1. Brief

The Department of the Environment, Food and Rural Affairs appointed LGC to conduct a research contract into exposure to chloropropanol (CP) isomers via polyamines.

The objectives of the research are:

1. To develop methods of analysis capable of achieving a detection limit of 1ug/L for the following CP Isomers: 3-monochloropropan-1,2-diol (3-MCPD); 1,3-dichloro-2-propanol (1,3-DCP); and 2,3-dichloro-1-propanol (2,3-DCP).
2. To carry out analysis of treated water entering the supply and water from consumers premises for 3 CP isomers.
3. To adapt the method developed under (1) above, for the analysis of 3 CP isomers in samples of commercially available polyamine flocculants.
4. To carry out analysis for 3 CP Isomers in samples of commercially available polyamine flocculants.
5. To report on the potential for consumer exposure to 3 CP isomers via water supplies.

1.1 Background

Chloropropanol (CP) isomers are by-products of the production of hydrolysed vegetable proteins. Some CPs are carcinogenic and the European Commission’s Scientific Committee on Food has made a number of recommendations concerning the reduction of CP concentrations in foodstuffs. Polyamine flocculants contain chloropropanol isomers and it is possible that consumers are exposed to low levels of CP, when polyamines are used in drinking water treatment.

The Committee on Chemicals and Materials for use in Public Water Supply (CPP) has already recommended more stringent controls on the purity and dosing concentrations for polyamine flocculants. These controls were aimed at reducing exposure to 3-monochloropropan-1,2-diol. The CPP now wishes to obtain information about levels of exposure to three specific CP that are present in commercially available polyamine water treatment flocculants.

1.2 Work Carried out by LGC

1.2.1 Objective 1 - Development of method with a detection limit of 1ug/L for 3-MCPD; 1,3-DCP; and 2,3-DCP

An account of work conducted and progress achieved for objective 1 (including full methodology) is contained in the remainder of this report (Sections 2-5).

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1 Reproduced from DEFRA invitation to tender
1.2.2 Objective 2 - The analysis of treated water entering the supply and water from consumers premises for 3 CP isomers

In August 2001 the CPP contacted UK water companies to gather information on the type and dosage of polyamine flocculants in use in water treatment. Of the respondents to this request for information, three water companies indicated that they may be able to assist with providing access to sampling points for water treated with polyamine flocculants.

LGC contacted the three water companies concerned in order to arrange the collection of water samples for analysis using the method developed in Objective 1.

The first water company contacted reported that they had now decided to discontinue the use of polyamine flocculants following the CPP request for information in August 2001.

The second water company had two sites which use polyamine flocculants however the sites were currently off-line due to capital works. When the company was approached a second time, once capital works were due to be completed, the relevant person at the water company could not be determined or contacted despite numerous attempts. After significant efforts attempts to secure samples from this source were abandoned with no success.

The third water company contacted also reported that they had now stopped using polyamine flocculants and samples of treated water would therefore not be available.

CPP then extended the scope for obtaining samples of polyamine treated water to Scotland and Northern Ireland and a potential site was identified in Northern Ireland.

Contact was also made with the Polyelectrolyte Producers Group (PPG) who agreed that some members of the group may be able to identify down-stream users of polyamines where sample collection may be possible. However, further attempts to secure such samples were fruitless. Additionally, it was unlikely that any samples available would have been from the UK and they would therefore have been of little relevance to the project.

After significant effort was made to secure samples from a variety of sources and locations it was concluded in July 2003, with the agreement of DWI, that there appeared to be little prospect of obtaining samples of treated water for analysis from the UK. (Although a potential supply was identified in Northern Ireland it was considered that a single source was insufficient to provide a robust and representative analysis of the potential for consumer exposure.) Objective 2 of the project could therefore not be completed.

1.2.3 Objectives 3, 4 and 5

Work conducted under Objective 2 lead to the conclusion that polyamines were now unlikely to be in use in water treatment in the UK, DWI requested that Objectives 3, 4 and 5 of the project now be discontinued.

Work carried out on objective 3, prior to its discontinuation, included the sourcing and acquiring of a commercially available polyamine flocculant.