

## Lochinvar WTW Coagulation failure 5 July 2018

DWQR Inspector:  
Moira Malcolm

Event No. 9449

### Event Category: Significant

At 23:11 on 5th July 2018 the Intelligent Control Centre (ICC) received a number of alarms from Lochinvar WTW. They all quickly cleared (apart from a DAF recycle pump) indicating a short power cut. At 00:05 on 6th a high Coagulant pH alarm generated with the previous alarms, was passed to the standby operative. By this point the pH was dropping and as the timeline was similar to that experienced previously when the works returns to normal following a power dip this was not followed up.

A low final chlorine alarm at 06:40hrs prompted the standby operator to attend site, where he found that the final chlorine was in alarm and the instrument reading 0.10mg/l (normally 0.65mg/l) which was confirmed by a bench test. The operator found both coagulant dosing pumps in the stopped position, which he was unable to restart. He switched the pumps to manual and dosing commenced. The event was then escalated to the team leader and Public Health Team (PHT); sodium hypochlorite was added to the clear water tank (CWT); and final water and distribution sampling was initiated.

Bench tests taken throughout the day showed no breach of standards in the final water, although chlorine dipped to 0.1mg/l. Laboratory samples taken at the final sample pint and in distribution over the subsequent 2 days all passed, except for one THM failure in distribution of 115µg/l on 7th July.

The cause of the incident was a mains power dip which caused the coagulation dosing pump to stop. The process ran without coagulation dosing for 7 hours 45 minutes.

Once the initial alarms cleared, the ICC had no visibility that the incident was occurring until the final chlorine alarmed 7 hours later. This is due to a range of faults with the monitors and alarms at Lochinvar. After the initial spike in coagulation pH that caused it to alarm, the coagulation pH dropped below the alarm set point but continued to stay elevated for the duration of the incident, which was not visible to ICC. Scottish Water's investigation found that there were no coagulant dosing pump signals linked to telemetry - only SCADA; and the clarified colour alarm had failed during the power dip. During the incident the clarified turbidity meter was reading 0.03NTU and was unresponsive, and the filtered turbidity meter read 0.17NTU – just below the alarm point of 0.20NTU. The clarified pH alarm was set at Priority 5, so was not visible to the ICC.



It is likely that adding sodium hypochlorite to the CWT to boost chlorine residual caused the THM failure in distribution on the 7th July. My investigation of the incident showed that disinfection, although compromised, was still sufficient to achieve a compliant contact time.

The event has been categorised as Significant. 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 three additional recommendations.

