

## SUMMARY

### I OBJECTIVES

The general objectives of this project were (a) to review and assess any monitoring data currently undertaken regarding perchlorate in drinking water and its sources in the UK, (b) to establish the usage of perchlorate within England and Wales to identify any activity that may give rise to high environmental contamination, (c) to conduct a risk assessment to identify high and low risk drinking water sources (both public and private supplies) based on the usage pattern studies identified, (d) to devise and perform a one-year monitoring study of perchlorate at 20 sites of water used for drinking water (both public and private) across England and Wales, and (e) to identify possible implications for water supplies.

### II REASONS

Perchlorate has a well known historical use as a rocket fuel propellant, however, other more widespread uses include in fireworks, medicinal treatments and car airbags. It is also reported to occur naturally in saltpetre in areas of Chile and other countries and have natural atmospheric origins. Perchlorate may suppress the function of the thyroid, which can lead to a variety of adverse effects. Sensitive sub-populations are neonates, infants and pregnant mothers. Recent work has shown that perchlorate is a widespread contaminant in the United States of America (USA) and it is also emerging that it may be an environmental contaminant in other countries such as Japan, China and Korea (where it has been detected in both environmental and drinking waters).

### III CONCLUSIONS

- The review of monitoring data for perchlorate in the UK indicated that only minimal information was available; from a single set of data in a rural setting, there was no evidence of perchlorate in the raw, untreated drinking water. There has been no comprehensive monitoring of environmental waters or drinking water abstraction points near industrial sites or sites of historical commercial activity.
- A sensitive method for perchlorate analysis based on ion chromatography and tandem mass spectrometry has been developed and performance tested.
- The survey of levels of perchlorate indicated that it appears to be a general low level background contaminant of raw and treated drinking water in England and Wales. No discrete significant sources of contamination, for example through the use of rocket propellant, were identified, and these low levels may be the result of natural processes.
- Perchlorate was detected at three of the control low risk sites and at every higher-risk site during at least one of the four sampling sessions. Concentrations were comparable in each session and showed no obvious increase or decrease over the period of this study. No English or Welsh drinking water standards currently exist for perchlorate, and based on the levels found, none of the health-based values set by authoritative bodies would be exceeded.

- From the limited data, no apparent trends exist in relation to the time of year, the type of perceived higher-risk, the method of chlorination, the type of treatment, or any of the associated parameters measured (pH, chloride, alkalinity and nitrate).
- The conventional drinking water treatment processes involved did not show any signs of being able to remove perchlorate, though there was evidence that ion exchange (for nitrate removal) was effective at one site. Limited laboratory work identified hypochlorite as a potential source of trace quantities of perchlorate.

#### **IV RECOMMENDATIONS**

- To ensure awareness of any ongoing perchlorate monitoring undertaken by the Water Companies and other National Bodies in the UK.
- To monitor the situation in the USA with regard to the possibility of the Environmental Protection Agency (EPA) setting a drinking water standard for perchlorate.
- To further investigate the removal of perchlorate.
- To undertake a risk assessment of perchlorate specifically in the UK to determine whether there is a need for a health-based standard.