

Incident Summary

Penwhirn WTW
Aluminium Failure
9th January 2021

DWQR Inspector:
Moirra Malcolm

Event No. 11470

Event Category: Significant

On 9th January the Intelligent Control Centre (ICC) received an alarm from Penwhirn WTW for a raw water pump failure and informed the standby operator. As the pumps were not in use the operator did not attend site. The following morning the ICC called out two primary filter turbidity alarms. The standby operator confirmed that they would attend site, but as they were due to attend on a planned visit did not go immediately. The operator attended at 10:30, noted that the primary filtered turbidity and aluminium levels were in excess of the EALs, and that a Programmable Logic Controller (PLC) fault had occurred which had stopped the Dissolved Air Flotation (DAF) scrapers and automatic filter washes. The operator momentarily shut down the site to reset the PLC; the DAF scrapers were reinstated and the operator started manually washing the filters. Only three of the five primary filters could be backwashed due to the capacity of the dirty wash water tanks. Run to waste was considered by the operator, but a local burst increased network demand and reduced Clear Water Tank (CWT) levels which presented a risk to supply, so the operator increased the inlet flow to 170l/s until demand reduced. The operator escalated the situation to the standby team leader and fitted the Cryptosporidium filter. Scraping the DAF sludge blankets impacted on the subsequent process, first with clarified turbidity and aluminium spiking, then treated water aluminium rose above 200µg/l for 3½ hours before the DAF process began to recover, returning to typical levels of turbidity and aluminium by the evening. Final water samples for aluminium were recorded above the PCV on the 10th (304µg/l at 14:30; 211µg/l at 19:30; and 217µg/l at 20:15). Sampling over the subsequent 2 days from the final sample point and at service reservoirs was compliant for aluminium and turbidity, and chlorine remained stable throughout the incident.

Scottish Water's investigation found the root cause of the incident to be a PLC fault which stopped the DAF scrapers and automatic filter washes. This in turn caused a rise in aluminium and turbidity in the filtered water – both while the fault was occurring and during the subsequent actions to resolve the issues. The PLC fault was also to blame for the raw water pump alarm on the 9th, and for the lack of alarms for the DAF scrapers and PLC watchdog. The lack of immediate response by the standby operator prolonged the incident, and the lack of clarity in communication between the ICC and standby operator was also a hindrance. As the ICC is to be taking a larger role in escalation in future, it is essential that there is much more clarity in these conversations so that ICC can escalate alarms further if the standby operator is unable to attend.

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