SUMMARY

I OBJECTIVES

The general objectives of this project were (a) to review existing data on concentrations of iodinated disinfection by-products (DBPs), iodide and bromide in drinking water and its sources in the UK and worldwide, identifying any key factors that give rise to high concentrations of iodinated DBPs; (b) where UK occurrence data are lacking, estimate mean and maximum concentrations of iodinated DBPs likely to occur in UK drinking water, based on knowledge of disinfection and other treatment processes, data on levels of iodide in raw waters, and on levels of chlorinated or brominated DBPs and any other relevant factors; (c) to review existing knowledge of toxicity of the iodinated DBPs identified and if possible conduct a high level risk assessment; (d) to consider the availability of methods of analysis for the iodinated DBPs identified; (e) to devise a priority list of iodinated DBP for future research on occurrence within the UK drinking waters.

II REASONS

Studies in the USA have identified low levels of iodinated DBPs in drinking water. Concern has been raised that these compounds may be more toxic than chlorinated and brominated DBPs. However, the dataset on the toxicity of these compounds is far from complete. The conditions required for the production of iodinated DBPs are, at present, unknown in the UK and there is thought to be little data on the concentrations of iodinated DBPs in environmental and drinking water.

III CONCLUSIONS

- **Toxicity** - Concern has arisen that iodinated-DBPs are of greater toxicological concern than their brominated and chlorinated analogues. This view is predominantly based on non-regulatory research *in vitro* cytotoxicity and genotoxicity assays as a dataset of basic toxicological information on the iodinated-DBPs is not available. This lack of basic toxicological data makes any sound assessment of the risk posed by iodinated DBPs in drinking water impossible.

- **Analytical methods** - Although there is increasing interest in iodinated DBPs and more monitoring is likely to be undertaken, at present the analytical methodology is research-based. Sensitive methods may need to be developed for the measurement in water of a number of different iodinated compounds, including iodoacids and iodoform

- **Potential Concentrations in UK drinking water** - There is no evidence that iodide levels are higher in the UK than those detected in the USA. There is evidence that the formation of iodinated DBPs is increased by chloramination and reduced by ozonation and that iodinated-THMs may be removed by GAC to some extent. Chloramination is not common in the UK while ozonation and GAC are widely used. Taking all this information, together with modelling which estimates the formation of iodinated DBPs and limited monitoring data, it appears likely that the levels of iodinated DBPs in England and Wales will be no higher and will probably be lower than the low concentrations detected in the USA. It should be noted that the introduction of a standard for haloacetic acids in England and Wales may lead to an increased use of chloramination and if this occurred, further consideration of the concentration of iodinated DBPs in drinking water would be advisable.

IV RECOMMENDATIONS

- **Toxicology** - The potential genotoxicity of iodinated DBPs has generated much interest in these compounds and it will be important to expand the dataset on iodinated DBPs using more conventional toxicological methods. Further studies are now being carried out in the USA and it will be important to monitor their progress

- **Monitoring and Analysis** – At present, conditions in the UK indicate that iodinated DBPs are likely to be present at low concentrations. If the use of chloramination in the treatment of drinking water increased, then the formation of iodinated DBPs is also likely to increase. In this case there might be a need for the development of robust methods for the detection of iodinated DBPs. Monitoring in different water conditions and drinking water treatment processes could also then be considered, particularly those which may affect the production of iodinated DBPs such as chloramination, ozonation and GAC.

- It would be useful to have a good study of iodide concentrations in environmental waters, in particular, where there is abstraction for drinking water. This would enable the identification of any area of high iodide where the likelihood of iodinated DBPs production may be increased during drinking water treatment.

- **Prioritisation of iodinated DBPs for future work** - The prioritisation of iodinated DBPs for future study depends considerably on the results of further toxicity testing. It does appear that iodoacids, iodoform and iodate may be of greater toxic potential than iodinated THMs although this remains to be confirmed. It appears that the presence of iodide (a role for bromide, if any, is as yet unclear) in the source water and chloramination in the drinking water treatment process may increase the likelihood of iodinated DBP formation. Unfortunately current surveys of iodide levels in environmental waters have not yielded data that will enable the identification of areas of the UK with higher iodide levels which may be of greater risk for iodinated DBP production. Gathering of this basic information may be the priority before the identification of iodinated DBPs of particular importance for further research.