Drinking Water Quality Regulator for Scotland

Incident Assessment

Acharacle WTW
Overdose of Chlorine
5-7 February 2012

DWQR Inspector:
Matt Bower

Summary of Incident

The control system for Acharacle WTW was damaged during severe weather at the beginning of January 2012, necessitating the operation of the works in manual control. This effectively removed a number of safeguards that would normally have been in place, including an automatic shutdown for the plant should chlorine concentrations go outside pre-determined limits. On 17 January, the direct telemetry link to Scottish Water's control centre that alerts operational staff to problems also failed.

On 5 February an operator discovered that the chlorine leaving the site was higher than usual. He re-calibrated the chlorine analyser on the assumption that this would restore normal operation. Although the operator reported the issue, the standby team leader was not aware that the site was operating without telemetry alarms, and wrongly assumed that continuing problems would be reported.

On 6 February a second operator visited the site and noticed that the chlorine was still excessively high in water leaving the works. He saw that the water currently being produced by the plant was lower in chlorine, which would have the effect of reducing levels, especially as he was aware of the action taken the previous day.

Also on 6 February, a number for chlorine complaints were received from this small water supply zone. As soon as the treatment team leader became aware of the complaints the following day, an operator was sent to the site to investigate and found chlorine residuals still to be higher than normal. Action to reduce this was taken immediately, and this was effective.

The incident has no implications for public health, as disinfection was being achieved and chlorine concentrations were well within those that would give any cause for concern. Having said this, it is evident that consumers found the taste and smell of chlorine in their water to be unacceptable, as evidenced by the 10 complaints Scottish Water received from this small supply zone.

DWQR Assessment of Cause of Incident

Scottish Water attributes the cause of the high chlorine to be the failure of the buffering system which regulates the pH of water supplied to the chlorine analysers, due to the stock of carbon dioxide buffer running out. This meant that the chlorine residual was not being accurately measured, and correspondingly the residual controlled dosing was not adding the correct quantity of chlorine. Scottish Water had been experiencing difficulties with the supplier for carbon dioxide and checks which should have been made on stock levels were not being consistently undertaken. Scottish Water attributes the latter to the additional workload caused by the works having to be operated manually.

Under normal conditions an alarm to Scottish Water's control centre would have been received and the treatment works would have shutdown automatically once chlorine residuals exceeded the defined limits.

DWQR Assessment of Actions Taken by Scottish Water

The incident was prolonged by the fact that two successive operators who visited the site, whilst acting with the best of intentions, did not follow up action to ensure that chlorine dosing had returned to normal. The standby team leader was unable to advise appropriately because he was not made aware that there was, at the time, no telemetry at the site.

DWQR is of the opinion that both operators should have remained on site to verify that chlorine residuals were returning to normal. Proper use of data trending available to them on site would have clearly shown the extent of the issue, and this has been identified as a training issue by Scottish Water.

Communications were an additional confounding factor in that senior staff on standby were not aware of the vulnerability of the site due to a lack of telemetry. Although the severity of the weather is appreciated, it is questionable whether the site should have been left in this position for such an extended period, and especially not without additional monitoring and precautions put in place.

Finally, on a number of occasions operators were reporting chlorine measurements at the top end of the operating range of their instruments. It is possible that actual concentrations were higher than those reported.

Scottish Water has proposed 10 actions in response to the incident, and DWQR considers these to be appropriate.

Action Number	Action Description	Completion Date
1	Review with Operators the EAL procedure and the SHOUT process to the Public Health Team.	Complete
2	Review and confirm EAL sheet on site and cross check with all alarm set points set on site.	Complete
3	Change CO_2 cylinder supplier to Scottish Water framework supplier for supply to Acharacle WTW.	Complete
4	CO_2 system to be reviewed in conjunction with sister plant in Dunvegan to assess whether or not low level alarms can be established	Complete
5	Reiterate the importance of, and reasons for, CO_2 buffering, and undertake monthly review of Acharacle task schedules to monitor their completion.	Complete
6	Onsite training for Operators on Trending function on PLC at WTW's.	Complete
7	Investigate whether an alarm can be added to telemetry to show if an inhibit has been applied to a shut down function on site.	Complete

8	Review critical spares requirement for telemetry and site PLCs, and order common set of spares	Complete
9	Review and update DWSP in light of incident root causes and conclusions	Complete
10	Copy of the Incident Report to be circulated to all Water Operations Managers for information	Complete

Additionally, DWQR has made two recommendations following this incident:

Recommendation Number	Recommendation	Completion Date
DWQR 1	Ensure staff are made aware of the limitations of portable chlorine measuring equipment, especially with respect to the potential for readings showing the maximum range value for that instrument to be significantly higher than the upper limit displayed and the steps to be taken in order to obtain a true reading.	Spring 2013
DWQR 2	Review procedures for operating plants temporarily without telemetry, including enhanced monitoring, appropriate escalation and the need for all standby staff to be formally made aware of the situation	End 2012