

Penwhapple WTW  
Disinfection Failure  
15 June 2014

DWQR Inspector:  
William Byers

Event No. 6036

## Event Category: Significant

### Summary of Incident

The standby operator for Penwhapple water treatment works (WTW) was alerted at 23:19 hrs on 14 June 2014, to a low chlorine alarm at the station. Following arrival at the site and investigation of the process, he identified chlorine dosing was not operating due to the motive water pumps being stopped. These were started and dosing commenced at 00:15hrs on 15 June. By this time, the final water chlorine levels had dropped to 0.36mg/l. Dosing rates were significantly increased and a quantity of sodium hypochlorite was added to the clear water storage tank (CWT) to compensate and arrest the decline. With the level of chlorine in the final water still falling and reaching 0.12 mg/l by 02:30, a further spike dose of hypochlorite was made to the CWT. Further sampling showed there was a recovering trend by 03:00 but it was not until 09:00 on 15 June that the normal level of 0.6 mg/l of chlorine in the final water was reached.

Investigation of the reason for the chlorine motive pumps not working has shown that this was a consequence of work carried out earlier in the day, on 14 June, to address a coagulation problem. During this work, the filter station was taken through a controlled shut-down and re-activation procedure. The shut down and reactivation is effected through the control panel (SCADA) and it transpires that the motive water pumps are not tied into the shutdown sequence. This allowed them to continue to operate and to draw down the service water storage tank until it emptied at which point they tripped off. When the time came to bring processes back on line again, through the control panel, the chlorine motive pumps remained off due to there being no service water to draw on. As a consequence, there was no disinfection applied to the treated water from the time production was restored to the CWT at around 17:15 hrs. A period of some seven hours. In all, the chlorine level in the final water was below normal for approximately 12 hours, due to this event.

### DWQR Assessment of Cause of Incident

DWQR is satisfied that the failure to adequately disinfect the water supply was due to two key factors, the absence of adequate controls on the chlorine motive pumps and the failure of operators to observe and interpret plant status information on the SCADA system.

### DWQR Assessment of Actions Taken by Scottish Water

Scottish Water responded appropriately to the low chlorine alarm and took the necessary steps to restore the disinfection process. DWQR however is concerned that insufficient regard was paid to process information and plant status presented on the works SCADA. Had proper attention and checking of equipment been carried out to the apparently anomalous status of elements of the process during the plant shutdown and reactivation procedure, this disinfection failure could have been avoided entirely.



In terms of recognising the risk to public health, DWQR has significant concerns around three areas: failure to alert Scientific staff timeously to enable effective communications with the Consultant in Public Health Medicine (CPHM); initiating adequate sampling; understanding emergency dosing of hypochlorite to CWTs.

It is essential that there is a clear understanding between Scottish Water and health authorities around unfolding events and there must be an effective framework in place for formal reporting and informal notification where there may be a risk to health. This requires effective internal escalation to scientific and public health teams and for a shared understanding of the health risk assessment carried out for the developing situation.

DWQR considers Scottish Water to have failed to demonstrate there was no impact on consumers as no samples were taken from consumer taps to test water quality during or following the event. This is of particular relevance within the zone fed directly from the treatment works and the 466 consumers there, who experienced low levels of chlorine in their supply. It is noted that samples were taken from storage tanks in the distribution system and these met the microbiological standards but this cannot be considered to meet requirements of regulations. DWQR recognises SW has identified an action to review its event sampling strategy as a consequence of this incident.

With regard to the third, DWQR acknowledges that SW has in progress a pan-Scotland review of site specific disinfection strategies. This project will ensure there is a clear understanding for site staff of the requirements for ensuring effective disinfection of water supply leaving the works including emergency dosing measures and emergency actions.

The event has been categorised as Significant. Scottish Water has identified a number of actions and DWQR accepts that these are appropriate. Additionally, DWQR has made two recommendations and will be monitoring to ensure all are completed prior to signing off the incident.

