



DRINKING WATER INSPECTORATE

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Information Letter 05/2020

To: Board Level and Day to Day contacts of Water and Sewerage Companies and Water Companies in England and Wales

Dear Sir/Madam

Chloramination disinfection and associated risk of cyanide formation in treated water

Purpose

1. The purpose of this letter is to notify water suppliers of the potential risk for the formation of cyanide in the final treated water at concentrations above the prescribed limit (PCV) in the Water Supply (Water Quality) Regulations¹ following chloramination.

Background

2. The Drinking Water Inspectorate publishes reports and information letters on the outcomes of its investigations into drinking water quality events and technical audits where there are lessons to be learned that are important for all water suppliers to take note of.
3. In August 2019 an event was reported to the Inspectorate where drinking water containing concentrations of cyanide in excess of the 50 µg/l PCV had been supplied to consumers. Cyanide is a schedule 1 health-related parameter, therefore water supplied to consumers was unwholesome in contravention of regulation 4(2) of the Regulations.
4. The maximum concentration of cyanide detected at consumers' properties during the event was 270µg/l. The concentrations were below the World Health Organisation (WHO) guideline values², and there is no evidence of any risk to health associated with the water that was supplied to consumers during the event.

¹ The Water Supply (Water Quality) Regulations 2016 SI No. 706 as amended and The Water Supply (Water Quality) Regulations (Wales) 2018 SI No 647

² Guidelines for Drinking Water Quality, World Health Organisation (WHO), Fourth Edition, 2011

5. Low concentrations of cyanide in raw water do not normally survive conventional disinfection processes as it is readily oxidised by free chlorine (WHO, 2004) highlighting this occurrence as unusual.
6. The supply was subjected to a post-disinfection chloramination treatment stage and more specifically employed ammonium sulphate as the ammoniation agent. The most likely cause of cyanide being detected was through its formation as a by-product of chloramination.

Actions Required for Water Suppliers

7. Companies are notified that where chloramination is in place at any treatment works, whether through use of ammonium sulphate or ammonia gas, this process is considered a potential risk for the formation of cyanide as a disinfection by-product.
8. Where treatment works and the associated supply system employ chloramination, companies are expected to add cyanide to the regulation 27 risk assessment and then demonstrate by analysis the absence of this by-product.
9. It is expected that, as a minimum, enhanced operational monitoring for cyanide in the final treated water is undertaken for a minimum period of one year to evaluate the potential risk.
10. If the monitoring for cyanide verifies an increased risk of cyanide being present as a disinfection by-product, the company should inform the Inspectorate, and commence enhanced monitoring in supply zones. The Inspectorate may issue regulation 9(6) monitoring variation notices requiring increased monitoring for cyanide, and other parameters if necessary, at treatment works and in water supply zones.
11. Companies should review their risk assessments as a matter of relevance, any hazardous events relating to:
 - Changes in the organic composition of raw water
 - The use or presence of formaldehyde in the catchmentCompanies are encouraged to undertake operational monitoring for cyanide relating to these hazardous events where insufficient information exists.

Additional Guidance

12. In accordance with the requirements of regulation 31, all treatment chemicals used in the supply of water for regulation 4(2) purposes must conform to the published BS:EN for that chemical, or be otherwise approved by the Secretary of State and be listed in the list of approved products published on the Inspectorate's website.
<http://dwi.defra.gov.uk/drinking-water-products/approved-products/soslistcurrent.pdf>
13. Manufacturers' instructions for use and requirements specified in BS:EN documents must be adhered to. Chemicals must not be used beyond specified shelf-life expiry dates.

14. Companies are reminded that they should have appropriate procedures in place for the acceptance of chemical deliveries, such that only the correct chemicals of the correct specification are received (with reference to Information Letter 12/2003). The Inspectorate also considers that it is good practice to have an independent internal audit process in place to ensure that suppliers, procurement staff and local arrangements at treatment works are sufficient to demonstrate compliance with the requirements of regulation 31 (with reference to Information Letter 05/2011).
15. All chemical dosing arrangements must have adequate mixing in place downstream of the dosing point and sufficiently upstream of any online monitoring used to control the chemical dose. Appropriate alarms and fail-safe mechanisms should be in place as necessary to identify an over- or under-dose of chemicals.
16. Facilities for batching up solid chemicals for dosing as a slurry or suspension must be properly calibrated and regularly checked and maintained to prevent an over-dose of the chemical.
17. Where chlorinated motive or carrier water is used in the dosing of a chemical downstream of chlorination treatment, this should be risk-assessed because of the increased risk of disinfection by-product formation. Such arrangements may constitute a breach of regulation 26(2). Companies should check all of their chemical dosing facilities, and if chlorinated water is used as carrier or motive water at any point in a water treatment process, the regulation 27 risk assessment for the works should be reviewed and updated.

This letter is being sent electronically to Board Level and day to day contacts. Hard copies are not being sent but the letter may be freely copied.

Any enquiries about the letter should be addressed directly to jacqueline.atkinson@defra.gov.uk

Copies of this letter are being sent to Christine McGourty, Chief Executive, Water UK; Jan Dixon and Kirstin Green, Deputy Directors Water Quality, Department for Environment, Food and Rural Affairs; Eifiona Williams, Water Management Team, Welsh Government; Sue Petch, Drinking Water Quality Regulator for Scotland; Catriona Davis, Drinking Water Inspectorate for Northern Ireland; Tony Smith and Chairs of the Regional Consumer Council for Water; Alison Cullen, Ofwat; Simon Moody, Environment Agency; Benedict Duncan, Food Standards Agency; and Stephen Robjohns at Public Health England.

Yours sincerely



Marcus Rink
Chief Inspector