) **Graduated calibration tube,**
- d) **Metering pump with pressure relief diaphragm pressure gauge and back-pressure/anti-siphoning valve on the delivery side of the pump.**
- e) **Potable or filtered dilution water source if dilution is needed to fully disperse the added fluoride before the water reaches the closest consumer.**

A day tank acts as a physical barrier that minimizes the risk of large volume of fluoridating agent from the bulk storage tank being added to the water supply in error. The volume of fluoridating agent in the day tank should not exceed 24 hours of supply based on maximum flow and target dose rate. The amount that can be transferred into the day tank each day cannot be more than the maximum volume required to be dosed into the drinking water in the same 24-hour period.

7.4.2. For small plants where direct feed from storage tanks is suitable, the dosing system must include a:

- a) **Weighing platform for the acid container.**
- b) **Graduated calibration tube, a metering pump with pressure relief and a backpressure/anti-siphon valve on the delivery side of the pump.**
- c) **Potable or filtered dilution water source if dilution is needed to fully disperse the added fluoride before the water reaches the first consumer.**

7.4.3. Carboys, drums, day tanks, indoor bulk storage and graduated calibration tubes containing hydrofluosilicic acid must be completely sealed and vented to the outside of the fluoridation building.

7.4.4. Transfer of hydrofluosilicic acid from the bulk tank to the day tank may be by pump or gravity as appropriate and must incorporate a

fail-safe motorised valve on the storage tank outlet and full storage measurements in the day tank. Interlocks must be provided to automatically stop the transfer prior to overflow of the day tank.

7.4.5. A metering pump must be provided with low level protection to ensure it shuts down when a low level in the day tank or drum occurs.

7.4.6. Flushing points before and after the metering pumps must be provided to allow for safe maintenance.

The provision of well-designed flushing points on both the suction and delivery sides of the metering pumps gives operators and maintainers the ability to safely flush water through the pumps and pipe work, release high pressure trapped between the metering and the backpressure/anti-siphoning valve and drain the pipework prior to carrying out any maintenance.

7.5. Dry Fluoridating Chemical Systems

7.5.1. Dry fluoride feed systems must include a:

- a) **Dust extractor system.**
- b) **Bag loader or a vacuum loading system.**
- c) **Storage/feed hopper.**
- d) **Volumetric or gravimetric dry feeder.**
- e) **Dissolving tank with mechanical stirrer.**
- f) **Weight loss system to monitor the weight of fluoridating chemical used.**
- g) **Potable or filtered dilution water source.**
- h) **Positive displacement solution transfer pump (if not gravity fed).**

7.5.2. The dry feeder, tank solution level, mixer and transfer pump must be electrically interlocked to ensure total fluoride system shut down.

Tank solution level refers to the makeup water of the tank.

7.5.3. Where sodium silicofluoride is used, a water softener must be provided if the service water hardness exceeds 200 mg/L as CaCO₃.

PART 8 Standard Operating Procedures

8. Standard Operating Procedures

8.1. General Requirements

8.1.1. The regulated entity must prepare standard operating procedures (SOPs) for all activities for each site. The SOPs must include as a minimum detail on:

- a) Description of the plant and its design.**
- b) An inventory of all plant and equipment at the site.**
- c) All plant operation activities and maintenance.**
- d) Fluoride testing and data recording.**
- e) Breakdown response.**

The regulated entity should recognise their broader legal responsibilities for environmental management, worker health and safety in legislative instruments mentioned in Clause 1.1 of this Code.

8.1.2. A copy of the SOPs must be kept on site. These SOPs must be made available to the Committee upon request from the Director or Public Health Officer.

PART 9 Testing and Sampling

9. Testing and Sampling Requirements

9.1. Fluoride Chemical Specifications

9.1.1. Any impurities in the fluoridating agent must not cause health problems for consumers or result in non-compliance with the Australian Drinking Water Guidelines. Physical characteristics and variations in strength of the fluoridating agent must not significantly increase the risk or reliability in maintaining the required fluoride concentration in the treated water.

9.1.1.1. *The requirements of Clause 9.1.1 should be complied with as the concentration of the fluoridating agent changes.*

9.1.2. The regulated entity must develop and use a specification for purchasing fluoridating agents to ensure consistency in physical characteristics and allowable range of fluoride concentrations, as well as the chemical specification.

9.1.2.1. *The Australian Drinking Water Guidelines and the latest American Water Works Association (AWWA) specifications for the allowable fluoridating agents listed in Table 1 should be treated as a minimum requirement. The fluoridating agent should meet appropriate specification limits for contaminants using the Recommended Maximum Impurity Concentration (RMIC) approach outlined in the ADWG.*

9.1.2.2. *If a fluoridating agent not listed in Table 1 is to be used for water fluoridation, the regulated entity should first use the risk assessment framework contained in the ADWG to demonstrate the safety and efficacy of the alternate chemical to be used. Prior to the use of that alternate chemical, the regulated entity must seek the approval of the Director or Public Health Officer.*

9.1.3. The regulated entity must ensure the suppliers of the fluoridation agents provide a full chemical analysis of their products according to the specifications developed under Clause 9.1.2.

It is the responsibility of the regulated entity to ensure the suitability of any fluoridating agent used is fit-for purpose and does not contain contaminants over the allowable levels as specified in the ADWG.

9.2. Analysis of Water Samples

9.2.1. A means of obtaining a representative sample of treated water that directly reflects the real time dosing performance of the fluoridation plant must always be available.

Consideration needs to be given to acquiring a grab sample for verification of the treated water. Where online analysers are used, their point of installation should be considered as being representative of real time with the grab sample being taken from here.

9.2.1.1. The sampling point location should be far enough downstream of the fluoride injection point to ensure the fluoride is well mixed, but prior to any service reservoir where possible.

9.2.2. A reliable off-line method for determining fluoride concentration in the treated water must be provided on site at all times. The technique should be recognised by the American Public Health Association (APHA).

9.2.2.1. The analytical method used to measure fluoride concentrations should conform to that described in the most recent edition of Standard Methods for the Examination of Water and Wastewater⁵. Any deviations from this should be approved by the Director or a Public Health Officer.

9.2.2.2. For any method used for the determination of fluoride concentration, procedures should be in place to ensure the accuracy of the fluoride standards, that any reagents used are fit for purpose and equipment is well maintained.

9.2.2.3. Appropriate regular quality assurance checks and balances should in place to ensure the accuracy and reliability of fluoride measurements in the treated water.

⁵ Published jointly by the American Public Health Association, American Water Works Association, and the Water Environment Federation (US).

9.3. Fluoride Concentration Assurance

9.3.1. The analysis of fluoride in the treated water must be conducted at the fluoridation plant at a minimum during every site visit required under Clause 7.1.7. During each on-site visit, at least one potable water sample must be collected at the site under Clause 9.2.1 and analysed for its fluoride ion concentration under Clause 9.2.2.

These samples are operational results and do not form part of the compliance assessment for a plant as outlined in Clause 5.1.1.

There is an expectation that a grab sample is taken each time the site is visited, but no more than once per day. If the site is being monitored remotely, then there is no expectation that an online analyser reading be recorded as part of the daily records required under Clause 10.1.1.

9.3.2. The regulated entity must collect and analyse a minimum of two samples in each system twice per month, unless otherwise agreed by the Director or a Public Health Officer. These samples must be well separated in the reticulation network and must be taken at least two weeks apart regardless of the operational status of the fluoridation plant.

9.3.2.1. These samples must be analysed by a laboratory accredited by that National Association of Testing Authorities (NATA) for the analysis of fluoride.

It is these laboratory generated sample results that form the basis for the compliance assessment referred to under Clause 5.1.1. The twice per month sampling frequency recognises that some months will have four weeks, whilst others will have five weeks. The sampling separation of at least two weeks apart ensures that the two sampling events are spaced over a calendar month.

9.3.3. If the fluoride result from a sample taken under Clause 9.3.1 or 9.3.2 lies outside the fluoride concentration range (0.8 – 1.1 mg/L), action must be taken and documented to ensure the accuracy of results.

Consideration should also be given by the regulated entity as to any notification requirements that are required under Clause 6.1.1.

PART 10 Analytical Records

10. Analytical Records and Frequency of Analysis

10.1. Daily Records

10.1.1. The regulated entity must keep the following daily records, either electronically or by hard copy, of the fluoridation process:

- a) **The volume of water fluoridated.**
- b) **The quantity of fluoridating agent added over the same time period.**
- c) **The corresponding average calculated fluoride concentrations (theoretical concentration).**
- d) **Off-line fluoride analysis results from treated water samples taken during this time period as required under Clause 9.3.1.**
- e) **The theoretical amount of fluoridating agent to be used for the volume of water treated.**

Clause 10.1.1 d) relates to the grab samples taken and analysed via a method recognised under Clause 9.2.2. With consideration given to the visitation regime under Clause 7.1.7, the number of data points per week will be set as a minimum of two, but the regulated entity should include all data generated by this method in their daily records required under Clause 10.1.1 when the site is visited. Records associated with 10.1.1a) and 10.1.1b) can be acquired remotely on days the plant is not visited or retrospectively and used in the determination of 10.1.1c) and 10.1.1e).

10.2. Monthly Records

10.2.1. The regulated entity must also keep the following monthly records and must be submitted in the approved form to the Director or a Public Health Officer by the 15th day of the following month:

- a) Daily records required to be kept under clause 10.1.1.**
- b) Results of the reticulation network samples required under clause 9.3.2 including the calculated average exposure fluoride concentration with the year-to-date data assessing compliance against Clause 5.1.1(a) and, Clause 5.1.1(b).**
- c) The number of days of temporary shutdowns.**
- d) Notifications made to Director or a Public Health Officer under Clause 6.1.1, including the Notification Class and an account of the corrective and preventative actions undertaken.**

If the 15th day falls on a weekend or a public holiday, then the monthly report is due the next business day unless otherwise approved by the Director or a Public Health Officer.

The monthly report should clearly indicate the minimum, maximum, average, rolling average and the number of samples taken for the fluoride concentration in each system for results generated under Clause 9.3.2 only.

PART II Operators

II. Operator Qualifications and Training

II.1. General Requirements

II.1.1. The regulated entity must ensure that operational personnel are appropriately skilled and trained in the operation and maintenance of the fluoridation plant. Operational personnel must have an adequate knowledge of the principles of fluoridation, the type of plant or equipment and its operation and maintenance.

II.1.2. Induction and training required to become proficient as an operator of a fluoridation plant must include training in the health and safety aspects of handling fluoride compounds.

Only operators who have successfully completed their fluoridation training certification should operate fluoridation plants. External certification should be achieved within 12 months of the commencement of a staff member operating fluoridation equipment.

II.1.3. The fluoridation plant and equipment must not be operated by unqualified persons.

As a minimum, any staff that operates fluoridation equipment should receive appropriate in-house training prior to acquiring their external certification.

PART 12 Contingency Plans

12. Contingency Plans

12.1.1. The regulated entity must develop a contingency plan to deal with events of overdosing. These plans must include as a minimum detail on:

- a) Procedures for shutting down the equipment in the event of overdosing.
- b) The action required to identify and rectify the problem.
- c) Notification requirements to the Director or a Public Health Officer.
- d) Action required to warn and protect the public in the event of a significant overdosing event.
- e) Reporting protocols including a clear chain of command and designated responsibility.

APPENDIX A – DoH Contacts

Departmental Officers

The person(s) occupying the following position(s) within Public Health Services Department of Health (Tasmania) is a *Public Health Officer* for the purposes of this Code of Practice:

- ***State Water Officer***
- ***Senior Environmental Health Officer***
- ***Director of Environmental Health Services***
- ***Chair of the Tasmanian Fluoridation Committee (when an employee of DoH)***

Contact details

Public Health Services

Department of Health

GPO Box 125, Hobart 7001

Phone: 1800 671 738

Email: public.health@health.tas.gov.au

APPENDIX B – Glossary of Terms

Term	Definition
ADWG	Australian Drinking Water Guidelines as published and updated from time-to-time by the NHMRC
APHA	American Public Health Association
AWWA	American Water Works Association
Committee	The Tasmanian Fluoridation Committee established under the Tasmanian <i>Fluoridation Act 1968</i> .
Compliance (assessment)	<p>A compliant fluoridation system must satisfy all requirements under Clause 5.1.1, that is:</p> <ol style="list-style-type: none"> 1. An average exposure fluoride concentration within the fluoride concentration range of 0.8 mg/L to 1.1 mg/L for that reporting period (known as compliance exposure target); and 2. All fluoride concentrations less than or equal to 1.5 mg/L. <p>Note: the assessment of compliance as outlined in Clause 5.1.1 and is undertaken using samples taken from within the reticulation network as outlined in Clause 9.3.2. Any fluoridation system that does not meet both measures over a reporting year will be determined as being non-compliant.</p>
CaCO₃	Calcium carbonate
CCP	Critical Control Point
Code	Tasmanian Code of Practice for the Fluoridation of Public Water Supplies 2022 sets the details of the requirements for risk minimisation, accuracy of dosing and reporting as required by the <i>Fluoridation Act 1968</i> and the <i>Fluoridation Regulations 2019</i> . The Code aims to provide best practice standards for the provision of fluoridation by the regulated entity.
Director	Means the Director of Public Health DoH with the statutory head of power under the <i>Public Health Act 1997</i> and referenced in the <i>Fluoridation Act 1968</i> .
Distribution water sample	A water sample taken from a representative location within a water supply reticulation network and tested for its fluoride concentration that is designed to be representative of water quality delivered to customers as required under Clause 9.3.2.
DoH	The Tasmanian Department of Health.

Term	Definition
Exposure fluoride concentration	The average concentration of fluoride determined over a reporting period for samples taken under Clause 9.3.2. It represents the exposure from the consumption of fluoridated drinking water. It is directly related to the oral health benefits of fluoridated water.
FDI	International Dental Federation
Fluoridating Agent	The substance used to fluoridate a public water supply that is consistent with the specifications outlined in the latest version of the ADWG published by the NHMRC and updated from time-to-time.
Fluoridation	The addition of fluoride to drinking water for the purpose of oral health benefit. Fluoridation involves the controlled addition of a fluoridating agent to public water supplies to increase the fluoride concentration to a level that effectively prevents dental caries.
Fluoridation Act	The Tasmanian <i>Fluoridation Act 1968</i> sets out the composition and functions of the Tasmanian Fluoridation Committee (the Committee). Under the Act, the Committee has powers to recommend to the Minister that fluoride be added to the public water supply.
Fluoridation Plant	The building and equipment involved in the fluoridation of drinking water, including chemical storage areas, dosing and control equipment, safety equipment and any other fixtures for, or associated with, the purpose of fluoridation.
Fluoridation Regulations	The Tasmanian <i>Fluoridation Regulations 2019</i> sets out the requirements for risk minimisation, accuracy of dosing, and reporting requirements.
FSA	Fluorosilicic acid or hexafluorosilicic acid as a fluoridating agent
H₂SiF₆	Fluorosilicic as a fluoridating agent
mg/L	Milligram per litre
Ministerial Direction	The document issued by the DoH on behalf of the Minister for Health to the regulated entity, which sets out the details and conditions of approval under which a water supply authority must fluoridate a public water supply.
MRIC	Recommended Maximum Impurity Concentration
IADR	International Association for Dental Research
NaF	Sodium fluoride as a fluoridating agent
Na₂SiF₆	Sodium silicofluoride, disodium hexafluorosilicate or sodium fluorosilicate as a fluoridating agent
NATA	National Association of Testing Authorities
NHMRC	National Health and Medical Research Council

Term	Definition
Notification	Is the process of informing the Director of Public Health or a Public Health Officer within a defined timeframe of a non-compliant fluoride concentration result and/or incident pertaining to the fluoridation of a public water supply in accordance with Clause 6.1.1.
Fluoride Concentration Range	The optimal fluoride concentration range for the purpose of this Code of Practice is between 0.8 mg/L – 1.1 mg/L and as prescribed in the <i>Fluoridation Regulations 2019</i> .
PLC	Program Logic Control
Public Health Officer	<p>The person(s) occupying the following position(s) within Public Health Services, DoH is a Public Health Officer for the purposes of this Code of Practice:</p> <ul style="list-style-type: none"> • State Water Officer • Senior Environmental Health Officer • Director of Environmental Health Services. • Chair of the Tasmanian Fluoridation Committee (when an employee of DoH)
Public Water Supply	A water supply controlled by the regulated entity that is used for supplying water to the public and intended for human consumption.
Regulated entity	The regulated entity referred to in this document is the Tasmanian Water and Sewerage Corporation trading as TasWater or an entity required to fluoridate a public water supply under a Ministerial Direction issued under the <i>Fluoridation Act 1968</i> . It has the same meaning as a Water Supply Authority defined under the <i>Water and Sewerage Industry Act 2008</i> .
Reporting Year	Same as a financial year (i.e. 1 July to 30 June)
SoP	Standard Operating Procedure
Tasmanian Drinking Water Quality Guidelines 2015	Means the Guidelines issued by the Director of Public Health under the <i>Public Health Act 1997</i> as they relate to the management of drinking water quality by the regulated entity.
WHO	World Health Organisation
WHS	Workplace Health and Safety

Table 3: Glossary of terms