

Incident Summary

Lochinver WTW
Treatment Issue
6th May 2022

DWQR Inspector:
Moira Malcolm

Event No. 12548

Event Category: Serious

On 6th May the Intelligent Control Centre (ICC) passed out a low clear water tank (CWT) alarm and the operator who attended site found the plant mode in automatic and offline due to normal procedure, but with a 'Daily Clean Unavailable' and 'Awaiting Manual Restart' direction on the human machine interface (HMI) screen. It appeared that the plant had attempted a clean in place (CIP) but that this had been aborted as the valves were closed (this is a process that is triggered manually). The operator restarted the works and noted a high permeate turbidity alarm so took a hand held test which was 0.1NTU, with the final water turbidity reading 0.12NTU. The works then shut down on high dosed chlorine, but as the works often has high chlorine readings after a restart (the alarms are masked for an hour after restart due to this), they assumed this was the cause and restarted the works again.

A second operator attended site and noted low post CCT and treated water chlorine residuals, so started running the site to waste by turning off the treated water pump lifts. The consensus was that the monitors were at fault and a call was raised with maintenance. Later in conversation with process science they discussed the possibility that some of the CIP chemicals had entered the process stream, and process science confirmed that there was forward flow when the works was offline for 1 hour. This instigated an escalation to the public health team (PHT) and then the team manager.

Process science calculated the volume of chemicals lost from the CIP tank and requested material safety data sheets from the health and safety team as they were not available online. PHT requested that one cell of the CWT should be isolated and to investigate bypassing the CWT altogether. A visual inspection of the CWT revealed a sheen on the



surface of cell 2 so this was isolated, following this cell 1 was also isolated and all water to supply stopped. By this time treatment parameters were all conforming and so forward flow through the works was reinstated, albeit running to waste. After concerns about discharging to waste were resolved the CWT was drained, and refilled with the compliant water.

With the water to supply isolated, tanker support and bottled water were arranged with 'Boil Notices' and consumer communications issued. The network was drained and flushed overnight to remove the chemicals from supply. Flushing was paused the following morning due to increased demand then recommenced once the CWT had recovered.

The main CIP chemical was citric acid, so sampling concentrated on looking at pH levels as an indicator. Turbidity and chlorine demand had also increased and were also monitored within the network. These returned to normal by the evening of 7th May and so flushing was suspended. Bottled water stations were maintained until the results of the microbiological and Cryptosporidium sampling were returned as satisfactory by the evening of 8th May and the Boil Notice was lifted.

Throughout the incident three samples from the network failed for iron and two for manganese. 22 consumer contacts were made during this time, mainly bottled water requests. It should be noted that due to the dilution of the chemicals in the CWT and that these were mainly composed of citric acid, there was no risk to health from the ingestion of the chemicals themselves – the risk was due to the increased turbidity and lack of disinfection. This was confirmed by advice by UKWIR toxicity specialists and NHS Highland.

Scottish Water's detailed incident investigation concluded that this incident was caused by CIP chemicals entered the treatment stream, most likely via syphonage from the CIP tank through the membranes. The automatic valve of the limestone contact tank then opened fully to mitigate the low pH, and the increased flow through the bed and the low pH dissolved many of the larger limestone fines and caused turbidity to rise. There was a total loss of chlorine residual from dosed and post CCT monitors which suggests that the CIP chemicals scoured the membranes of organic carbon and biofilm and metals, which spiked chlorine demand.

The chemicals were present in the CIP tank due to two unsuccessful attempts to activate the CIP procedure in the previous week.

The event has been categorised as serious. Scottish Water has identified six 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.

