Drinking Water Quality Regulator for Scotland

# Incident Summary

## Afton WTW
## Aluminium failure 14 August 2020

DWQR Inspector:
Colette Robertson-Kellie

Event No. 11155

**Event Category: Significant**

On Friday 14 August 2020 at 21:35, Intelligent Control Centre (ICC) staff called the standby Operator for Afton WTW to advise that the duty polyelectrolyte carrier water pump had failed, and at 21:48, another call was made to advise that the standby carrier water pump had also failed. The operator did not attend site. Clarifier turbidity trends from the site show that there was a sharp increase in turbidity from 0.11 NTU at 22:15, which caused the monitor to flat line at its maximum setting of 1 NTU.

Over the next hour and a half, the ICC received a further three alarms, two for clarifier desludge fails and another for a clarified water turbidity alarm, but the Operator was not called as the ICC again assumed that he was onsite, and the alarms were suppressed. At 23:12, the ICC checked that the Operator was aware of the deterioration of water quality on the site, and the Operator advised that the site should settle down. At 23:30 the ICC called the Operator again to inform him that there were further clarified water turbidity alarms. It was only at this stage that the ICC became aware that the Operator was not onsite, and at 23:40, the operator left for the treatment works, notifying the standby Team Leader while en route.

Once onsite, at 00:20, the operator checked the SCADA system and noted that neither of the polyelectrolyte carrier water pumps were running, so he reset them on the SCADA system. Examination of turbidity trends from the primary filters and from the secondary filters show that there had been a rapid increase in turbidity at 00:15; the turbidity monitors from both sets of filters flat lined as turbidity appears to have vastly exceeded the maximum set

value of 2 NTU on the monitors (the regulatory maximum on the outlet of a water treatment works is 1 NTU). The standby Team Leader was again called, and agreed to attend the site. The Operator was instructed to run the site to waste at 00:50 by closing the inlet to the chlorine contact tank (CCT) and shutting down the secondary filters, allowing the primary filters to flow to waste through their overflow pipes. The polyelectrolyte dosing pump speed was increased to 100%. The Operator inspected the clarification process and found that control had been lost of the clarifier sludge blankets, which had spilled over and overloaded the primary filters. At 01:30 the Team Leader arrived on site and checked the polyelectrolyte dosing pumps. While the dosing and carrier water pumps were running, the polyelectrolyte was being pumped out of the pressure release valve (PRV), suggesting that the dosing lines or injectors were blocked. This had not been noticed by the Operator, who had been onsite for over an hour. The polyelectrolyte was switched over to the standby dosing line, dosing was restored, and the clarification process immediately visibly improved.

Coagulation pH increased sharply at 03:45 from its normal value of around 6.1 to 7.65 for an hour and a half. No explanation has been given by Scottish Water for this.
The first of the five primary filters was washed at 03:30, with washwater sent to the nearby watercourse, but since the backwash water storage tank at Afton WTW is located after the CCT, at 03:30 the inlet to the CCT was opened to allow further backwashing; online flow trends confirm that this water was used solely for backwashing and did not enter the CWT. Flow trends show that water began to flow into the CWT at 04:45; from 00:49 to 04:45 the works had run from storage in the CWT.

After the primary filters had all been washed, the water sitting in the secondary filters was sent to waste, and the secondary filters were restarted at 07:30. Online measurement of turbidity from these filters shows that turbidity exceeded the maximum instrument setting of 2 NTU on return to service, again causing the instrumentation to flat line, so the actual maximum turbidity of the water leaving these filters for three hours is unknown. There is no final water turbidity monitor at Afton WTW. Just after the secondary filters were returned to service, one of them started an automatic wash – this increased the flow through the remaining two secondary filters, again causing spikes in turbidity. The filter was allowed to continue with the wash, and then one of the other secondary filters was manually washed, and the secondary filters were again restarted at 09:10. Turbidity from the secondary filters returned to a more normal reading of 0.02 NTU at 10:30.

Aluminium levels from the final water in the CWT reached 309 µg/l at 01:19, and then reduced as the works was run to waste. When the secondary filters were restarted, final water aluminium increased sharply from 137 to 499 µg/l at 10:27, with aluminium not dropping below the 200 µg/l standard until ten hours later, at 20:30. Online trends show that the clarified water and the filtered water aluminium monitors were not responsive to what would have been high levels of aluminium; no explanation has been given by Scottish Water for this.

Chlorine demand increased significantly when the works was returned to service, and the treated water free chlorine residual dropped to 0 mg/l for 15 minutes at 08:00, allowing undisinfected water to enter the CWT. The final water at Afton WTW was sampled by laboratory sampling staff as part of Scottish Water's routine statutory sampling programme at 06:55, only microbiological samples had been scheduled and they complied with standards. A sample was taken in response to the incident at 14:30, nine hours after the works had been returned to service; the aluminium result was 308 µg/l. Samples taken from service reservoirs (no consumer tap sampling could be carried out due to COVID-19 restrictions), all complied with regulatory standards. A *Cryptosporidium* sample filter was fitted to the final water sample point at 12:45, no *Cryptosporidium* was detected.

The duration and severity of the incident was significantly increased by the Operator's failure to communicate adequately with the ICC on his actions and whereabouts, and to physically check the polyelectrolyte dosing system when water quality did not improve.

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 sixteen additional recommendations. DWQR subsequently served an Enforcement Notice on Scottish Water to prevent recurrence. A copy of the Enforcement Notice is available on the DWQR website here: https://dwqr.scot/regulator-activity/enforcement/.