

Tomnavoulin WTW Disinfection failure 8th October 2024

Event No. 15022

Event Category: Significant

On the morning of the 8th October, a contractor attended Tomnavoulin WTW to carry out routine Maintenance Scheduled Tasks (MSTs) on sodium hypochlorite dosing pump 2. During this activity, chlorine dosing was maintained using pump 1.

Whilst completing this maintenance, a leak was identified on the delivery pipework to pump 2 and the inlet valve was closed to afford a repair and prevent air locking. However, upon leaving site, the valve was not reopened, and the site operator was not informed.

That evening, the Intelligent Control Centre (ICC) received a treated water low chlorine alarm for the site. The standby operator attended site and discovered the chlorine residual within water exiting the clear water tank (CWT) was 0.47mg/l and that chlorine dosing was not in operation. Investigations showed that this was due to the transfer of dosing to pump 2 and the presence of the closed valve.

In response the operator immediately restored dosing by transferring dosing to pump 1 and opening the valve to pump 2. As a result, chlorine residuals improved, and the chlorine set point was increased from 0.7 to 0.9mg/l in the morning to further assist recovery.

Chlorine dosing was not operational for a total of 10hrs 45 mins, with the chlorine residual dropping from midday on 08 th October and remaining below the EAL of 0.7mg/l until 04:00 on the 9th October.



The incident was caused by human error, whereby a contractor failed to reopen a closed valve following maintenance.

However, two factors significantly contributed to this incident

1: Inadequate on-line monitoring arrangements (and capacity of control system): This incident was not rapidly identified and was unnecessarily prolonged due to a fundamental lack of online monitors with associated alarms. Specifically, there were no flow switches on the hypochlorite dosing lines and no chlorine monitor was installed to rapidly identify any loss of dosing (the nearest downstream chlorine monitor being within the CWT). Consequently, timely recognition of this issue by the ICC did not occur and without this monitoring the site was not configured to have an automatic shutdown upon failure of disinfection (this functionality is limited to dissolved Organic Carbon (DOC) monitoring of the combined membrane filtrate).

To compound this, the incident was only recognised 9.5 hours later by a treated water low chlorine alarm originating from the monitor within the CWT. The alarm set-point was 0.3mg/l which I consider inadequate to identify a failure of chlorine dosing (due to mixing within the tank) and prevented a timely response. I note that this setpoint is to be reviewed.

2: Considering the criticality of maintaining appropriate disinfection, it is disappointing to note that the third-party contractor did not communicate effectively with operational personnel upon identifying the leak and commencing repair work. My investigation notes that had the operator been aware of the details regarding the repair and valve isolation then this incident would have been prevented as the valve would have been opened prior to the operator leaving site. I also note that the original activity undertaken by the contractor did not go through the Treatment Control approval process due to a misunderstanding. Whilst this did not in itself contribute to the incident, it is very concerning that work was being undertaken



on critical water quality components without this oversight. I note that Scottish Water have committed to relevant actions to prevent recurrence.

My investigation also noted that chlorine disinfection at Tomnavoulin WTW relies upon residence time within the CWT as there is no contact tank or pipe. From the evidence provided, significant short circuiting of water through the CWT can occur and although Scottish Water's assessment concluded that an Estimated Concentration Time (ECt) was maintained well above 10mg.min/l throughout this incident I am sceptical that this may be evidenced.

The event has been categorised as significant. Scottish Water has identified eight 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.

