

## Potential Priority Chemicals:

*p,p'*-Bisphenols  
and  
Diglycidyl Ethers of *p,p'*-Bisphenols

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

At the November 8, 2012 meeting of the Scientific Guidance Panel (SGP), the Panel recommended including the classes “*p,p'*-bisphenols” and “diglycidyl ethers of *p,p'*-bisphenols” as designated chemicals for Biomonitoring California. These two classes of chemicals are 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 selected chemicals in this group 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 Chemicals	Use	Detected in Humans (matrix)	Biomonitoring California Analytical Methods
<b><i>p,p'</i>-Bisphenols<sup>3,4</sup>, including</b>			Method under development to measure BPAF, BPB, BPF, BPS, and BADGE in urine. Method could be expanded to measure more compounds.
Bisphenol AF (BPAF)	Synthetic rubber components in food processing equipment; specialty polymers for high heat applications	-- <sup>5</sup>	
Bisphenol B (BPB)	Epoxy resins, such as for can linings	Urine, serum	
Bisphenol F (BPF)			
Bisphenol S (BPS)	Developer in thermal paper, such as for cash register receipts; epoxy resins, such as for can linings and plastics	Urine	
4,4'-Sulfonylbis[2-(2-propene-1-yl)phenol] (TGSA)	Developer in thermal paper, such as for cash register receipts		
<b>Diglycidyl ethers of <i>p,p'</i>-bisphenols<sup>3,4</sup>, including</b>			
Bisphenol A diglycidyl ether (BADGE)	Epoxy resins, such as for can linings and dental restorative materials	Urine <sup>6</sup>	
Bisphenol F diglycidyl ether (BFDGE)	Epoxy resins, such as for can linings		

<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 one or both of these classes. The Program would determine the appropriate target chemicals for measurement.

<sup>5</sup> A study by Fernandez *et al.* (2004) was cited by NTP (2008) as having found BPAF in extracts of human female mammary or abdominal adipose tissue samples (see OEHHA [2012] for these references). However, Fernandez *et al.* provided no specific information on detecting BPAF. Biomonitoring California was not successful in reaching Fernandez to confirm NTP's description.

<sup>6</sup> Wang *et al.* (2012) measured BADGE and three of its derivatives (BADGE·H<sub>2</sub>O, BADGE·H<sub>2</sub>O·HCl, BADGE·2H<sub>2</sub>O) in 127 urine samples collected in the U.S. (n = 31) and China (n = 96; 26 adults and 70 children). BADGE and BADGE derivatives were found in 100% of the samples. Levels of the BADGE·2H<sub>2</sub>O derivative were the highest among the 4 BADGE compounds tested.

### **Selected References**

Office of Environmental Health Hazard Assessment (OEHHA, 2012). *p,p'*-Bisphenols and Diglycidyl Ethers of *p,p'*-Bisphenols. Materials for November 8, 2012 Meeting of Scientific Guidance Panel (SGP) for Biomonitoring California. Available at:  
<http://www.oehha.ca.gov/multimedia/biomon/pdf/110812Bisphenols.pdf>

Wang L, Wu Y, Zhang W, Kannan K. (2012). Widespread occurrence and distribution of bisphenol A diglycidyl ether (BADGE) and its derivatives in human urine from the United States and China. *Environ Sci Technol* 46:12968–12976.