

# Irish Water

## Technical Standards

### REMOTE ASSET MANAGEMENT (RAM) POLICY

#### Water Treatment Fluoridation

Document Number: IW-RAM-SPEC-5020-009

Document Revision: 1.0



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## 1.0 INTRODUCTION

### 1.1 OBJECTIVE

The objective of this document is to define the business requirements for telemetry information (referred to as information in the rest of this document) for fluoridation processes.

This policy sets out how assets will be monitored in respect of:

- **Alarm Response**

The actions arising from a set of “abnormal” conditions which require intervention/remedial actions within prescribed timescales.

- **Performance Measures**

A range of parameters against which the performance of an asset may be assessed and upon which interventions will be taken to improve overall business performance.

### 1.2 SCOPE

This document defines the asset type/purpose and the operating conditions to which the business needs to respond in order to meet its obligations to health and safety, business efficiency, our customers and the environment.

Where information should meet specific quality criteria (e.g. must be calibrated to “X standard” for external reporting purposes) it will be captured within this policy.

### 1.3 INTENDED AUDIENCE

The Remote Asset Management (RAM) policy for any asset/process defines the information required not only to determine the Alarm Response but also that required for reporting purposes (Performance Measures). The latter could well apply to the collection of information for external reporting e.g. Strategic Flows to EPA/CER etc.

RAM policies therefore apply to any consumer of information and are not constrained to any particular business user. As such, any business function/department having a requirement for information derived remotely from the company’s assets are stakeholders in the associated RAM policy and their requirements form an integral part of the policy definition process.

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## 1.4 REFERENCE DOCUMENTS

The following documents have been used for reference in the development of this policy document:

Document	Issue No.	Date	Author

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## 1.5 CHANGE HISTORY

This document has been subject to the following changes/revisions:

Date	Issue	Nature of Change	Sections Affected
05/04/2016	0.1	Draft for review at Workshop	
17/06/2016	0.2	Meeting Amendments incorporated Final version for approval	
05/07/16	0.3	Final Version including comments	See collated comments
19/07/2016	1.0	Amended to Rev 1.0 issued to doc control for approval	Cover page

## 2.0 PROCESS DESCRIPTION

### 2.1 PROCESS OBJECTIVE

The fluoridation process is designed to raise the naturally occurring level of fluoride in the water supply up to a level of 0.6 – 0.8 mg/l as defined by the Regulations made under the Health (Fluoridation of Water Supplies) Act. This document covers the addition of the chemical hydrofluosilicic acid in order to achieve fluoridation. In this document the dosing of hydrofluosilicic acid is referred to as “fluoride dosing” or “fluoridation”.

Fluoridation is undertaken on behalf of and at the request of the Health Service Executive who also fund this treatment.

Irish Water’s undertaking of the provision of fluoridation must adhere to the relevant legislation and also have regard to the guidance contained in the Code of Practice on the Fluoridation of Drinking Water.

### 2.2 PROCESS DIAGRAM

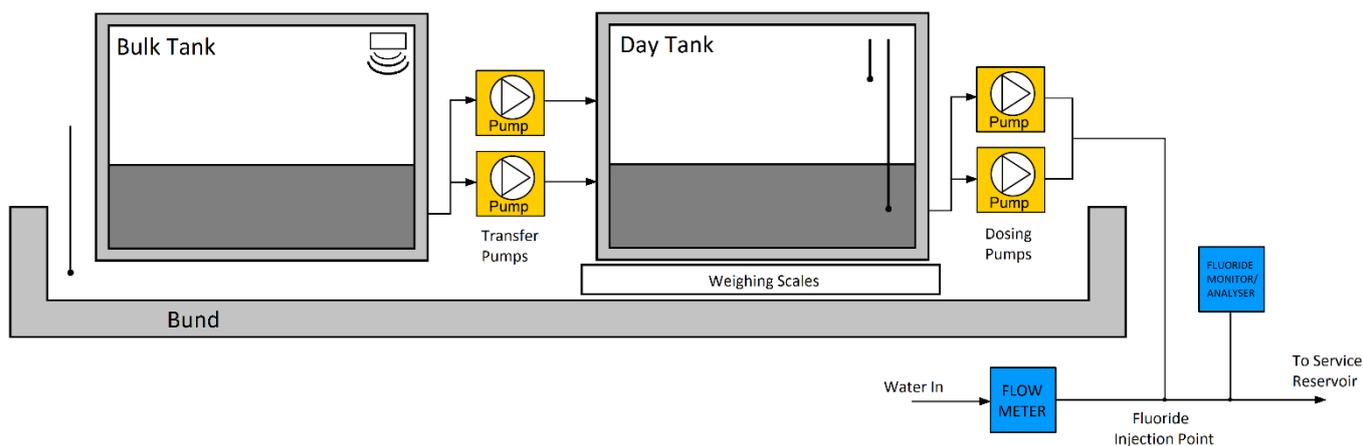


Figure 1 – Chemical Dosing - Fluoride

### 2.3 PRIMARY DESIGN

The assumption in this policy is that the fluoride dosing rig comprises of

- Bulk storage for concentrated acid
- Transfer system to a “day tank” (including weighing scales, pumps and ‘dead man’s handle’ type operation)
- Duty Standby Dosing System
- Fluoride monitor

The following abbreviations are used in the table:

- DI – Digital Input
- AI – Analogue Input
- PI – Pulsed Input
- DO – Digital Output
- AO – Analogue Output

Primary Design - Chemical Dosing - Fluoride (CDF)						
Signal Name	DI	AI	PI	DO	AO	Comments
Bund High	X					
Bulk Tank Level		X				
Bulk Tank Level Instrument Failed	X					
Dosing System Partial Fault	X					Transfer or Dosing pump failed or day tank mixer failed
Fluoride Concentration		X				
Fluoride Concentration Instrument Condition	X					
Plant Shutdown	X					
'Dead man lever' for day tank filling operated	X					Check with tank level signal to determine nature of fault
Weighing scales Load Cell	X					Can be used to determine rate of change where no level sensor

## 2.4 CONSEQUENCE OF FAILURE

Our response to alarms for a process is based around the consequence of failure (COF) of the process to achieve the desired objective. Generally, where the consequence is severe, we will respond faster than if the consequences are minor; this is the essence behind the risk based approach to alarms defined within this policy. We use a High, Medium and Low (H/M/L) categorisation for the consequence of failure.

For fluoridation systems the COF is dependent upon:

- Health and Safety of Treatment Plant Operator
- Provision of Fluoride monitor on site
- Health and Safety of Irish Water Customers
- Protection of the Environment
- Irish Water obligation to fluoridate drinking water

The categorisation of High, Medium and Low will be carried out in accordance with Irish Water’s asset assessment tool whereby the consequences of the asset failure will be assessed against five number criteria. These criteria are:

- (i) Number and sensitivity of customers impacted by the asset failure;
- (ii) The ease of repairing the asset post failure;
- (iii) The reputational damage incurred by Irish Water as a result of the asset failure;
- (iv) The environmental damage that would be caused by the asset failure;
- (v) And the financial cost associated with the failure (including repair costs, fines, compensation, etc.)

<b>COF</b>	<b>Definition</b>
<b>High</b>	Environmental damage due to hydrofluosilicic acid spill. Dosing direct to network with no in line monitoring No on-line (continuous) Fluoride monitor on site Risk of Injury to operating personnel
<b>Medium</b>	
<b>Low</b>	Small number of customers affected by failure (cessation) of fluoridation

The performance measures developed as part of this policy are to be used to support periodic and ad hoc reviews of the COF value. This review process will be used promote processes/sites both upward and downward to support the balance of cost and risk.

## 2.5 ALARM RESPONSE SUMMARY

The main principles of the alarm responses provided in tables in Appendix A, are as follows:

- An urgent response is required for possible chemical leakage/ overdosing
- We shall attend non critical dosing system failures within 1 week for high CoF or next visit for low CoF dosing systems. .
- Loss of service will be responded to on the Next Working Day
- A risk assessment must be carried out to ensure adequate controls are in place when responding to alarms, to protect the responder and the public.

### 3.0 ASSET OPERATION – ALARM RESPONSE

The alarm response tables in Appendix A define the required business response, in terms of timescales and personnel required, for each site condition and consequence of failure.

The response tables defined in Appendix A have been completed using the standard column headings below.

**ID** – A unique identifier for each condition which may occur on site

**Plant Condition** – A description of the plant condition e.g. one blower failed

**Dry/Storm & Winter/Summer** – This item recognises that there may be other factors which could modify the alarm response for a particular condition e.g. Dry Weather Flows (DWF) and Storm conditions may require different responses or Winter and Summer conditions may require different responses.

**Wait (Mins)** – A time delay which can be applied to each condition before it is presented as an alarm, maximum entry value 360 minutes

**Recipient** – The recipient of the alarm, chosen from:

- Site Owner / Manager
- Field Operator / Caretaker
- OMC (Control Room)
- Maintainer (Mechanical)
- Maintainer (Electrical)

**Intervention** – This is the action required to be undertaken

**Time to Clear** - This is a fixed value assigned to the alarm and is the company's "target" for the **time to clear 'simple faults'**. More specifically it can be regarded as the time from the annunciation of the alarm (which is post the **wait** period) to completion of initial investigation on site and fixing of simple faults or logging a follow-up job.

Values to be chosen from:

ABBREVIATION	ALARM CATEGORY	DUE TIME
Imm	Immediate - Critical	1 hr
SD-U	Same Day – Urgent	3 hr
SD-BE	Same Day – Best Endeavour	6 hr
ND	Next Day	1 day
NWD	Next Working Day	3 days
NW	Next Week	7 days
NV	Next Visit	30 days

**High CoF, Medium CoF, Low CoF** – These are included as sub-headings under the heading of **Time to Clear**, because the required Time to Clear for a particular condition may vary depending on the Consequence of Failure (COF). See section 2.5 for description of COF levels.

**SOP** – Where a specific “Standard Operating Procedure” is applicable, enter the SOP number/ID.

**Comments / Assumptions** – Where required, state the rationale or assumptions made for the alarm response

## 4.0 ASSET MANAGEMENT REQUIREMENTS – PERFORMANCE MEASURES

The asset performance tables in Appendix B define the measures by which the performance of the asset / process type shall be measured. These measures shall be applied across the business thus ensuring that appropriate reports can be generated to highlight performance issues and / or facilitating comparisons of similar assets.

The performance measures tables defined in Appendix B have been completed using the standard column headings below.

**ID** - A unique identifier for each condition which may occur on site.

**Signal** –The measure from site.

**Measure** – Defines what pattern of conditions or events are required to generate our report.

**Frequency** – How often does the measure need to be reviewed?

- Event or
- Periodic - Daily(D), Weekly(W), Monthly(M), Quarterly(Q), Annually(A)

**Recipient** – The recipient of the Report or Exception Notification

- Work Management/Work Flow
- OMC
- Site Owner/Manager
- Compliance
- Optimisation

**Intervention** – The action required following issue of the report.

**Signal Criteria** - Any quality criteria related to the signal, for example:

Analogue:

- Limits of measure
- Accuracy +/-%
- Decimal Places

Digital:

- 'Time stamp to the nearest second'

Count:

- 'To the nearest unit'

**Comments / Assumptions** - For comments and/or specific signal quality parameter.

## APPENDIX A – ALARM RESPONSE TABLE

Alarm Response Table										
Process/Asset Type			Chemical Dosing - Fluoride (CDF)							
Process/Asset Description			Fluoride Dosing							
ID	Site Condition	DWF or Storm	Wait (Mins)	Recipient	Intervention	Time to Clear			SOP	Comments /
		Summer or Winter				High CoF	Medium CoF	Low CoF		Assumptions
1	Day Tank Rate of Change (Falling)		5	Caretaker	Attend & Resolve	SD-U		SD-U		Level Sensor in place Could also be calculated from day tank weight and dosing pump hours run. This may indicate leak from tank or potential overdose
2	Chemical Order Alert		15	Caretaker	Order Chemicals	NWD		NWD		Set at X days storage in the bulk tank
3	Bulk Tank Level Low		15	Caretaker	Check Chemical Delivery Status	NWD		NWD		Set at Y days storage in the bulk tank
4	Bulk Tank Level Sensor Fault		15	Caretaker	Attend & Resolve	NWD		NWD		
5	Dosing System Partial Fault		15	Caretaker	Attend & Resolve	NW		NV		This is a non-critical plant fault such as Transfer or Dosing pump failed or day tank mixer failed
6	Fluoride Concentration High (automated on-line fluoride monitor at plant)		5	Caretaker/ Regional Ops	Attend & Resolve	SD-BE		NWD		Overdosing will shut fluoridation plant down. Check shutdown signal Any overdose is a notifiable incident
7	Fluoride Concentration		15	Caretaker	Attend & Resolve	NWD		NW		Obligation not being

<b>Alarm Response Table</b>										
<b>Process/Asset Type</b>			<b>Chemical Dosing - Fluoride (CDF)</b>							
<b>Process/Asset Description</b>			<b>Fluoride Dosing</b>							
<b>ID</b>	<b>Site Condition</b>	<b>DWF or Storm</b>	<b>Wait (Mins)</b>	<b>Recipient</b>	<b>Intervention</b>	<b>Time to Clear</b>			<b>SOP</b>	<b>Comments /</b>
		<b>Summer or Winter</b>				<b>High CoF</b>	<b>Medium CoF</b>	<b>Low CoF</b>		<b>Assumptions</b>
	Low (automated on-line fluoride monitor at plant)									met
8	Fluoride Concentration Instrument Failed (automated on-line fluoride monitor at plant)		5	Caretaker	Attend & Resolve	SD-BE			NWD	This will shut fluoridation plant down automatically to avoid overdose Check shutdown signal
9	Fluoridation Plant Shutdown		15	Caretaker	Attend & Resolve	NWD			NW	Critical Plant Fault has occurred
10	Fluoride High or Instrument Failed - Fluoridation Plant still running		5	Caretaker	Attend & Resolve	SD-U			SD-U	This may cause potential overdose
11	Bulk Tank Rate of Change (Falling)		5	Caretaker	Attend & Resolve	SD-U			SD-U	Only alarm if day tank is not being filled manually (signal from 'dead man's lever where available or Check day tank signal for rate of change rising')
12	Bund High		5	Caretaker	Attend & Resolve	SD-U			SD-U	

## APPENDIX B – PERFORMANCE MEASURES TABLE

Standard Configuration Performance Measures							
Process/Asset Type		Chemical Dosing - Fluoride					
Process/Asset Description		Fluoride Dosing					
ID	Asset Signal	Measure	Frequency	Recipient	Action	Signal Criteria	Comments/ Assumptions
1	Bulk Tank Instrument Failed	Greater than 2/year	Event	Site Manager Regional Lead	Investigate high frequency event / instrument reliability or location	Count to nearest Whole Number	Regional Lead will have a rolled up view for their region i.e. number of sites in region
2	Fluoride Concentration High	Every occurrence	Event	Site Manager Regional Lead Compliance Asset Strategy	Investigate event / instrument reliability or location	Count to nearest Whole Number	Verify readings with a hand held colorimeter reading but also check the manually calculated Fluoride concentration (gravimetric method).
3	Fluoride Concentration Low	Greater than /month	Event	Site Manager Regional Lead Compliance Asset Strategy	Investigate high frequency event / instrument reliability or location	Count to nearest Whole Number	Verify readings with a hand held colorimeter reading but also check the manually calculated Fluoride concentration (gravimetric method).
4	Fluoride Concentration Outside Limits	Total Hours greater than 24/month	Event	Site Manager Regional Lead Compliance Asset Strategy	Diagnose and raise Job for caretaker or maintenance	Time Stamp 1 Minute	Over/under dosing may be occurring
5	Fluoride Concentration Instrument Failed	Every occurrence	Event	Site Manager Regional Lead	Investigate high frequency event / instrument reliability or location	Count to nearest Whole Number	
6	Fluoride Concentration Average	Total average Monthly /Annually	Monthly/ Annually	Site Manager Compliance Asset Strategy	Site comparison information	Value +/- 1.5%	For Regulatory Reporting

Standard Configuration Performance Measures							
Process/Asset Type		Chemical Dosing - Fluoride					
Process/Asset Description		Fluoride Dosing					
ID	Asset Signal	Measure	Frequency	Recipient	Action	Signal Criteria	Comments/ Assumptions
7	Fluoride Monthly Usage	Total average	Monthly	Site Manager	Site comparison information	Value +/- 1.5%	Investigate process problem if fluctuations (taking into account changes in water demand)
8	Fluoride Plant Shutdown	Every Occurrence	Event	Site Manager Compliance Asset Strategy	Investigate	Count to nearest Whole Number	high frequency event may indicate instrument reliability or location problem
9	Bund Operating	Greater than 2/year	Event	Site Manager	Investigate	Count to nearest Whole Number	high frequency event may indicate instrument reliability or location problem
10	Bulk Tank Rate of Change (Falling)	Every Occurrence	Event	Site Manager Regional Lead	Investigate high frequency event	Count to nearest Whole Number	May indicate leak