

Spey Badentinan WTW *Cryptosporidium* Detection 11 August 2014

DWQR Inspector:
William Byers

Event No. 6203

Event Category: Serious

Summary of Incident

On 12 August, the standby operator for the Spey Badentinan water treatment works (WTW) was alerted to alarms generated from the membrane plant. These related to increasing trans membrane pressures as the units were affected by deteriorating raw water quality from the wellfield source. On attending the site at 04:00 hrs, the plant flow was reduced, chlorine dosing increased and adjustment made to pH correction to suit. With continuing poor raw water quality and membrane units requiring repeated cleaning cycles, a decision was taken to shut down the plant and this was done at 11:00 hrs. One half of the raw water storage tanks was isolated and the highly discoloured water allowed to drain to waste and allow capacity for cleaner water to be pumped from the wellfield when conditions improved. However due to concerns around a reducing level of water in the clear water storage tanks (CWT) and the necessary significantly reduced production flow rate, the plant was restarted at 16:00 hrs to ensure the rate of drop in CWT volume was arrested.

Further alarms were received later that night at 21:00 hrs and the operator re-attended the site. The plant had automatically closed down due to all units being withdrawn from production to allow membrane washes to take place. The operator restarted the plant and initiated a series of cleaning through manual control. Plant production was maintained over the next two days through careful round the clock management of the wash cycles and membrane cleaning processes.

On 14 August, results from the *Cryptosporidium* samples removed on 11th and 12th became available. The sample for 11 August, which detected 94 Oocysts (0.654 Oocysts/10 litres), was reported to Scottish Water's Public Health Team (PHT) at 13:52 and the 12 August result of 0.044 Oocysts/10 litres (6 Oocysts), an hour and a half later. PHT staff contacted NHS Grampian Consultant in Public Health Medicine (CPHM) to advise of the potential health risk to consumers (potentially 60,000 affected) and after consideration of the issues and further discussion, a full Incident Management Team (IMT) was convened.

The IMT addressed the immediate risk to consumers, the options for placing restrictions on the supply across the extensive geographic area and the time of travel of the water supply through the distribution network from the WTW to the extremities of the system. A further *Cryptosporidium* sample result from 13 August showed low level detections of 0.032 Oocysts/10 litres, indicating the peak of the episode to have passed. Consideration of the time of travel of the supply indicated that any contamination occurring on 10th/11th August was likely to have transited through the distribution system and consequently, restrictions on use of

the supply now, would not serve any health benefit. Subsequent daily samples showed there to be no *Cryptosporidium* detections in the supply.

DWQR Assessment of Cause of Incident

Although this works has experienced the detection of isolated, very low level of *Cryptosporidium* Oocysts in the past, an episode such as this, where very high numbers of Oocysts can be found in the final treated supply, is of grave concern. DWQR visited the site to investigate the circumstances and gain an understanding of the actions being pursued to investigate the event.

Membrane plants generally afford a robust barrier against the passage of *Cryptosporidium* and where detections of this magnitude have been experienced elsewhere, it is usually the cause of a mechanical failure of the product, or seals, and the problem persists until the defect is repaired. In this instance, the integrity of the membrane filters appear to be sound and the occurrence, transient. Scottish Water has carried out an investigation of the event and has identified an issue where it may be possible, through the sequencing program of control valves under certain process conditions, for contamination of the filtered water off the membrane units, with wash water. Although Scottish Water has examined other possibilities for contamination to occur within the site, DWQR considers this possibility to provide the most likely cause.

Whilst this situation may not normally manifest in impaired final water quality, DWQR considers the coincidence of the heavy rainfall being experienced in the Spey catchment at the time, lead to very poor raw water being supplied from the wellfield and the necessity for more frequent washing created the situation where the wash water contained elevated levels of *Cryptosporidium*.

DWQR Assessment of Actions Taken by Scottish Water

DWQR considers Scottish Water to have made appropriate response to the developing situation at the treatment works, as is normal, given the storage capacity available in the CWT which permits a period when production can be shut down when there is poorer quality raw water.

From the information provided by Scottish Water, DWQR is of the view that the source of the elevated *Cryptosporidium* loading is likely to have arisen from the collection system at Ordiequish. This source was isolated from the raw water feed to the treatment works at 18:30 hrs on 11 August but the timeline of the rainfall and valve operation suggests the first flush of run-off from the catchment could have transported Oocysts into the raw water storage tanks and onto the membrane plant. Scottish Water has identified a number of actions to investigate this element of the source water and to investigate better control and monitoring. DWQR considers this essential to managing the *Cryptosporidium* risk for this system.

With regard to the considerations of consumer health, DWQR is concerned that the time taken for the analysis and reporting of the result of the *Cryptosporidium* sample taken on 11 August was excessive, given the prevailing supply conditions. It is unacceptable for crucial health information to be unavailable for consideration by health teams for a period in excess of 75 hours. In such circumstances where there is elevated risk of impact on water quality, quicker analysis and reporting is required.

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

