

Torra WTW

Islay

Elevated Aluminium Concentrations

Aug 2014

Event Category: Significant

DWQR Inspector:

Matt Bower

Event No. 6167

Summary of Incident

Torra is a medium sized works serving the Southern part of Islay. On 8 August a blocked pH monitoring line resulted in the coagulation pH deviating from the optimum. As a result, the clarifier sludge blanket re-dissolved and / or carried over onto the filters. The treatment works was shut down and filters washed in order to regain control of the treatment process and restore water quality. Initial measurements of aluminium concentration suggested that the PCV of 200 microgrammes per litre had not been exceeded. Subsequent analysis of laboratory samples contradicted this and showed final water aluminium concentrations had, in fact, reached at least 1392 microgrammes per litre, probably for a relatively short period.

DWQR Assessment of Cause of Incident

The root cause of this incident was the blockage of the line to the coagulation pH monitor, which caused the sodium carbonate dose to increase, taking the water pH outside the range at which effective flocculation can be achieved. This resulted in the aluminium sludge carrying over onto the filters, blocking them. Water containing a high concentration of dissolved aluminium also passed through the works, although the flow to the clear water tank, which stores treated water, was shut down promptly. The full extent of the incident was not initially realised – aluminium concentrations were thought to be much lower – as final water samples were not taken and the flow to the aluminium monitor ceased when the works was shut down. It is likely that a quantity of water containing high aluminium was present in the pipe between the contact tank and clear water tank, and this entered the clear water tank once the works was re-started. As the clear water tank was at a low level due to the works having been shutdown, there was minimal dilution effect, resulting in water containing high aluminium concentrations entering supply.

DWQR visited the site in February 2015 and audited the plant. It was noted that the coagulant dosing tank, from where the pH control sample was taken, had flaking internal paintwork, and the pipe supplying the pH monitor took water from the very bottom of the tank, making it vulnerable to blockage from accumulated paint debris plus any un-dissolved chemicals.

DWQR Assessment of Actions Taken by Scottish Water

Scottish Water attended site promptly in response to turbidity alarms from both the clarifiers and rapid gravity filters. The blockage to the coagulation pH monitor was rapidly cleared. Initial bench testing suggested that aluminium concentrations, although elevated, had not exceeded the PCV. It is likely that these samples were taken before the high –aluminium water had reached that point in the treatment process. The outlet from the chlorine contact tank was shut off in order to prevent any lower quality water entering supply and conserve supplies, as the ability to restore quality by backwashing the filters is limited by the size of the chlorine contact tank, from where the site’s backwash water originates. This was a reasonable action to take, but unfortunately, this had the effect of cutting of the supply of water to the treated water aluminium monitor, meaning that for the rest of the event there was no online monitoring for this parameter until the monitor was re-calibrated.

Control of the treatment process was regained at 20:30, and water was allowed to pass forward from the contact tank into the clear water tank and on into supply. Although laboratory samples were taken from the water leaving the clear water tank, no bench analysis was undertaken, which might have alerted staff to the fact that aluminium concentrations had breached the standard by a significant margin and enabled the appropriate notifications to have taken place. DWQR accepts Scottish Water’s explanation that the elevated aluminium in the final water was due to a quantity of water trapped in pipework between the contact tank and clear water tank, entering the nearly empty clear water tank with minimal dilution, however it is apparent that aluminium concentrations remained high for a considerable time after process control was restored, as a final water sample containing 564 microgrammes per litre was obtained the following day at 12:00, 15 hours after the link to the clear water tank was re-opened.

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:

	Action	Completion
1	Change the clarified turbidity alarm set point from 0.8 NTU to 0.4 NTU to allow remedial action to be taken much quicker and therefore limit the knock on effect downstream of blanket carryover.	30/9/14 (Complete)
2	Reinstate automatic desludging. Carry out control tests in automatic mode on the desludging system and if necessary install new system.	1/6/15
3	Investigate the possibility of a run to waste system between the RGF and the CCT and or the CWT	30/12/14 (Complete)
4	Review analogue and digital alarm settings	30/12/14 (Complete)
5	Carry out tool box talks on Scottish Water Operator Training Package, including operators responsibilities and TOMS procedures.	30/11/14 (Complete)
6	Highlight the importance to Operators that during any event, bench samples from the CWT must be taken periodically along with other samples from the process and that these results form a crucial understanding of the facts both in terms of reporting results and in any follow up investigations.	30/12/14 (Complete)

In addition, DWQR has identified a further action:



	DWQR Action	Completion
DWQR 1	Investigation sampling arrangements for the coagulated pH probe, including the condition of the coagulation chemical mixing tank and the location of the probe sample line draw-off and make any modifications required to reduce the risk of future blockages.	

