**Workshop on Safe Storage and Disposal of Redundant Mercury**

**St Anne's College, Oxford (UK)**

**13th & 14th October, 2009**

**BRIEFING NOTE FOR PARTICIPANTS**

## Introduction

The safe management of mercury no longer needed for products and processes is increasingly demanding the attention of policy makers, industry and independent experts. The workshop to be held in Oxford, UK on 13 and 14 October 2009 will consider the scientific and engineering issues associated with ensuring the safe storage and disposal of redundant mercury. The greatest quantity of redundant mercury arises from that no longer needed by the chloralkali industry, but there are other sources such as the mercury removed from obsolete products such as mercury thermometers. The workshop will help to inform the development of the UK's position in impending discussions at a European and UN level.

Specifically, it will examine key options for an underground repository for mercury, reflecting on the scientific and technical issues associated with ensuring safety during the operational and post-operational periods. The potential role of an interim surface storage facility will also be considered. Through presentations, discussion and breakout groups, the workshop will aim to identify consensus between participants, but also to record the range of views expressed where they differ.

## The policy context

In 2008, The European Union (EU) adopted Regulation 1102/2008 banning exports of mercury and certain mercury compounds to countries outside the Member States from March 2011. The chloralkali industry represents the largest industrial use of mercury in the EU: in 2008 about 9600 tonnes of mercury were still in use as a catalyst in 43 chloralkali electrolysis plants in Europe. This includes the mercury from the UK's one remaining set of mercury cells at Runcorn.

The chloralkali industry has voluntary committed to a phase out by latest 2020 of the use of mercury cells in favour of other technologies. According to the 2008 Regulation, the mercury arising from the decommissioning of mercury cells at chloralkali plants must remain within the EU and be stored in a way that is safe for human health and the environment. In 2008, Euro Chlor, which represents the European chlorine industry, made a voluntary agreement to place this mercury in sealed vessels in salt mines after July 2011. The European Commission (EC) did officially recognise this voluntary industry agreement through a Recommendation which highlights the key aspects of the agreement e.g. use

utmost care in selecting storage facilities for decommissioned mercury and have contracts in place with storage facility operators.

The 2008 Regulation says that the EC must submit a report to the European Parliament by 1 January 2010, reviewing safe disposal options for mercury. On the basis of this report, the Commission may suggest that the original Regulation is revised. Defra (the UK Government's Department of Environment, Food and Rural Affairs) intends to provide information to the EC to assist with its forthcoming report to the European Parliament. In particular, it wishes to ensure that a range of expert opinions on scientific and engineering issues associated with storage and disposal is communicated.

In addition to evolving policy at the EU level, an agreement to form a global, legally-binding instrument on mercury was made at the 25th Meeting of the UN Environment Programme's Governing Council. This includes provision for measures to "*enhance capacity for environmentally sound storage*". International meetings regarding the legally-binding instrument will commence in October 2008.

Defra wishes to inform discussions about any agreement on the fate of mercury no longer required and, in particular, to help inform a common position of the European Union for the formal negotiations.

**Ensuring safety**

Any disposal (or 'permanent storage') facility for mercury must ensure the continuing isolation of its components over very long timescales: in effect, any period over which future habitation in the area of the repository can be conceived. Given the toxicity of mercury, a very high level of containment must be achieved: only a very small fraction of a repository's inventory of mercury can be allowed to return to the biosphere in any year if current safety standards, particularly in respect of drinking water and ingestion through consumption of fish, are to be maintained.

It is therefore generally accepted that a surface facility cannot provide the necessary isolation over the required timescales to constitute permanent storage / disposal. Over time, the chances of the integrity of a surface repository being compromised by future events (for example accidental human intrusion or natural processes such as erosion or glaciations) are too great. However, an interim surface store may have a role to play in the interim management of redundant mercury (an option being considered seriously in the USA), and will be evaluated in the workshop.

In the EU the current requirements for the assessment of the safety of an underground repository for mercury are set out in Appendix A of the Council Decision of 19 December 2002 'establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC. It requires that a site specific risk

assessment be carried out for any repository for mercury which must consider both the operational and post-operational phases.

The safety case for the operational period of a repository may take due account of management interventions, and the integrity of the mercury storage vessels will be central to minimising risks. In the post-operational (or 'post-closure') period, safety in the longer term cannot continue to rely on human interventions, and it should be assumed that the waste containers will degrade. The properties of the geosphere and biosphere, and of the physical/chemical form of the mercury itself, will be key to delivering acceptably low risks in the long-term.

**Repository concepts**

An important area of discussion to inform impending international agreements is the form of the mercury stored/disposed in the repository. A concept based on storage/disposal of elemental (i.e. liquid) mercury in deep salt deposits has been proposed in the Regulation. This concept relies on the impermeability of appropriate salt deposits to liquids and gases, and the ability to seal (and/or for the convergent properties of the salt to self-seal) any openings into the repository formed during its operational phase.

Alternatively, a concept based on solidification of the mercury to substantially reduce its solubility in groundwater is under investigation in several countries. This may extend the range of potentially suitable disposal sites. However, solidification processes (the main being based on formation of mercury sulphide) are still under development, and increase the cost of disposal.

A comparison of the merits and developmental status of these two main options for disposal of mercury will be an area on which the workshop will focus.

**Further reading (click on the relevant links)**

- Mercury storage activities of the United Nations Environment Programme
- Eurochlor Question and Answer document on safe storage, February 2008
- BiPRO study for the European Commission, 2009
- Activities of the United States Government on mercury storage

Other links to publications related to mercury storage and disposal, together with a list of previous events relating to the topic, may be found on the IKIMP website (www.mercurynetwork.org.uk).