## Executive Summary

The purpose of this project is to produce an up-to-date assessment of the risk of brominated flame retardants (BFRs) reaching drinking water sources in England and Wales. The study reviews BFRs as a group, building on the existing risk assessments that are available, and focuses on the potential for contamination of sources of drinking water.

A total of around 85 substances have been identified that could potentially be used as BFRs in England and Wales. Using a screening approach, the BFRs were assigned to one of three groups: those with a high potential for occurrence in water sources; those with a moderate potential for occurrence in water sources; and those with a low potential for occurrence in water sources. Based on the (in many cases limited) information available, the substances identified with the highest potential for occurrence in water sources are as follows.

BFRs identified as a high potential for occurrence in water sources

Tetrabromobisphenol-A (along with tetrabromobisphenol-A dimethyl ether)

Tetrabromobisphenol-A bis-(2-hydroxyethylether)

Tetrabromobisphenol-S

Dibromopentylglycol

Tribromoneopentylalcohol

Vinylbromide

Tribromophenyl allyl ether

Pentabromobenzyl acrylate

Pentabromotoluene

2,3-Dibromo-2-butene-1,4-diol

2,4-Dibromophenol

2,4,6-Tribromophenol

Pentabromophenol

1,2-Bis(2,4,6-tribromophenoxy)ethane

Tetrabromophthalic acid Na salt

Tetrabromophthalic acid diol (and diester of tetrabromophthalic acid and 1,2-benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, mixed esters with diethylene glycol and propylene glycol)

Tetrabromophthalic anhydride

Hexabromocyclododecane

1,2-Dibromo-4-(1,2-dibromomethyl) cyclohexane

Ethylene-bis(5,6-dibromonorbornane-2,3-dicarboximide)

1,3,5-tris(2,3-dibromo-propoxy)-2,4,6-triazine

Bromo-chlorinated paraffins

Tris(2,4-dibromophenyl) phosphate

Chlorinated brominated phosphate ester

Ethane-1,2-bis(pentabromophenyl)
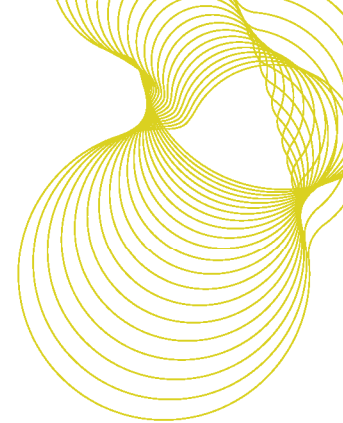
The available limited monitoring data suggest that widespread contamination of water sources from BFRs would not be expected and, when present, the concentration would be expected to be very low (low ng/l levels). Worst case calculations indicate that higher concentrations might occur in some water sources close to industrial point sources of release, for example plastics processing or textile processing sites. However the subsequent treatment processes used to purify the final drinking water would be expected to be effective at reducing these concentrations or removing these contaminants almost entirely.

There are a number of important data gaps that limit the robustness of the analysis that could be carried out notably:

- limited information on the actual levels of BFRs in drinking water and surface water worldwide;

- lack of information on the current amounts, actual applications and sites of use of BFRs in England and Wales;

- lack of information on the emissions to the environment;

- lack of experimental information on the physico-chemical properties, degradation and effects of BFRs; and

- lack of information on removal during treatment of surface water and ground water to produce drinking water.

In terms of options for future work, one option that could be considered to reduce the uncertainty in this work is to carry out further monitoring for the levels of BFRs in drinking water sources in England and Wales. A limiting factor here may be the lack of suitable analytical methods for many of the BFRs, particularly if very low (sub-µg/l levels) need to be determined.

An alternative option here would be to consider a review of the available data on BFRs in sediments in England and Wales as this could act as a useful marker for water sources where a higher risk of contamination from BFRs could occur.

It may also be possible to remove some of the uncertainties in this study by generating new information on the current amounts of BFRs used in England and Wales, the actual uses and sites of use of these BFRs, the emissions to the environment and the actual removal during treatment of drinking water. However this is likely to be time consuming and there is no guarantee that sufficient new information will be generated to address all of the uncertainties in the evaluation.

The outcomes of this research will be useful to water companies carrying out risk assessments under Regulation 27 of the Water Supply (Water Quality) Amendment Regulations 2007 (Statutory Instrument 2007/2734) or the Water Supply (Water Quality) Regulations 2001 (Amendment) Regulations 2007 (Statutory Instrument 2007/3374) and to the Drinking Water Inspectorate in reviewing the risk assessment reports submitted under Regulation 28 of this legislation.