

Castle Moffat WTW Turbidity and manganese failures April-May 2020

DWQR Inspector:
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Event No. 10976

Event Category: Serious

On 28 April Scottish Water staff prepared to drain down and close Cell No.1 of Traprain Law Service Reservoir (SR) downstream of Castle Moffat WTW for routine cleaning. This was following approval from Centralised Network Control and the operation to drain and close the cell whilst simultaneously opening the outlet from Cell No.2 was undertaken in a controlled manner without any issues being noted. However 45 minutes after the operators left the SR, the operator at Castle Moffat WTW noted an increase in outlet flow from the works from 175 l/s to 460 l/s. This was accompanied by an increase in final water turbidity from 0.09NTU to 1.91NTU. The WTW operator escalated the issue, and Network Service Operators (NSOs) were dispatched to Traprain Law SR to investigate. At this time the Intelligent Control Centre (ICC) received High Inlet Flow alarms from Traprain Law SR and High Outlet Flow alarms from Castle Moffat WTW, however in the assumption that operators were still on site at the SR these were not passed out for action. NSOs discovered that the Inlet flow control valve (FCV) of the SR had malfunctioned and opened from 0 l/s firstly to 131 l/s and then to fully open (the maximum reading on the monitor showed 164 l/s). The NSO brought the inlet flow back under control by throttling a downstream valve and this reduced the flow and final turbidity from Castle Moffat back to normal levels. A manganese sample taken at the WTW final sample point also breached regulatory limits at 70µg/l, with a follow up sample showing that this quickly reduced to 2.2µg/l.

Due to Covid-19 restrictions, sampling from consumers taps was not possible, so samples were taken from SRs and hydrants throughout the supply zone. Sampling and flushing activities continued for 5 days until water quality was recovered throughout the network. The sample analysis gave 28 failures for manganese: 1 from Castle Moffat final and 27 from the network, with a maximum of 398.2µg/l. This is far in excess of the regulatory limit of 50µg/l, but well below the Short Term Health Risk Action Value (SHRAV) of 1000µg/l. There were also 6 aluminium failures in the network (maximum 224µg/l). Between 28 April and 2 May, 174 consumer contacts were received by Scottish Water's CEC for discolouration in relation to this incident. Calls were received from across East Lothian, mostly from North Berwick, Dunbar and East Linton.

The incident was caused by a malfunction of the inlet FCV at Traprain Law SR. This increased the flow from Castle Moffat WTW and caused the clear water tank to quickly empty, scouring manganese and lime sediment from the tank floor and sides and causing final water failures in turbidity and manganese. The increased flow also scoured the trunk main between the WTW and the SR, disturbing manganese and aluminium deposits. This discoloured water then carried through the SR and to the end of the network. As one cell of the SR was isolated for cleaning, there was both less dilution at the tank and no option to contain the discoloured water, and so it took longer to recover the network. Scottish Water found no clear reason for the malfunction of the FCV as the valve itself was found to be in working order, and so it is suspected that the valve control telemetry

– which is over 20 years old – was at fault. It is noted that the valve is rarely completely closed and was last done in 2017 for the previous tank clean.

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

