



# Alternatives to BPA in Thermal Paper Partnership

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## Report Outline



# Purpose of Presentation

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- Explain elements of DfE Alternatives Assessment Report
- Focus attention on information and data needs
- Enhance productivity of subsequent discussions



# 1.0 Introduction

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1.1 Purpose of the BPA Alternatives Assessment

1.2 Scope of the BPA Alternatives Assessment



## 2.0 BPA in Thermal Paper

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2.1 Thermal Print Machinery

2.2 Chemistry of Thermal Paper

2.3 Applications



## 3.0 Exposure to BPA in Thermal Paper

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3.1 Exposure Pathways and Routes (General)

3.2 Industrial Releases and Exposures

3.3 Worker Exposures

3.4 Consumer and General Population Exposures



# 4.0 BPA Alternatives Evaluations

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4.1 Summary of Alternatives

4.2 Chemical Summary Assessments

# Flame Retardants in Printed Circuit Boards



Human Health  
Hazard Concern

Ecotoxicity  
Hazard Concern

Environmental  
Concern

Chemical	CASRN	Human Health Effects									Aquatic Toxicity		Environmental		Exposure Considerations	
		Acute Toxicity	Skin Sensitizer	Cancer Hazard	Immunotoxicity	Reproductive	Developmental	Neurological	Systemic	Genotoxicity	Acute	Chronic	Persistence	Bioaccumulation		
<b>Reactive Flame Retardant Chemicals<sup>2</sup></b>																
<b>Tetrabromobisphenol A (TBBPA) (Albemarle, Chemtura, and others)</b>																
TBBPA	79-94-7	L	L	L	L	L	M	L	L	L	H	H	M	L		
<b>DOPO (6H-Dibenz[c,e][1,2] oxaphosphorin, 6-oxide) (Samko Co., Ltd. and others)</b>																
DOPO	35948-25-5	L	L	L	L	L	L	L	L	L	M	M	L	L		
<b>Fyrolflex PMP (Aryl alkylphosphonate) (Supresta)</b>																
Fyrolflex PMP	Proprietary	L	L	L	L	L	L	L	L	L	L	L	H	L		
<b>Reactive Flame Retardant Resins<sup>2</sup></b>																
<b>Reaction product of TBBPA - D.E.R. 538 (Phenol, 4,4'-(1-methylethylidene)bis[2,6-dibromo-, polymer with (chloromethyl)oxirane and 4,4'-(1-methylethylidene)bis[phenol]] (Dow Chemical)</b>																
D.E.R. 538	26265-08-7	L	M	M <sup>0</sup>	L	M <sup>0</sup>	M <sup>0</sup>	L	L	M	L	L	M	L		
<b>Reaction Product of DOPO - Dow XZ-92547 (reaction product of an epoxy phenyl novolak with DOPO) (Dow Chemical)</b>																
Dow XZ-92547	Proprietary	L	M	M <sup>0</sup>	L	M <sup>0</sup>	M <sup>0</sup>	L	L	M <sup>0</sup>	L	L	H	L		
<b>Reaction product of Fyrolflex PMP with bisphenol A, polymer with epichlorohydrin (Representative Resin)</b>																
Representative Fyrolflex PCB Resin	Unknown	L	L	M <sup>0</sup>	L	M <sup>0</sup>	M <sup>0</sup>	L	L	M <sup>0</sup>	L	L	H	L		

# 5.0 Considerations for Selecting a Replacement for BPA



5.1 Positive Attributes

5.2 Performance

5.3 Process and Equipment Considerations

5.4 Economic Viability

5.5 Alternative Technologies

5.6 Methods for Selecting BPA Alternatives



# 6.0 Recommendations

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## 7.0 References