Drinking Water Quality Regulator for Scotland

Incident Summary

Tullich WTW Coagulation failure16 September 2020

DWQR Inspector:
Moira Malcolm

Event No. 11223

Event Category: Significant

At 01:08 on 16 September the Intelligent Control Centre (ICC) received a ‘combined high iron’ alarm from the primary filter monitor at Tullich WTW. This was relayed to operators who attended within the hour and reviewed the water quality trends. The plant began to shut down on high combined high iron which the operator disabled and instead ran both primary and secondary filters to waste. The previous day the works had been experiencing issues with the Dissolved Air Flocculation (DAF) saturators and so the operator informed standby escalation and the public health team of their activities and concentrated on investigating them. DAF turbidities improved slightly so the operator assumed that the DAF saturator intervention was effective and the works was recovering. With this in mind, DAF saturator A was returned to service (it had been out of service due to issues with the saturator nozzles becoming detached and entering the pipework). Throughout the morning operators and senior area staff continued to work on the saturators, with water eventually put back into supply at 13:00hrs as Clear Water Tank (CWT) levels were extremely low - this was done with the agreement of NHS Highland as iron levels were still breaching the PCV. At 13:30hrs the process scientist arrived and conducted a drop test which found that the ferric pumps were delivering only half the required dose of coagulant, so maintenance staff were instructed to focus on the ferric dosing pump as it may be fouled. Ferric dosing was increased to 8mg/l to improve coagulation but it was noted that the pumps were not able to deliver this amount as a thick layer of sludge at the bottom of the bulk tank was impeding delivery. In the network flows were reduced to half and one Service Reservoir (SR) was isolated to limit the non- compliant water in the network.

Over the evening both ferric bulk tanks, bunded area and chemical waste tanks were cleaned and returned to service. The standby ferric pump was stripped and cleaned and the choked ferric lines were cleared and flushed and ferric pumps brought back online. Chlorine dosing was increased to compensate for increased demand due to elevated iron, colour and organics passing through the works. By early on 17 September the water quality had improved and by 09:30 water leaving the WTW was compliant with the PCV (Prescribed Concentration or Value). Over the following days the network was flushed and SRs dropped until all areas of the network had returned to normal iron levels. In total, failing samples were recorded across the network for two days. Two consumer contacts were received during the incident timeframe.

Scottish Water's investigation found the root cause of the event to be the fouling of the ferric dosing pump caused by sludge build-up in the ferric bulk storage tanks. However the incident would have been kept to a minimum if the Treatment Operations & Maintenance Strategy (TOMS) procedure for investigating the elevated ferric had been followed and a drop test conducted sooner. Instead, operators and all levels of management staff involved jumped to the conclusion that the DAF saturator issue that they had been dealing with the previous day was the cause and it took half a day and the arrival of the process scientist who conducted the drop test to diagnose the cause which then led to appropriate measures being taken. This failure of process and the time taken to diagnose the issue led to non-compliant water being introduced into the network due to Scottish Water's need to maintain supply when storage levels were very low. It is also disappointing that the build-up of ferric sludge in the bulk tanks was allowed to occur - due to a lack of cleaning and maintenance being scheduled as a routine activity - at such a new WTW.

The event has been categorised as Significant. Scottish Water has identified seven actions which DWQR accepts are appropriate and will monitor to ensure they are completed prior to signing off the incident. DWQR made one additional recommendation.