

Invercannie WTW Disinfection Failure 24 July 2011

DWQR Inspector:
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Summary of Incident

A failure of the disinfection process occurred at Invercannie Works on 24 July at a time when the quality of the raw water was regularly affected by heavy rainfall. The coincidence of this process failure, the poorer quality raw water and subsequent failures of microbiological standards at a key service reservoir (Brathens, near Banchory) on 09 August, required investigation to determine any causal link.

There was a period of adverse weather within the River Dee catchment leading up to this event, when the quality of the raw water reaching the works had elevated levels of colour and turbidity. The automatic facility to close off the abstraction point was faulty during this period but alarms from the raw water instrumentation alerted staff to the problems and operators were called out to manually close the intake. This manual system was activated a number of times leading up to the 12th July and thereafter, with the intake being reopened each time when the colour and turbidity levels had reduced to more normal levels. Although there were increased raw water colour and turbidity levels entering the works and there were frequent detections of *Cryptosporidium* Oocysts in the raw water, there was no impairment of the treatment process and with the exception of the detection of a single *Cryptosporidium* Oocyst in a final water sample on 14 July, the quality of the water passing forward into the network was good.

On 24 July, the standby treatment operator was called out to investigate an alarm of a low flow on the inlet to the membrane filters and a low chlorine residual alarm. On arrival on site, the treatment operator found that the membrane inlet flow was normal. Checks on the disinfection process found that the duty chlorinator had failed to restart after the membrane low flow alarm signal had shut it down. The operator tried to reset the chlorinator but was unable to achieve a stable operation. The process was switched to manual control to enable disinfection to be restored.

A full investigation of the chlorine control system and the dosing pumps was carried out and found a fault with the flow meter readings and scaling within the control system. The fault was repaired and the system restored to full auto control. The investigation also found a fault within the SCADA operating system where a conflict between data held on two SCADA systems was causing control problems.

On 9 August, a routine sample taken from Brathens distribution service reservoir (DSR) failed with 1 Coliform and 1 E.Coli. Investigations of samples taken from the treatment works upstream and at various points downstream of this DSR indicated a problem within Brathens tank itself and during this period, chlorine levels were boosted as a precaution. The investigation of the tank identified likely ingress from the roof on the South storage cell. Both cells were cleaned and subsequent sampling showed no further bacteriological failures.

DWQR Assessment of Cause of Incident

DWQR is satisfied that the cause of the disinfection failure was due to faults within the control system and software. Investigation has shown that the raw water quality at the time of the failure had returned to near normal conditions and that the quality indicators of the final water supplied into distribution showed no cause for concern. DWQR is also satisfied that the time of travel of treated water through the water mains to the key service reservoirs is a matter of hours and the problem with the disinfection system on 24 July is unlikely to be a factor in the microbiological failure at Brathens service reservoir on 09 August.

DWQR Assessment of Actions Taken by Scottish Water

The actions taken by Scottish Water to control the abstraction of raw water from the River Dee whilst the automatic controls were inactive were appropriately managed. Scottish Water responded to the failure of the disinfection system and took appropriate actions and sampling to verify water quality at storage tanks and within the water supply zone. The company also took the necessary actions in response to the microbiological failures at Brathens service reservoir. A thorough report on the structural integrity of the service reservoir has been obtained indicating some significant improvement works are required to the South cell.

The failure of the disinfection process at the works is however of great concern and DWQR is of the view that conflicts between control software is a preventable and foreseeable issue and more rigorous testing should be carried out to avoid these issues. DWQR visited the site recently to carry out an audit of the works and is satisfied that the control problems have been addressed with work continuing to ensure common data between SCADA systems. DWQR is also reassured that significant work has been carried out in servicing of the membrane treatment process to ensure its integrity.

Scottish Water has identified a number of actions from this incident. DWQR accepts that these are appropriate and will be monitoring to ensure they are completed prior to signing off the incident.