

Incident Summary

Manse Street WTW Coagulation failure July 2020

DWQR Inspector:
Moira Malcolm

Event No. 11058

Event Category: Significant

On 30 June 2020 the Intelligent Control Centre (ICC) received a high filtered turbidity alarm from Manse Street WTW, which was suppressed for 1 hour 20 minutes. A further two alarms were generated over the next three hours and by 00:03 on 1 July further alarms for all four primary filters had been generated. The standby operator was alerted but only told that one filter was in alarm. As this monitor had been calibrated the previous day and had been reading high, the operator decided not to attend site. At 00:25hrs the ICC called the standby operator with a high combined filtered aluminium alarm and noted that the primary filter turbidities were also increasing, and the operator left for site.

On attendance the standby operator found all four primary filter turbidities above their alarm level, so increased the poly dose by 5% and carried out a raw water colour bench test which showed the raw water to be 80 Hazen – up from 50 Hazen the previous day. The operator also carried out jar tests to determine an accurate coagulation dose and increased the dose from 3.08mg/l to 4.5-5mg/l, however both the duty and standby pumps tripped at this increased level so it was reduced back to the original dose to maintain dosing. The discolouration was caused by the disturbance of sediment in the mains (a mix of spun and cast iron). This came from the increase in flow from the temporary pumps, coupled with the switching on and off pumps, and accompanying rezoning throughout the operation.

At 02:50 the standby operator noted that the coagulant dosing meter was reading lower than the plant shutdown alarm level (0.5l/hr) but the plant was still operating and escalated the situation to the standby team leader. They decided to keep the plant running but change the coagulant point of application to a point with fewer restrictions. On this change the flow rate increased to 4.5l/hr. At 06:15 the coagulant dosing flow dropped again, reaching 0.39l/hr. The ICC received a low dosing flow alarm but did not send it out as the standby operator was on site, however Manse Street WTW doesn't have a SCADA on site and so the alarm was not visible. The standby team leader remotely checked telemetry at 07:45 and contacted the standby operator, who changed the pump over to the standby pump and successfully found and cleared an airlock and a blockage in the duty pump loading valve.

By 09:00 process scientist arrived to do more jar tests to further reduce turbidities and increased the coagulant dose to 7.07mg/l which helped to recover the site. Throughout the event coagulation dosing was interrupted on two occasions – first for 20 minutes and again for 90 minutes. Sampling at the final sample tap and in distribution gave no failures. One consumer contact was received in the zone on 1 July for milky/cloudy water.

The cause of the event was a failure for the coagulation dose to respond to a 60% increase in raw water colour caused by heavy rainfall in the catchment. I note the lack of visibility in both raw colour and clarified turbidity has been addressed by Scottish Water's actions.

However in my opinion the original event became a more significant incident because the ICC did not promptly inform the standby operator of the full extent of the turbidity alarms being generated, and did not alert the standby operator of the drop in coagulant dosing flow. The issue of the low flow alarm not generating autosutdown is also of concern, especially as it is noted that the reason for this has not yet been found. This was compounded by the blockage in the coagulant dosing lines which meant that the changes in coagulant dose could not be undertaken. It was most likely caused by deposits of solidified chemical in the Alba 18 bulk tank. These should be cleaned as per task scheduling, however this had not been done for the previous three months and this lack of basic maintenance contributed to the event and the recovery of the works. I am also concerned that the site did not have a look up table for coagulant dose, which with a variable quality source water is the minimum of requirements in the absence of any coagulant control instrumentation, though I note there is an action to remedy this.

The event has been categorised as Significant. Scottish Water has identified seven 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. DWQR also audited Manse St WTW following this incident.

