



Guardians of drinking water quality

**DRINKING WATER INSPECTORATE**

Area 4a, Ergon House  
Horseferry Road  
London SW1P 2AL

Enquiries: 030 0068 6400

E-mail: [claire.pollard@defra.gsi.gov.uk](mailto:claire.pollard@defra.gsi.gov.uk)  
DWI Website: <http://www.dwi.gov.uk>

DWI Information Letter 07/2012

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

**PUBLICATION OF FURTHER RESEARCH ON NITROSAMINES IN WATER TREATMENT COAGULANTS AND DRINKING WATER**

Dear Sir or Madam

**Background**

1. In September 2008, the DWI published research on the nitrosamine, N-nitrosodimethylamine (NDMA), in drinking water, along with guidance to the water industry. The research was generally reassuring - at over 90% of the treatment works, samples of final water were free from detectable concentrations of NDMA (limit of detection 0.9ng/l). However this research identified evidence that one ferric coagulant may contain NDMA. As a result of this finding, the manufacturer took steps to reduce the concentration of NDMA in its ferric coagulant.
2. DWI commissioned further research to determine whether water treatment coagulants are a widespread source of NDMA and to investigate formation and removal of NDMA and other nitrosamines in water treatment. Results of this further research are now available and are summarised below.

**Purpose**

3. The purpose of this letter is to inform you that:
  - a) the results of the DWI research on nitrosamines are being published on the DWI website at <http://dwi.defra.gov.uk/research/completed-research/2000todate.htm#analysis>;

- b) remind companies of the guidance to the industry on NDMA, arising as a consequence of the findings of the original research <http://dwi.defra.gov.uk/stakeholders/guidance-and-codes-of-practice/NDMA%20concentrations%20in%20drinking%20water.pdf> (PDF 79KB): and
- c) advise companies of steps to be taken in light of the latest research.

### **Findings of the further research**

4. The findings of the further research are summarised in the bullets below and are generally reassuring, though there are lessons to be learnt.
- In most coagulants NDMA was either not detected or detected only at trace concentrations
  - In six ferric sulphate coagulants higher concentrations of NDMA (levels up to 19 µg NDMA per litre of product) were initially detected but these were well below the concentrations detected during the previous study
  - No concentrations of NDMA in final water exceeded the WHO guideline of 100ng/L, although some samples exceeded the tier 3 trigger level of 10 ng/L in the DWI guidance (see link to the guidance above for detail of the trigger levels).
  - N-Nitrosomorpholine (NMOR) was detected as a contaminant in one ferric coagulant, though no detectable concentrations were found in treated waters.
  - Rapid gravity filtration, GAC and ozonation/GAC can all be effective in removing nitrosamines
  - Part way through the study, high levels of NDMA (over 200 µg/L) were detected in one coagulant but steps were taken to reduce levels and the coagulant in question is no longer on the market.
5. Since the main potential source of nitrosamines in drinking water appears to be contaminated ferric coagulants, the report suggested that manufacturers should analyse coagulants for nitrosamines and provide results to water companies to ensure that this contamination route is controlled.

### **Action taken and to be taken by DWI**

6. During the course of the project DWI took further advice from the Health Protection Agency (HPA). This covered the level of NDMA detected in drinking water and the level of NMOR detected in laboratory studies. HPA confirmed that both NDMA and NMOR should be regarded as genotoxic carcinogens and as is the case for all such substances there is no identifiable threshold for adverse effects. Therefore exposure should be reduced to as low as reasonably practicable (ALARP).

7. In relation to NDMA, the advice concluded that the highest concentration found (24 ng/L) in drinking water presented a minimal risk to health for a short-term exposure, nonetheless the advice in the DWI guidance remained appropriate.
8. In relation to NMOR, the advice used a margin of exposure approach to conclude that should the highest concentration found in laboratory studies (26 ng/L) be found in drinking water it is unlikely to be of concern. Moreover, this concentration is lower than the levels of NMOR found in the environment. However, exposure to NMOR should be as low as reasonably possible (ALARP).
9. As a result of the findings, the Inspectorate contacted the manufacturer of the product containing high levels of NDMA and ensured steps were taken to reduce the concentration. The product in question is no longer on the market.
10. The Inspectorate recognises that there remains a risk that the concentration of nitrosamines in ferric sulphate coagulants may increase again in the future. In the short term, companies are reminded of the DWI advice on NDMA and are advised to take the steps set out below. The Inspectorate will consider imposing a national condition of use on ferric sulphate coagulants to ensure the potential risks from nitrosamines are controlled.

### **Action to be taken by the industry**

11. In light of the research findings and health advice, DWI considers it prudent for the water industry to obtain more data on the nitrosamine concentrations in the ferric sulphate that they use. The research suggests that nitrosamine concentrations can vary from batch to batch and between product manufacture and delivery, though the main source of nitrosamine appears to be related to the quality of the raw material used in production. Companies should liaise with their suppliers to determine nitrosamine content of their products and should establish acceptable concentrations of nitrosamines in ferric sulphate based on risk assessment of their sites and the principles laid out in the guidance on NDMA. In addition companies should periodically analyse batches of ferric sulphate delivered to their sites for both NDMA and NMOR. As NMOR has not to date been detected in drinking water no specific guidance has been issued on NMOR. However given the similar toxicological profiles of the two compounds, in the first instance, companies should apply the trigger values for NDMA to NMOR. The Inspectorate recognises that it will take some time to implement these steps.

## Enquiries

12. Copies of this letter are being sent to Pamela Taylor, Chief Executive, Water UK; Chris Preston, Water Supply and Infrastructure Division, Department for Environment, Food and Rural Affairs; Peter Jiggins, Drinking Water Quality and WAAQ project management, Department for Environment, Food and Rural Affairs; Olwen Minney, Water Management Team, Welsh Assembly Government; Susan Petch, Drinking Water Quality Regulator for Scotland; Margaret Herron, Drinking Water Inspectorate for Northern Ireland; Tony Smith and Chairs of the Regional Consumer Council for Water; Noel Wheatley, Ofwat; Nick Cartwright, Environment Agency; Liz Stretton, Food Standards Agency; and Frances Pollitt at the Health Protection Agency.
13. This letter is being sent electronically to Board Level and day to day contacts. Please acknowledge receipt by email to [dwi.enquiries@defra.gsi.gov.uk](mailto:dwi.enquiries@defra.gsi.gov.uk). Hard copies are not being sent but the letter may be freely copied. Any enquiries about the letter should be made to Dr Peter Marsden, Principal Inspector – risk analysis.

Yours sincerely



Claire Pollard  
Deputy Chief Inspector