

Clatto WTW  
Coagulation Failure  
20 May 2015

DWQR Inspector:  
William Byers

Event No. 6896

## Event Category: Significant

### Summary of Incident

On 19 May 2015, at 02:30 hrs, Scottish Water's control centre (ICC) reported an alarm relating to the aluminium sulphate dosing system to the standby treatment operator. Arriving at the site, the operator investigated the system and found the water champ dosing unit had failed. This mechanical, in-line dosing and diffusion equipment was re-set but instantly tripped out again. Switching the system to manual allowed dosing to start again, and after a time, it was switched back to automatic and continued to run without any issue. Dosing had been off for some 25 minutes, causing changes to the coagulation process and slightly elevated turbidity and aluminium levels in the filtered water. Around 30 minutes later a noticeable improvement could be seen and after monitoring the process for a time, to ensure there were no further problems, the operator left the site at 05:15 hrs.

E&M technicians arrived on site, first thing on the 20 May, to change out the water champ with a spare unit to allow inspection. A standby arrangement was brought into service to maintain coagulant dosing whilst this was being done but SCADA trends showed that filtered water turbidity and aluminium levels began to rise. Whilst levels of both remained within standard, the significant shift was a concern and adjustment was made to the aluminium sulphate dose rate. This failed to restore these to normal levels and since the water champ had not yet been removed, the dosing system was reverted to normal arrangement at around midday. This too, however, failed to bring things back to normal and the works was shut down to allow fuller investigations. These determined that very little aluminium sulphate was being dosed and when a leak was identified on the dosing line, it was felt this was the issue. With the dosing line repaired and the works restarted, it did not bring any appreciable improvement and the works was again shut down. A temporary dosing point was established which bypassed the normal dosing arrangement to restore coagulation and allow better investigation. With this in place, water quality returned to normal.

The water champ was removed on 21 May and replaced with the spare unit and it was discovered that the impeller on the water champ had become detached from the shaft.

### DWQR Assessment of Cause of Incident

DWQR is satisfied that the root cause of this incident is the failure of the water champ unit. It is likely that a fault occurred in the unit, which led to the disengagement of the impeller. The unit apparently still operated with the motor running as normal but crucially, without the impeller causing the dosing vacuum, a greatly reduced level of coagulant dose was applied.

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This, in conjunction with the implementation of alternative dosing arrangements and the stopping and starting of the works, caused destabilisation of the coagulation process.

## **DWQR Assessment of Actions Taken by Scottish Water**

Scottish Water staff responded quickly to the initial alarm and took appropriate action to restore coagulant dosing. The water champ unit is a key piece of equipment in the treatment process at Clatto, bringing as it does a facility to ensure instantaneous mixing and diffusion of the coagulant in the incoming raw water. Arrangements to remove the water champ for investigation were quickly put in place and it is unfortunate that the already destabilised coagulation process caused deferment of the work.

Effective coagulation is key to ensuring the water is properly prepared for disinfection and to avoid excessive levels of aluminium in the final supply to consumers. Scottish Water ensured there was suitable scientific and operations staff at the works to support investigation of the coagulation problems and this, together with advice from the public Health Team, enabled appropriate decisions to be made and the necessary actions taken, to limit the impact of the process failure on final water quality. Additional monitoring of processes and bench testing of samples, enabled this welcome outcome. Whilst it was some 40 hours from the aluminium system failure until finally, treated water turbidity was restored to normal, over the course of the event, there were no breaches of the drinking water quality standards in samples taken from the works or in distribution.

The event has been categorised as significant. Scottish Water has identified a number of actions and DWQR accepts that these are appropriate and will be monitoring to ensure they are completed prior to signing off the incident.

