

Fair Isle WTW Loss of control of the treatment process 20th December 2021

DWQR Inspector:
Andrew Kennedy

Event No. 12339

Event Category: Significant

Fair Isle Water Treatment Works (WTW) is a newly installed plant which was commissioned offline and put into supply in September 2021 following successful testing and sampling. On 15 December 2021 a regulatory Fair Isle WTW zonal sample failed for manganese ($61\mu\text{gMn/l}$), with a subsequent final water sample also failing ($74.6\mu\text{gMn/l}$). Further investigation by Scottish Water found that the final water manganese levels had been above the PCV since 24 November 2021, however the Public Health Team (PHT) had no visibility of this as the samples were logged as post water-in-supply (WIS) commissioning samples. Scottish Water identified that multiple failures in the filtration process at the WTW had occurred, resulting in poor manganese removal and backwash performance. A complex investigation involving multiple Scottish Water teams and their delivery partners was carried out across each stage of the treatment process, with final water quality from Fair Isle WTW being compliant from mid-February 2022, and within the downstream zone from mid-March 2022.

It is clear that there was a fundamental failure of the manganese removal process at Fair Isle WTW following its successful commissioning, sampling and introduction to supply. Scottish Water's investigation identified a number of failures that contributed to this process failure as detailed below:

- Rapid scaling of small bore pipework occurred, which may have reduced the oxidation time of manganese

prior to the filters. This risk of scaling was not identified by Scottish Water's design and design review

processes prior to the plant being constructed and commissioned. • Oxidisation of manganese was reduced due to the use of TP Chlor as an oxidising agent. The polyphosphate (Calgon) contained in TP Chlor can sequester manganese, such that it will not form large precipitates and therefore compromised the filter performance.

- Failure of the filter backwashing process, due to a multi-channel valve blocking from scaling and manganese, allowing unfiltered water to pass forward during a backwash.

Further to the above physical and chemical failures of the treatment process at Fair Isle WTW, Scottish

Water's investigations also highlighted a failure to effectively react to (and escalate) failing "Project Samples". Final water "Project Samples" showed that manganese levels were progressively rising from 25 October 2021, with the first breach of final water PCV occurring on 24 November 2021 (79.9µgMn/l), however these failures were not included in Scottish Water's "out of specification" report and, as a result, Scottish Water's PHT were not aware of these failures until a sample review was requested by the Project Manager on 4 January 2022.

This was done as part of an investigation into the regulatory Fair Isle WTW zonal sample failure on 15th December 2021 and subsequent Fair Isle WTW final water sample failure.

The event has been categorised as significant. Scottish Water has identified nine actions which DWQR accepts are appropriate and will monitor to ensure they are completed prior to signing off the incident. DWQR made zero additional recommendations.

