

## Potential Priority Chemicals:

Non-halogenated Aromatic Phosphates

April 11, 2013  
Meeting of the Scientific Guidance Panel  
Biomonitoring California<sup>1</sup>

At the March 16, 2012 meeting of the Scientific Guidance Panel (SGP), the Panel recommended including the class “non-halogenated aromatic phosphates” as designated chemicals for Biomonitoring California. This class is now under consideration by the SGP as potential priority chemicals.

The following table (on page 2) summarizes selected information relevant to the criteria for recommending priority chemicals, as specified in the enabling legislation (SB 1379<sup>2</sup>). Details and references are provided in OEHHA (2012), unless otherwise noted. The known or potential toxicity of chemicals in this class of compounds is also summarized in OEHHA (2012).

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<sup>1</sup> California Environmental Contaminant Biomonitoring Program (also known as Biomonitoring California), codified at Health and Safety Code section 105440 et seq.

<sup>2</sup> SB 1379, Perata and Ortiz, Chapter 599, Statutes of 2006. Available at:  
[http://www.oehha.ca.gov/multimedia/biomon/pdf/sb\\_1379\\_bill\\_20060929.pdf](http://www.oehha.ca.gov/multimedia/biomon/pdf/sb_1379_bill_20060929.pdf)

Potential Priority Chemical(s)	Use	Detected in Humans (matrix)	Biomonitoring California Analytical Methods
<b>Non-halogenated aromatic phosphates<sup>3,4</sup>, including</b>			
Bisphenol A bis(diphenyl) phosphate	Flame retardant in electronic equipment		Method development currently under consideration
<i>t</i> -Butylphenyl diphenyl phosphate	Plasticizer and flame retardant in items including polyvinyl chloride (PVC), textile coatings, lubricants, and hydraulic fluids		
2-Ethylhexyl diphenyl phosphate (EHDPP)	Plasticizer in food-packaging plastics	Breast milk	
Isodecyl diphenyl phosphate	Plasticizer in some commercial resins and PVC products		
Isopropylated triphenyl phosphate	Plasticizer and flame retardant in items including PVC products, adhesives, paints, polyurethane foam, electronics, and hydraulic fluid		
Resorcinol bis(diphenyl phosphate)	Flame retardant in electronic equipment		
Tricresyl phosphate	Flame retardant and plasticizer; additive to industrial lubricants	Breast milk <sup>5,6</sup>	
Triphenyl phosphate (TPP)	Flame retardant in polyurethane foam and electronic equipment	Urine, plasma <sup>7</sup> , breast milk	

<sup>3</sup> All members of the chemical class are potential priority chemicals, including, but not limited to, the chemicals shown in the table.

<sup>4</sup> Parent chemicals would be listed as priority chemicals for Biomonitoring California, if the SGP recommends inclusion of this class. The Program would determine the appropriate target chemicals for measurement.

<sup>5</sup> Sundkvist *et al.* (2010), cited in OEHHA (2012) as detecting EHDPP and TPP, also found tricresyl phosphate in breast milk, but at much lower levels than EDHPP and TPP.

<sup>6</sup> Schindler *et al.* (2013) analyzed more than 300 urine samples of pilots and cabin crews for di-*m*-cresylphosphate and di-*p*-cresylphosphate, which are likely metabolites of tricresyl phosphate. These metabolites were found in only one sample, at levels near the limit of detection. In an earlier study, Schindler *et al.* (2009) did not find these compounds in 30 urine samples from the general German population.

<sup>7</sup> Jonsson *et al.* (2001) detected triphenyl phosphate in three plasma samples collected in Sweden.

**Selected References:**

Jonsson O, Dyremark E, Nilsson U (2001). Development of a microporous membrane liquid-liquid extractor for organophosphate esters in human blood plasma: identification of triphenyl phosphate and octyl diphenyl phosphate in donor plasma. *J Chromatogr B Biomed Sci* 755:157-64.

Office of Environmental Health Hazard Assessment (OEHHA, 2012). Non-halogenated Aromatic Phosphates. Materials for March 16, 2012 Meeting of Scientific Guidance Panel (SGP) Biomonitoring California. Available at:  
<http://www.oehha.ca.gov/multimedia/biomon/pdf/031612NhArP.pdf>

Schindler B, Förster K, Angerer J (2009). Determination of human urinary organophosphate flame retardant metabolites by solid-phase extraction and gas chromatography–tandem mass spectrometry. *J Chromatogr B Analyt Technol Biomed Life Sci* 877:375–381.

Schindler B, Weiss T, Schutze A *et al.* (2013). Occupational exposure of air crews to tricresyl phosphate isomers and organophosphate flame retardants after fume events. *Arch Toxicol* 84:645-648.