

Incident Summary

Picketlaw WTW Disinfection failures January 2020

DWQR Inspector:
Colette Robertson-Kellie

Event No. 10823

Event Category: Significant

On 20 January 2020, Electrical and Mechanical (E&M) staff attended Picketlaw WTW to perform a routine service on chlorinator 2 on the site. Operations staff disabled the low chlorine autosutdown to allow the work to be done, and E&M contacted the Intelligent Control Centre (ICC) to advise that the ICC should ignore chlorine gas alarms for the site. At 11:08 chlorine gas dosing was switched from chlorinator 2 to chlorinator 1 to begin the service, and gas flow from chlorinator 1 was noted. The pipework for chlorinator 2 was disconnected for the service. At 11:16, a fault with chlorinator 1 resulted in an automatic switchover back to chlorinator 2, but since the pipework had been disconnected from chlorinator 2 for the service, no chlorine gas could be dosed. A low primary chlorine residual alarm was received by the ICC, but since the Ops log entry advised that all chlorine alarms from the site should be ignored, no action was taken. E&M staff observed that there was a drop in chlorine five minutes after the system had alarmed, and alerted the Operator. Chlorinator 1 was controlled on manual setting until chlorinator 2 had been serviced, at which point chlorinator 2 was reconnected and was made the duty chlorinator. There is no Clear Water Tank (CWT) at Picketlaw WTW, and site procedures require the loss of disinfection to be reported to the Team Leader and to Scottish Water's Public Health Team, but this did not happen. The cause was a low vacuum fault caused by a blockage, described as 'crystallisation', in the chlorine injector.

At 14:20, chlorinator 1 was tested - it failed, leading to no chlorine dosing for 11 minutes - this was attributed to the SCADA control system not being reset following the first interruption. At 18:15, on-line measured dosed chlorine levels dropped from 1.62 to 0 mg/l, which triggered the treatment works' autosutdown by stopping the inlet flow to the works. On arrival at the treatment works the Operator installed stop logs to prevent forward flow to the Chlorine Contact Tank (CCT). This issue was caused by an airlock, which led to a low flow to the pre-CCT chlorine monitor sample pumps; this chlorine monitor controls the low chlorine autosutdown. The sample pump was changed and the system flushed of air. Additionally, the Operator noted that the pre-CCT monitor was giving erratic readings, so E&M were called out, another Operator was contacted for support, and the Team Leader was informed at 19:00, at which point instruction was given to take a *Cryptosporidium* sample and other samples on plant start up.

At 22:10, the CCT was spiked with sodium hypochlorite to raise residual chlorine levels and the stop logs were removed to put water back into supply. However, when the flow through the works was restarted, the chlorine residual dropped to 0.08mg/l. Initially this appeared to be due to another interruption of chlorine gas, but gas flow could be observed. The CCT was spiked with sodium hypochlorite again. It was later found that some water with a low residual chlorine level had bypassed the stop logs during the shutdown and had entered the CCT, and during start up this water had passed into supply. A number of consumers are fed directly from the treatment works, so re-valving of the network was carried out to maintain supply to them and support was received from the E&M team for the monitor repair. Samples were taken in the distribution system in response to this incident, and there was one failure of the Coliform bacteria standard in the distribution system, which is discussed further in DWQR's Incident Assessment letter.

The first disinfection failure was caused by a blocked chlorinator injector which failed while the standby chlorinator was disconnected for service. The second was caused by the SCADA system not being reset. The third was due to low flow to the dosing pumps feeding the chlorine monitor which controls low chlorine autosutdown, and failure of the stop logs to contain the inadequately chlorinated water.

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

