

GreenScreen® Assessment for [Bisphenol A Bis-(diphenyl phosphate) (CAS#181028-79-5 and 5945-33-5)]

Method Version: GreenScreen® Version 1.2¹

Verified or Non-Verified²: NON-VERIFIED

Introduction^{3,4,5}

This GreenScreen assessment is based on the information reported in the corresponding chemical hazard profile in “An Alternatives Assessment for the Flame Retardant Decabromodiphenylether (DecaBDE) Final Report”³. Additional information on hazard endpoints beyond what was included in the final report was not sought with the exception of reactivity. Hazard classification information for reactivity was supplemented because it is not included in the DfE report but is needed to apply the GreenScreen Benchmark system.

Hazard classification levels reported in the DfE profiles and in this GreenScreen report may differ due to differences between criteria as defined in the DfE “Alternatives Assessment Criteria for Hazard Evaluation”⁴ and the GreenScreen for Safer Chemicals v1.2 methods⁵. Any differences in interpretation are explained and justified in this GreenScreen report.

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Date: February 9, 2014 (expires after 3 years)	Date: March 19, 2014
Licensed Profiler or Certified Practitioner (specify): N/A	

¹ Use GreenScreen® Assessment Procedure (Guidance) V1.2

² “NON-VERIFIED” means that Verification Has Not Been Performed on this GreenScreen Assessment

³ An Alternatives Assessment for the Flame Retardant Decabromodiphenylether (DecaBDE) Final Report Available at: <http://www.epa.gov/dfe/pubs/projects/decaBDE/deca-report-complete.pdf>; p 4-149, accessed 2/09/2014.

⁴ Available at: http://www.epa.gov/dfe/alternatives_assessment_criteria_for_hazard_eval.pdf, accessed 10/2013.

⁵ Details available at: <http://www.cleanproduction.org/Greenscreen.v1-2.php>, accessed 10/2013.

Confirm application of the *Disclosure and Assessment Rules and Best Practice*⁶: (List any deviations)

Disclosure thresholds applied by DfE are unclear in the DfE report.

Chemical Name (CAS #):

Bisphenol A Bis-(diphenyl phosphate) (CAS#181028-79-5 and 5945-33-5)

Also Called:

Phosphoric trichloride, reaction products with bisphenol A and phenol (TSCA Inventory); Phosphoric acid, isopropylidenedi-p-phenylene tetraphenyl ester; 2,2-Bis[4-[bis(phenoxy)phosphoryloxy]phenyl]propane; 4,4'-(Isopropylidenediphenyl) bis(diphenyl phosphate); Bisphenol A bis(diphenyl phosphate); Bisphenol A tetraphenyl diphosphate; BADP; BDP; BPADP; Phosphoric acid, P,P'-[(1-methylethylidene)di-4,1-phenylene] P,P',P',P'-tetraphenyl ester (TSCA Inventory) for 5945-33-5

Tradenames:

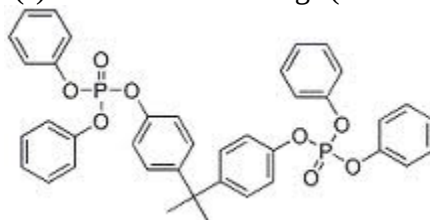
Fyrolflex BDP

Suitable analogs or moieties of chemicals used in this assessment (CAS #'s):

Confidential compounds

Chemical Structure(s):

*Note: Include chemical structure(s) of all suitable analogs (and /or moieties) used in the assessment.



Notes related to production specific attributes⁷:

For Inorganic Chemicals and relevant particulate organics (if not relevant, list NA)

Define Properties:

1. Particle size (e.g., silica of respirable size)
2. Structure (e.g., amorphous vs. crystalline)
3. Mobility (e.g., water solubility, volatility)
4. Bioavailability

For Polymeric Materials: (delete this section if not a polymeric material)

Identify Monomers and Corresponding Properties

⁶ See GreenScreen Guidance V1.2 Section 8

⁷ Note any composition or hazard attributes of the chemical product relevant to how it is manufactured. For example, certain synthetic pathways or processes result in typical contaminants, by-products or transformation products. Explain any differences between the manufactured chemical product and the GreenScreen assessment of the generic chemical by CAS #.

“This alternative is a polymer. The oligomer where $n = 1$ (also referred to as CASRN 5945-33-5) has a MW <1,000 and is amenable to EPI v4.0 estimation methods for physical/chemical and environmental fate values in the absence of experimental data. In commerce, CASRN 5945-33-5 is used interchangeably with 181028-79-5 and both represent in practice a substance that is 80+% BAPP with higher homologues ($n=1, 2$ or 3). Bisphenol A (CASRN 80-05-1), triphenyl phosphate (CASRN 115-86-6) and phenol (CASRN 108-95-2) are potential impurities in commercial formulations (NICNAS NA/773, 2000). The higher MW oligomers that have MWs >1,000 are assessed together using information contained in the literature concerning polymer assessment and professional judgment (Boethling et al., 1997).”

“The $n = 1$ structure comprises 80-85% of the mixture, with the balance primarily made up of higher oligomers ($n = 2, 3, 4$, etc.). The commercial mixture contains triphenyl phosphate as an impurity.”⁸

Further information to address the following section was not available in the report.

1. % of Each Monomer
 - a) Monomer 1: The $n = 1$ structure comprises 85% of the mixture, with the balance primarily made up of higher oligomers ($n = 2, 3, 4$, etc.). The commercial mixture contains triphenyl phosphate as an impurity
 - b) Monomer 2
 - c) Monomer 3
2. Are the monomers blocked? (Y/N)
3. Molecular Weight (MW) of polymeric material
4. % of polymeric material with
 - a) MW <500
 - b) MW <1,000
5. % Weight Residual Monomers
6. Solubility/Dispersability/Swellability
7. Particle size
8. Overall charge of polymeric material
9. Identify constituents and residual concentrations of
 - a) Catalysts
 - b) Processing aids
10. Identify any monomers, oligomers, catalysts or processing aids classified as Benchmark 1 according to the hazard identification lists in the GreenScreen List Translator.

Identify Applications/Functional Uses:
(e.g., Cleaning product, TV casing)

1. Flame Retardant

GreenScreen Benchmark Score and Hazard Summary Table:^{9,10,11,12}

⁸ An Alternatives Assessment for the Flame Retardant Decabromodiphenylether (DecaBDE) Final Report Available at: <http://www.epa.gov/dfe/pubs/projects/decaBDE/deca-report-complete.pdf>; p 4-149

⁹ See Appendix A for a glossary of hazard endpoint acronyms

¹⁰ See Appendix B for alternative GreenScreen Hazard Summary Table (Classification presented by exposure route)

¹¹ For inorganic chemicals only, see GreenScreen Guidance V1.2 Section 14.4. (Exceptions for Persistence)

¹² For Systemic Toxicity and Neurotoxicity, repeated exposure data are preferred. Lack of single exposure data is not a Data Gap when repeated exposure data are available. In that case, lack of single exposure data may be represented as NA instead of DG. See GreenScreen Guidance V1.2 Section 9.3.

BISPHENOL A BIS-(DIPHENYL PHOSPHATE) was assigned a **Benchmark Score of U** (Unspecified). A chemical must have sufficient data to assess at least 3 out of 5 Group I human health hazard endpoints (max 2 DGs). Permissible data gaps may only include Endocrine Activity and either Reproductive or Developmental Toxicity. BISPHENOL A BIS-(DIPHENYL PHOSPHATE) could be a Benchmark 1 if the data gap for carcinogenicity, reproductive toxicity, endocrine activity, or skin sensitization were filled with data indicating a high hazard score. In addition, Bisphenol A Bis-(diphenyl phosphate) could be a Benchmark 1_{TP} if the transformation product Bisphenol A is determined to be feasible.

Green Screen Hazard Ratings: [<i>Bisphenol A Bis-(diphenyl phosphate)</i>]																			
Group I Human					Group II and II* Human								Ecotox		Fate		Physical		
C	M	R	D	E	AT	ST		N		SnS*	SnR*	IrS	IrE	AA	CA	P	B	Rx	F
						single	repeated*	single	repeated*										
DG	L	DG	L	DG	L		L		L	L	DG	M	M	L	L	vH	H	L	L

Note: Hazard levels (Very High (vH), High (H), Moderate (M), Low (L), Very Low (vL)) in *italics* reflect estimated values, authoritative B lists, screening lists, weak analogues, and lower confidence. Hazard levels in **BOLD** font are used with good quality data, authoritative A lists, or strong analogues. Group II Human Health endpoints differ from Group II* Human Health endpoints in that they have four hazard scores (i.e., vH, H, M and L) instead of three (i.e., H, M and L), and are based on single exposures instead of repeated exposures.

Environmental Transformation Products and Ratings¹³:

Identify feasible and relevant environmental transformation products (i.e., dissociation products, transformation products, valence states) and/or moieties of concern¹⁴

“Degradation of BAPP has been demonstrated in experimental studies (Iwami, 1994; Hogg, 1997; Armstrong and White, 1999); however the degradates have not been identified. Degradation of BAPP by sequential dephosphorylation could produce phenol (CASRN 108-95-2), diphenyl phosphate (CASRN 838-85-7), and bisphenol A (CASRN 80-05-1). The importance of dephosphorylation relative to possible competing pathways has not been demonstrated in a published study. Therefore the hazards of the theoretical degradation products were not considered in this hazard assessment.”¹⁵

Functional Use	Life Cycle Stage	Transformation Pathway	Environmental Transformation Products	CAS #	Feasible and Relevant?	GreenScreen List Translator Score or GreenScreen Benchmark Score
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¹³ See GreenScreen Guidance V1.2 Section 13

¹⁴ A moiety is a discrete chemical entity that is a constituent part or component of a substance. A moiety of concern is often the parent substance itself for organic compounds. For inorganic compounds, the moiety of concern is typically a dissociated component of the substance or a transformation product.

¹⁵ An Alternatives Assessment for the Flame Retardant Decabromodiphenylether (DecaBDE) Final Report Available at: <http://www.epa.gov/dfe/pubs/projects/decaBDE/deca-report-complete.pdf>; p 4-149

			Bisphenol A	80-05-7		Benchmark 1 (TechLaw in IC2 database ¹⁶) LT-1 (Pharos)
			Phenol	108-95-2		LT-P1 (Pharos)
			Diphenyl phosphate	838-85-7		LT-U (GreenWERCS)

Introduction

Hazard Classification Summary Section:

For all hazard endpoints:

- **Search all GreenScreen specified lists. Report relevant results either in each hazard endpoint section or attach to the end of the report.**
- **Always indicate if suitable analogs or models were used.**
- **Attach modeling results (See Appendix C).**
- **Include all references either in each hazard endpoint section or at the end of the report.**

Group I Human Health Effects (Group I Human)

Carcinogenicity (C) Score (H, M or L): DG

BISPHENOL A BIS-(DIPHENYL PHOSPHATE) was assigned a score of DATA GAP for Carcinogenicity based on a moderate score and report summaries provided within the EPA's DfE alternatives assessment. While the moderate designation in both GreenScreen and EPA's alternatives assessment is based on the same measured endpoints, the moderate DfE score was based on "expert judgment"; however, no information was provided explaining what "expert judgment" was based on. Therefore, in a precautionary approach, this endpoint was assigned a score of data gap following GreenScreen guidance.

The summary provided within the EPA's alternatives assessment was as follows:

MODERATE: BAPP may have low potential for carcinogenicity based on expert judgment; there were no structural alerts in the molecule. However, there is uncertainty regarding the carcinogenicity of BAPP due to the lack of data for this substance. Carcinogenic effects cannot be completely ruled out.

Mutagenicity/Genotoxicity (M) Score (H, M or L): L

BISPHENOL A BIS-(DIPHENYL PHOSPHATE) was assigned a score of LOW for Mutagenicity based on a low score and report summaries within the EPA's DfE alternatives assessment. The low designation in both GreenScreen and EPA's Alternatives assessment is based on the same measured endpoints. The score was based on sufficient study details which were reported in a secondary source and therefore not reported in italics within the GreenScreen assessment.

¹⁶ http://www.newmoa.org/prevention/ic2/projects/assessments/TechLaw_BPA_AA.pdf

The summary provided within the EPA's alternatives assessment was as follows:

LOW: There is uncertain potential for mutagenicity based on experimental studies. Neither the commercial mixture nor the predominant component induced gene mutations in several in vitro assays in bacteria and did not induce chromosomal aberrations in CHO or CHL cells in vitro. The commercial mixture did not increase micronucleated polychromatic erythrocytes in mouse bone marrow cells in vivo.

Reproductive Toxicity (R) Score (H, M, or L): DG

BISPHENOL A BIS-(DIPHENYL PHOSPHATE) was assigned a score of DATA GAP for Reproductive Toxicity based on a low score and report summaries within the EPA's DfE Alternatives assessment. While the low designation in both GreenScreen and EPA's Alternatives assessment is based on the same measured endpoints, the low DfE score was based on "expert judgment"; however, no information was provided explaining what "expert judgment" was based on. Therefore in a precautionary approach this endpoint was assigned a score of data gap following GreenScreen guidance.

The summary provided within the EPA's alternatives assessment was as follows:

LOW: Estimated to have low potential for reproductive effects based on expert judgment. No data located.

Developmental Toxicity incl. Developmental Neurotoxicity (D) Score (H, M or L): *L*

BISPHENOL A BIS-(DIPHENYL PHOSPHATE) was assigned a score of LOW for Developmental Toxicity based on a low score within the EPA's DfE alternatives assessment. For developmental toxicity, EPA's DfE uses numerical data quantifying the hazard associated with the 3 different hazard levels, whereas GreenScreen does not base the hazard score on a numerical rating system but bases classifications on listing under GHS, the EU, and NTP. Therefore the conversion of DfE's developmental and reproductive toxicity conclusions to comparable GreenScreen hazard scores is done on a case by case basis. DfE's low score was based on expert judgment (Estimated by analogy) and a 14-day developmental study reported in a secondary source. Therefore this score is reported in italics within the GreenScreen assessment.

The summary provided within the EPA's alternatives assessment was as follows:

LOW: Estimated to have low potential for developmental effects based on a structurally similar confidential analog. No fetal effects reported. Experimental data located are inadequate to designate a hazard concern for this endpoint.

Endocrine Activity (E) Score (H, M or L): DG

BISPHENOL A BIS-(DIPHENYL PHOSPHATE) was assigned a score of Data Gap for Endocrine Activity. While the low designation in both GreenScreen and the "low potential" score in EPA's Alternatives assessment are based on the same measured endpoints, the low potential DfE score was based on "expert judgment"; however, no information was provided explaining what "expert judgment" was based on. Therefore in a precautionary approach this endpoint was assigned a score of data gap following GreenScreen guidance.

The summary provided within the EPA's alternatives assessment was as follows:

BISPHENOL A BIS-(DIPHENYL PHOSPHATE) is not expected to affect endocrine activity based on expert judgment. BAPP does not release bisphenol A. No data located.

Group II and II* Human Health Effects (Group II and II* Human)

Note: Group II and Group II endpoints are distinguished in the v 1.2 Benchmark system (the asterisk indicates repeated exposure). For Systemic Toxicity and Neurotoxicity, Group II and II* are considered sub-endpoints. When classifying hazard for Systemic Toxicity/Organ Effects and Neurotoxicity endpoints, repeated exposure results are required and preferred. Lacking repeated exposure results in a data gap. Lacking single exposure data does not result in a data gap when repeated exposure data are present (shade out the cell in the hazard table and make a note). If data are available for both single and repeated exposures, then the more conservative value is used.*

Acute Mammalian Toxicity (AT) Group II Score (vH, H, M or L): L

BISPHENOL A BIS-(DIPHENYL PHOSPHATE) was assigned a score of LOW for Acute Mammalian Toxicity. The low designation for Acute Mammalian Toxicity in both GreenScreen and EPA's alternatives assessment is based on the same measured endpoints. The score was based on sufficient study details which were reported in a secondary source and therefore not reported in italics within the GreenScreen assessment.

The summary provided within the EPA's alternatives assessment was as follows:

LOW: Based on oral and dermal LD₅₀ values of >2,000 mg/kg in rats for both the commercial mixture and its predominant component. No data located regarding the acute inhalation hazard.

Systemic Toxicity/Organ Effects incl. Immunotoxicity (ST)

(ST-single) Group II Score (single dose: vH, H, M or L):

DfE evaluates Systemic Toxicity based on repeated exposures. Lack of data for Systemic Toxicity based on a single exposure does not constitute a data gap when data for repeated exposures are available.

(ST-repeat) Group II* Score (repeated dose: H, M, L): L

BISPHENOL A BIS-(DIPHENYL PHOSPHATE) was assigned a score of LOW for Systemic Toxicity/Organ Effects based on a low score and report summaries within the EPA's DfE alternatives assessment. The low designation for repeat dose systemic toxicity/organ effects in both GreenScreen and EPA's Alternatives assessment is based on the same measured endpoints. The score was based on empirical data provided within EPA's alternatives assessment and therefore is not reported without italics within the GreenScreen assessment.

The summary provided within the EPA's alternatives assessment was as follows:

LOW: There were no treatment-related changes in systemic toxicity parameters measured at doses up to 1,000 mg/kg-day in a 28-day oral study in Sprague-Dawley rats. Although only one species has been studied, these were comprehensive OECD or EEC guideline studies that found no dose-related effects for either the commercial mixture or its predominant component.

In addition:

Estimated to have low potential for immunotoxicity based on expert judgment. No data located.

Neurotoxicity (N)

(N-single) Group II Score (single dose: vH, H, M or L):

DfE evaluates Neurotoxicity based on repeated exposures. Lack of data for Neurotoxicity based on a single exposure does not constitute a data gap when data for repeated exposures are available.

(N-repeat) Group II* Score (repeated dose: H, M, L): L

BISPHENOL A BIS-(DIPHENYL PHOSPHATE) was assigned a score of LOW for repeat dose Neurotoxicity based on a low score within the EPA's DfE alternatives assessment. The low designation in both GreenScreen and EPA's alternatives assessment is based on the same measured endpoints. The score was based on a NOAEL concentration from an analogous chemical and therefore is reported in italics within the GreenScreen assessment.

The summary provided within the EPA's alternatives assessment was as follows:

LOW: Estimated based on analogy to phosphoric acid, mixed esters with [1,1'-bisphenyl-4,4'-diol] and phenol (BPBP). In one experimental study of BPBP, there were no neurotoxic effects observed at doses up to 1,000 mg/kg-day following 28-day oral administration of the commercial mixture to rats. This study was not designed to assess all neurological parameters; however, it supports the estimated Low hazard designation. Although low hazard is predicted, there is uncertainty due to lack of data on cholinesterase inhibition which is associated with phosphate esters.

Skin Sensitization (SnS) Group II* Score (H, M or L): L

BISPHENOL A BIS-(DIPHENYL PHOSPHATE) was assigned a score of LOW for Skin Sensitization. The low designation for skin sensitization in both GreenScreen and EPA's alternatives assessment is based on the same measured endpoints. The score was based on a study with sufficient detail within EPA's alternatives assessment and therefore is not reported in italics within the GreenScreen assessment.

The summary provided within the EPA's alternatives assessment was as follows:

LOW: Commercial mixture and its predominant component were not skin sensitizers in two studies of guinea pigs.

Respiratory Sensitization (SnR) Group II* Score (H, M or L): DG

BISPHENOL A BIS-(DIPHENYL PHOSPHATE) was assigned a score of DATA GAP for Respiratory Sensitization. This conclusion was made based on no data located.

Skin Irritation/Corrosivity (IrS) Group II Score (vH, H, M or L): M

BISPHENOL A BIS-(DIPHENYL PHOSPHATE) was assigned a score of MODERATE for Skin Irritation/Corrosivity based on tests results provided within the EPA's DfE alternatives assessment which indicates BAPP was a slight skin irritant in rabbits. The score was based on a study with sufficient detail within EPA's alternatives assessment and therefore is not reported in italics within the GreenScreen assessment.

The summary provided within the EPA's alternatives assessment was as follows:

LOW: Commercial mixture was slightly irritating and predominant component was non-irritating to rabbit skin.

Eye Irritation/Corrosivity (IrE) Group II Score (vH, H, M or L): M

BISPHENOL A BIS-(DIPHENYL PHOSPHATE) was assigned a score of MODERATE for Eye Irritation based on tests results provided within the EPA's DfE alternatives assessment which indicates commercial mixtures of BAPP produced slight eye irritation in rabbits. DfE categorizes BAPP as a low eye irritant which corresponds to a moderate score under GreenScreen Eye Irritation/Corrosivity. The score was based on test data and therefore is not reported in italics within the GreenScreen assessment.

The summary provided within the EPA's alternatives assessment was as follows:

LOW: Commercial mixture was slightly irritating and predominant component was non-irritating to rabbit skin.

Ecotoxicity (Ecotox)

Acute Aquatic Toxicity (AA) Score (vH, H, M or L): L

BISPHENOL A BIS-(DIPHENYL PHOSPHATE) was assigned a score of Low for Acute Aquatic Toxicity based on reports summarized within the DfE alternatives assessment report. The low designation for acute aquatic toxicity in both GreenScreen and EPA's alternatives assessment is based on the same measured endpoints. The score was based on test data reported with sufficient detail within EPA's alternatives assessment and therefore is not reported in italics within the GreenScreen assessment.

The summary provided within the EPA's alternatives assessment was as follows:

LOW: Experimental data for both the predominant component (n = 1) and the commercial mixture for fish, daphnia, and algae indicate no effects up to the limits of the water solubility.

Chronic Aquatic Toxicity (CA) Score (vH, H, M or L): L

BISPHENOL A BIS-(DIPHENYL PHOSPHATE) was assigned a score of Low for Chronic Aquatic Toxicity. The low designation for chronic aquatic toxicity in both GreenScreen and EPA's Alternatives assessment is based on the same measured endpoints. The score was based on test data in one species and modeling within EPA's alternatives assessment and therefore is reported in italics within the GreenScreen assessment.

The summary provided within the EPA's alternatives assessment was as follows:

LOW: Experimental data for the commercial mixture in Daphnia indicate no toxicity effects up to the limits of the water solubility. Estimates for fish and algae also suggest no effects at saturation (NES).

Environmental Fate (Fate)

Persistence (P) Score (vH, H, M, L, or vL): vH

BISPHENOL A BIS-(DIPHENYL PHOSPHATE) was assigned a score of VERY HIGH for Persistence. While the very high designation for persistence in both GreenScreen and EPA's alternatives assessment is based on the same measured endpoints, information provided within the DfE report indicates the chemical fulfills the very high hazard score. Therefore a very high hazard score was determined for the GreenScreen profile. The score was based on test data within EPA's alternatives assessment and therefore is not reported in italics within the GreenScreen assessment.

The summary provided within the EPA's alternatives assessment was as follows:

HIGH: Experimental studies on the commercial mixture, which is estimated to contain approximately 85% BAPP, determined BAPP to be not readily biodegradable by a MITI-I (OECD TG 301C) test as 6% biodegradation occurred over 28 days in sewage sludge. BAPP is not expected to undergo hydrolysis and therefore not release bisphenol A at appreciable rates, as it does not contain functional groups that readily hydrolyze. The hydrolysis half-life of the commercial mixture was >1 year at pH 5 to 9. BAPP does not contain chromophores that absorb at wavelengths >290 nm, and therefore is not expected to be susceptible to direct photolysis by sunlight. The atmospheric half-life of BAPP is estimated to be 5.5 hours, although it is expected to exist primarily in the particulate phase in air.

Bioaccumulation (B) Score (vH, H, M, L, or vL): *H*

BISPHENOL A BIS-(DIPHENYL PHOSPHATE) was assigned a score of HIGH for Bioaccumulation. The high designation for bioaccumulation in EPA's alternatives assessment is equivalent to high score in GreenScreen. The score was based on an EPI estimated value. There appears to be empirical data in fish which indicate a lower hazard score based on a measured BCF of <500. However it is not clear if this value is from measured data or modeled estimates and the reference for this value is not provided in the DfE report and can not be validated. Therefore the more conservative score was selected. The score is based on modeled data and therefore is reported in italics within the GreenScreen assessment.

The summary provided within the EPA's alternatives assessment was as follows:

HIGH: The estimated BAF of 1,100 for the predominant component of the mixture, the only oligomer with a MW <1,000, suggests that BAPP may bioaccumulate in higher trophic levels.

Physical Hazards (Physical)

Reactivity (Rx) Score (vH, H, M or L): *L*

Bisphenol A bis-(Diphenyl phosphate) was assigned a score of LOW for Reactivity based on professional judgment and supporting information from industry. Because of the lack of concrete data for this endpoint, the score of LOW was italicized.

Bisphenol A bis-(Diphenyl phosphate) is created from a mixture of Bisphenol A and diphenyl phosphate. Reactivity for Bisphenol A is identified in the National Library of Medicine's Hazard Substances Database only when '*Finely dispersed particles...*'. Diphenyl phosphate is very similar in structure to triphenyl phosphate (TPP), which the same source indicates has a National Fire Protection Association Ranking of '0' for instability and states '*...materials that are normally stable, even under fire exposure conditions, and that do not react with water.*'

The European Commission indicated that explosivity is only a concern for Bisphenol A if '*...in powder or granular form, mixed with air.*' New Jersey has assigned BPA a reactivity ranking of '0' indicating BPA has 'minimal' reactivity (New Jersey, 2008).

These results are supported by Material Safety Data Sheets (MSDS) from industry. An MSDS from Spectrum for TPP indicated that '*The product is stable.*' and assigned a 'NFPA and HMIS reactivity ranking of '0'. An MSDS from Acros Organics for Bisphenol A indicated that it is '*Stable under normal temperatures and pressures.*'

Based upon professional judgment and the information above, Bisphenol A bis-(Diphenyl phosphate) is unlikely to be reactive.

References:

National Library of Medicine Hazardous Substances Data base, Bisphenol A information available at: <http://toxnet.nlm.nih.gov/cgi-bin/sis/search/f?./temp/~RrqDUi:1>, accessed 12/2013.

National Library of Medicine Hazardous Substances Data base, Triphenyl phosphate information available at: <http://toxnet.nlm.nih.gov/cgi-bin/sis/search/f?./temp/~YibxVb:7>, accessed 12/2013.

New Jersey Department of Health, Right to Know hazardous Substance Fact Sheet on [Bisphenol A](#), December 2008, 6 p., accessed 12/2013.

European Commission, European Chemicals Bureau, 2/19/2000, 114 p., available at: http://esis.jrc.ec.europa.eu/doc/IUCLID/data_sheets/80057.pdf, accessed 12/2013.

Acros Organics, Material Safety Data Sheet for 4,4'-Isopropylidenediphenol, 97%, MSDS# 43975, 4 p., available at: <https://www.fishersci.ca/viewmsds.do?catNo=AC158241000>, accessed 12/2013.

Spectrum chemical Mfg. Corp., Material Safety Data Sheet for Triphenyl Phosphate, 9/14/2006, 6 p., available at: http://www.chemblink.com/MSDS/MSDSFiles/115-86-6_Spectrum.pdf, accessed 12/2013.

Flammability (F) Score (vH, H, M or L): L

BISPHENOL A BIS-(DIPHENYL PHOSPHATE) was assigned a score of LOW for Flammability based on a not flammable description within the DfE report. This conclusion was based on adequate data and is not reported in italics

References (may be provided under each hazard endpoint or at the end of document)

**APPENDIX A: Hazard Benchmark Acronyms
(alphabetical order)**

- (AA) Acute Aquatic Toxicity**
- (AT) Acute Mammalian Toxicity**
- (B) Bioaccumulation**
- (C) Carcinogenicity**
- (CA) Chronic Aquatic Toxicity**
- (Cr) Corrosion/ Irritation (Skin/ Eye)**
- (D) Developmental Toxicity**
- (E) Endocrine Activity**
- (F) Flammability**
- (IrE) Eye Irritation/Corrosivity**
- (IrS) Skin Irritation/Corrosivity**
- (M) Mutagenicity and Genotoxicity**
- (N) Neurotoxicity**
- (P) Persistence**
- (R) Reproductive Toxicity**
- (Rx) Reactivity**
- (SnS) Sensitization- Skin**
- (SnR) Sensitization- Respiratory**
- (ST) Systemic/Organ Toxicity**

Appendix B
Optional Hazard Summary Table

Exposure Route	GreenScreen Hazard Ratings: [Chemical Name]																			
	Group I Human					Group II and II* Human								Ecotox		Fate		Physical		
	C	M	R	D	E	AT	ST		N		SnS*	SnR*	IrS	IrE	AA	CA	P	B	Rx	F
							single	repeate	single	repeated*										
oral																				
dermal																				
inhalation																				

Appendix C Modeling Results

Attach:

- **EPISuite Results for Chemical Name (CAS #)**
- **ECOSAR Results for Chemical Name (CAS #)**
- **Other**