Drinking Water Quality Regulator for Scotland

Incident Summary

Camisky WTW Turbidity and manganese failures June 2020

DWQR Inspector:
Moira Malcolm

Event No. 11029

Event Category: Significant

In late May 2020, tank A of the 2-cell clear water tank (CWT) from Camisky Water Treatment Works (WTW) was taken out of service for cleaning as scheduled. On the morning of 5th June the Intelligent Control Centre (ICC) called out an alarm for high final water pH. Earlier alarms had been received but as the site is prone to nuisance alarms these had been deferred. Due to the high final water pH alarm it was decided to bring tank A back into service to dilute the high pH water. During this time the plant then shut down on a failure of the high lift pumps (which pump water to the CWT). The Public Health Team confirmed that the sample results required to put CWT A back into service had passed, and the operator returned CWT A to service. The operator also restarted the works and adjusted the treated water pH dose. At this time the final water turbidity monitor flatlined at >2NTU (nephelometric turbidity units; the highest reading on the instrument scale). The operator flushed the sample line as there was visible discolouration but the monitor had read above the PCV (regulatory standard) for 69 minutes. A bench sample taken following flushing read 0.25NTU. The operator then left site.

At 12:50 a consumer complaint was received for milk/cloudy water. On investigation the Network Services Operator (NSO) noted the discolouration and began flushing the nearest hydrant. There he observed “white residue” which looked like lime being flushed out so escalated the issue to the Networks Team Leader and a boundary valve was opened to allow the area to be supplied by a different DMA (supply area). Further valve operations followed to move direct-fed consumers onto a cross feed from the network SRs (Service Reservoirs) to reduce the likelihood of discolouration from the CWT.

The operator was sent to back Camisky and a visual inspection of the CWT revealed that CWT A was “clear” but CWT B showed signs of disturbance of lime sediment. Bench samples gave a final water reading of 10NTU. The final water pH also reached 9.7 and was above the PCV for almost 3 minutes. This was relayed to the Escalation Team Leader and the operator took CWT B out of service. Monitoring and sampling in the network and at the works continued for the next three days, as did flushing in distribution until water quality returned to normal. Laboratory samples from the works and service reservoirs showed high turbidity on 5th June (highest reading 9.1NTU) which quickly declined, however handheld readings at hydrants continued to breach the PCV over the next couple of days (recorded at

5.7NTU on 7 June and only returned to >1NTU on 8 June). One of the network samples also failed for manganese. Two consumer contacts (including the one that alerted the incident) were received during the course of the incident.

A number of factors contributed to this incident. A series of problems with the lime batching and dosing system led to an overdose of lime which contributed to the increase in pH that alerted the event, and also to the increased lime deposits in the CWT.

The issues affecting lime accumulation are:

- Lime batching was inaccurate due to a faulty weight cell on one of the lime slurry tanks;
- The slurry tanks themselves had a considerable amount of scaling on their walls leading to a variability in batch volumes between each tank;
- The PID controller for lime has limited functionality and poor correction time;
- The treated water flow varies from 40-100l/s which impacts lime dosing;
- Lime dosing pump 2 was faulty and took longer to stabilise on pump changeover which led to a variability in dosing;
- In addition to the above, the outlet and scour pipes in the CWT are in sumps on the floor of the tank which increase the risk of lime deposits in the tank being drawn into supply, especially on completion of tank cleaning and contributed to the rise in turbidity during the event.

I note that a number of actions have been recommended by Scottish Water to address the above issues. Having half of the CWT out for cleaning meant that there was less buffering capacity in the remaining CWT which resulted in the lime issues being more pronounced than would normally be the case. There was also a delay in the ICC alerting the standby operator of the alarm.

The above factors contributed to the high pH event, however the cause of the incident was the operator opening the valves to CWT A too quickly which caused the disturbance in lime deposits while the two tanks balanced their levels as it introduced a back flow into CWT B. This lead to the associated turbidity at the final sample point and in distribution. Bringing CWT A back into service involved opening and closing both the inlet and outlet valves of CWT A, which should take a minimum of 30 minutes per operation. The operator completed the entire procedure in 10 minutes. The Distribution Operations and Maintenance System (DOMS) Impact Assessment Form (IAF) completed and reviewed by the operator prior to the operation was not followed. This is a gross failure in operational practice. The manganese failure in distribution was a result of the flushing and rezoning work undertaken to minimise the turbidity in distribution which disturbed deposits in the network.

The event has been categorised as Significant. Scottish Water has identified twelve 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.