

Turriff WTW  
*Cryptosporidium* Detection  
13 November 2013

DWQR Inspector:  
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Event No. 5712

## Event Category: Significant

### Summary of Incident

*Cryptosporidium* Oocysts were detected in a sample taken from the final water produced at Turriff Water Treatment Works on 13 November 2013. Sampling over the following days showed *Cryptosporidium* to be present again on 22 November and also on 2 and 5 December. Whilst individually these were of low level, the repeating nature of the detections gave DWQR concerns over the robustness of processes at the works and their ability to respond to changing raw water conditions.

Turriff treatment works has coagulation, clarifier and rapid gravity filter stages in the process and these, operated to best practice standard, should provide a good barrier to *Cryptosporidium*. At the time of the first detection, this region of Scotland experienced significant levels of rainfall and very high flows in rivers. The raw water source for Turriff is the River Devron and the highly coloured and turbid water drawn from the river placed a considerable challenge to the works. This plant provides a supply to much of Aberdeenshire but it also operates in concert with Invercarnie and Mannofield treatment works to provide the water supply to the city. These other two plants also experienced a heavily discoloured raw water supply at this time and production between the three plants had to be varied and re-balanced to ensure all consumers continued to receive a supply. During this time the normal contribution from the works to supplying the city, increased from a nominal 4 litres/sec to 100 l/s as the load was reduced on the other treatment works, requiring the Turriff to operate at near maximum capacity.

### DWQR Assessment of Cause of Incident

Scottish Water has investigated the performance of the treatment works and has identified elements where deficiencies could permit *Cryptosporidium* to pass. An important safeguard against *Cryptosporidium* breakthrough is the avoidance of any sudden or large changes to flow through the treatment processes. There is no automatic, variable flow control on the inlet to this works to ensure any change in flow is completed in a slow and controlled manner. Although manual control allowed incremental changes to be made over a number of steps until full production levels were achieved, these changes are sudden. This has been recognised as a possible contributory factor to the detections. The investigation also identifies issues with flow control to the individual filter beds and fissuring of the filter media and they conclude the continuing operation of the plant at near capacity, with these deficiencies present, as being the likely cause.

DWQR considers these to be the likely factors in the breakthrough. DWQR however also retains a concern that there are indications that the coagulation process may not have been operating optimally on the occasion of some of these detections and this, coupled with flow changes through processes, may also be a factor.

Scottish Water had previously commissioned an investigation of the filter beds to determine their condition. The report, obtained in May 2011, had identified a number of concerns covering the integrity of the structure of the beds, migration of filter materials, condition of under-drains, dirt and inefficient washing. Scottish Water has carried out improvement to the backwash pumps, which has improved some aspects of the filter performance. The ability to progress further is hampered at present by the lack of spare capacity to allow filters to be taken off-line for refurbishment.

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

It is clear the interconnectivity of regional water supply systems in this area is essential to maintaining supplies to all consumers. It is also clear however that the ability to remove elements of some treatment processes is dependent upon the availability of capacity elsewhere to increase production to allow improvement works to progress at a site. As demand increases in the region through economic expansion and seasonal factors, it becomes progressively more difficult to schedule improvement work. DWQR considers it unacceptable for important remedial works to be deferred for unduly lengthy periods of time, allowing serious deficiencies in water treatment processes to persist and leading to significant risk of failure of water quality standards.

DWQR is concerned that there is a perception within the organisation of a degree of inevitability at low levels of *Cryptosporidium* being present in final water under certain conditions, which may have influenced such investment and scheduling decisions. There is a lack of importance attached to a sequence of low-level *Cryptosporidium* detections and DWQR considers there to be a need for wider appreciation through the organisation of the importance of maintaining treatment assets, equipment and processes in an optimum state to address *Cryptosporidium* risk. This has been identified by DWQR in our assessment of similar *Cryptosporidium* events at other Treatment Works occurring around the same time and Scottish Water must address the issue.

DWQR welcomes the recent move by Scottish Water to extend the scope of its water quality event root cause investigation process to cover *Cryptosporidium* detections. The process should lead to a better understanding of the issues at treatment works where Oocysts are detected in final water and identify the necessary actions and investment to maintain effective treatment barriers.

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

