Drinking Water Quality Regulator for Scotland

Incident Summary

Port Charlotte WTW Manganese failure August 2020

DWQR Inspector:
Moira Malcolm

Event No. 11177

Event Category: Serious

On 21 August 2020 the Process Scientist at Port Charlotte Water Treatment Works (WTW) took manganese bench readings in preparation for a chlorine contact tank (CCT) clean as part of the ongoing efforts to remedy issues the works Swas having with erratic chlorine control. The final water manganese level was 317µg/l (PCV regulatory standard is 50µg/l). At this point previous laboratory results were investigated and a failing manganese sample was noted from Octomore Service Reservoir (SR) on 12 August (59.9µg/l). Further final water bench samples taken on 21 August remained high (both 301µg/l) with samples from the manganese filters also all above 300µg/l.

Following the CCT clean on 21 August, final manganese peaked at 778µg/l, and the manganese filters were set to backwash, however there were issues with all three filters: filter B skipped the air stage of the sequence, filter C drained down for only two minutes instead of ten; and then filter A went into fault and could not be reset. Backwash water was imported from Airport SR (supplied by Torra WTW). Further samples taken the following day found there was a significant manganese issue in the network (at all of the SRs supplied by Port Charlotte WTW) and it was not restricted to the filters, so over the following days at the works a series of mitigation measures were taken to address the manganese filter problems and optimise manganese removal within the works including decreasing interstage pH, increasing chlorine and further backwashing. Throughout the network SR levels were monitored and dropped over the same period to remove non-compliant water from distribution without disturbing any sediment within the pipework.

By 1 September samples showed with satisfactory manganese levels from both Port Charlotte final and across the network. It is likely that the final water at Port Charlotte breached the PCV for a total of 16 days with elevated manganese above the PCV in the network for 20 days. One consumer contact was received throughout the duration of the incident (for taste and odour).

The incident was caused by a blockage of soda lines and pump issues which occurred on 11-12 August. These caused a drop in pH which meant that the manganese filters were operating on a pH of between 5.91 and 6.0 for 7½ hours with final pH breaching the PCV for 1½ hours before the site shut down on low final pH. Typically the manganese filters operate at pH 7.2 – 8.0 and this lower pH (100 times lower) resulted in the filters being less efficient at catalysing manganese and removing it from the water. This was compounded by a number of factors:

- The manganese content of the raw water was elevated, but few samples had been taken to substantiate this.
- There is no online manganese monitor at Port Charlotte to warn of emerging issues, despite there being a dedicated manganese removal stage at the works.

- Operators were not taking the task scheduled bench samples due to a health and safety (COSHH) issue with the reagents and because operators were concentrating on dealing with ongoing issues to chlorine dosing control.
- The failing sample from Octomore SR was not flagged as an IT issue at the lab resulted in no 'out of specification' reports being generated on 16th August when the analysis results should have been reported.
- ICC acknowledged the low interstage pH alarm but due to the large volume of alarms being generated that night did not alert the Senior Operator until after a number of alarms including autoshutdown on low pH and an assumed power cut.

The event has been categorised as Serious. Scottish Water has identified five actions which DWQR accepts are appropriate and will monitor to ensure they are completed prior to signing off the incident. DWQR made no additional recommendations.