

## Perth WTW *Coagulation failure* 19 September 2018

DWQR Inspector:  
William Byers

Event No. 9709

### Event Category: Serious

On 18th September, severe weather caused a significant change in the quality of raw water drawn from the River Tay. Action had been taken to close off the surface water intake from the river, leaving the supply into the treatment works drawing through the gravel beds. Nonetheless, there was a significant change to the raw water colour and other characteristics. This caused an automatic response of increasing the dose of aluminium sulphate applied for coagulation and a direct consequence of high head-loss on the filters due to increased floc size causing them to queue for washing. As the queue increased, the plant shut down.

The shutdown led to the standby operator being called out to the works at 22:00 hrs and with sufficient filters washed, the plant was restarted in line with start-up procedure. Shortly after, filters again began to queue for washing due to turbidity measurements. With these filters washed, the operator restarted the works but in this instance, at normal production level of flow. In light of the raw water quality, the operator also increased the dose of aluminium sulphate. These changes had the consequence of causing the pH of the water to fall outwith the ideal coagulation range, causing a weakened floc and allowing aluminium to become soluble and pass through the filters. The aluminium monitor on the combined filtered water flow showed the PCV to have been exceeded for some 8 hours during the event. Over the course of the night, the operator continued to wash filters. At 6:30 the following morning, a reassessment of the issue with another operator led to the alum dose being reduced and the flows reduced to the normal start-up levels. Gradually, flows were increased as it became evident that the coagulation process was stabilising. A sample taken at 13:45 on the 19th September, of the final water leaving the works, failed the standard with a level of 378 µgAl/l. Subsequent sampling of the final water and all sampling carried out within the distribution system and at consumers taps showed no failures of the standards.

Whilst the treatment works was presented with a challenge by the significant changes to the raw water quality, the main factor in this incident were the actions taken by the operator to maintain production. It is clear from Scottish Water's investigation that the errors in the adjustment of the aluminium sulphate dose and restarting the plant at production flows instead of the minimum flow as stipulated in the operational procedure, were the key factors in the loss of control over the coagulation process.



The event has been categorised as Serious. 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.

