NICNAS Existing Chemicals Information Sheet

# Hexabromocyclododecane Draft Assessment Report Findings

November 2011

## What is Hexabromocyclododecane and how is it used?

Hexabromocyclododecane (HBCD) – CAS no. 25637-99-4 – is one of a group of polybrominated flame retardants, or PBFRs. It is used in expandable polystyrene foams in domestic and industrial building insulation, packaging of industrial products and bean bag fills. Other uses are as a polypropylene resin in housings for domestic electrical appliances and as a textile coating additive in blinds, baby car seats, public seating and textiles.

Finished articles containing HBCD include extruded polystyrene (XPS) boards, office equipment such as inkjet printers, projectors, scanners and ceiling ventilator covers.

## Background

In 2001, because of concerns of widespread use of flame retardants in households and industry, NICNAS assessed the extent of use of PBFRs in Australila and recommended that a full risk assessment be made, once testing of the chemicals was completed internationally.

Another survey by NICNAS in October 2004 indicated a significant increase in the use of HBCD in Australia compared to the period 1998-1999.

The decision to conduct a risk assessment of HBCD as a Priority Existing Chemical in 2005 was based on:

- its use as a flame retardant in polyester foam in domestic and industrial building insulation and in polystyrene beads used in insulation of articles such as housing for domestic electrical appliances and baby car seats. It is also used in other styrene resins, latex binders, unsaturated polyesters and textile coatings.
- Adverse effects from exposure to HBCD, such as increase in liver weights and thyroid-related hyperplasia, and effects on reproductive parameters. Emerging evidence indicated that HBCD was persistent in the atmosphere and had adverse effects on the environment.

## Manufacture and import

HBCD is not manufactured in Australia, but is imported as powder or granules, in expandable polystyrene (EPS) resin, as liquid dispersions and as a component of the plastic in finished articles.

NICNAS's assessment showed a decrease in the import of HBCD over recent years, with approximately 90 tonnes imported in 2006/2007 and about 50 tonnes in 2009-2010. The powder form is no longer imported.

## Health effects

Animal studies indicate that HBCD is rapidly absorbed and excreted (within 72 h) after oral exposure. Tissue distribution is widespread with the highest concentrations found in fat tissue and muscles followed by the liver, lung, kidney, blood and brain.

HBCD has low acute toxicity via all routes, low eye and skin irritation and sensitising potential in rodents. It is also not a skin sensitiser in humans.

Available data do not support a genotoxic or carcinogenic potential for HBCD. However, there are reports of increased liver, thyroid and pituitary weights in rats exposed repeatedly to HBCD.

HBCD shows no marked adverse effects on fertility parameters. It has developmental effects in rats such as low pup weights and increased mortality following exposure to HBCD through milk.

### Public exposure and health risk

Consumers using treated products (e.g. automotive upholostery) may be exposed to HBCD that diffuses out of the articles. Estimates of dermal exposure (main route) from this source indicate very low exposure and therefore low risk to adults as well as children.

Indirect exposure to HBCD through the environment may occur by consumption of food and drinking water contaminated by HBCD and by inhalation of indoor and outdoor air. Exposure to HBCD from these sources appears to be low and hence low risk is expected.

Toddlers may have the highest exposure to HBCD through ingestion and inhalation of dust/soil containing HBCD released from HBCD-containing articles in the house, however, the risk of developing adverse health effects is low. The risk to infants through exposure to HBCD in breast milk is also estimated to be low.

### Occupational exposure and health risk

Exposure of workers to HBCD depends on the form of HBCD used, powder or granular forms or aqueous solution, the nature of the work, and the different use patterns.

Workers in the polymer industry may be exposured to HBCD during weighing, compounding, conversion or moulding activities. Th risk to workers of acute adverse health effects such as inhalation toxicity, skin, eye and respiratory irritation and skin sensitisation is low. However, the risk of chronic harmful effects from exposure during all these processes (particularly weighing and compounding of powder form) is high in a reasonable worst-case scenario.

### Environmental effects, exposure and risk

There is sufficient evidence to indicate that HBCD is persistent, bioaccumulative and toxic, expecially to aquatic organisms. It meets the Persistent Organic Pollutants (POPs) criteria for persistence, bioaccumulation and toxicity listed under the Stockholm Convention on POPs.

Calculating ‘safe’ concentrations for compounds such as HBCD that are pesistent in the environment, bioaccumulate and also biomagnify in the food chain is difficult because potential adverse effects may not become evident for very long periods of time.

### Assessment Outcomes

The greatest risks are to the environment and workers handling HBCD and both need to be managed.

NICNAS has made a series of recommendations for suitable management to relevant authorities, and to importers and formulators of HBCD and HBCD products. Implicit is that best practice is implemented to minimise occupational and public exposure and environmental impact.

### Recommendations

The report contains three main recommendations.

- An OHS hazard classification to be included in the Hazardous Substances Information System (HSIS) and suppliers and employers to note the hazard classification and amend Material Safety Data Sheets and labels accordingly.
- Manufacturers and importers of flame retardant articles should voluntarily phase out the import and use of HBCD chemical, and articles containing the chemical, as an interim measure to support eventual elimination of HBCD.

- State and Territory environmental agencies develop an action plan to reduce and eventually eliminate HBCD levels in the Australian environment.

## Further information:

The full NICNAS Priority Existing Chemical report on HBCD can be accessed at: link

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