

# Toxic Chemicals in Children's Products Regulations:

## Chemicals and Practical Quantification Limits Under Consideration

### Information Available for Public Comment

The New York State Department of Environmental Conservation (Department) held a stakeholder meeting on September 15, 2021 to present on chemicals and practical quantification levels that it is considering for inclusion in forthcoming regulations to implement the Toxic Chemicals in Children's Products law.

ECL § 37-0905 requires the Department to promulgate lists of Chemicals of Concern and High Priority Chemicals, which will dictate the chemicals that must be disclosed if present in children's products sold in New York State. The law details the types of evidence that are acceptable when looking to include a chemical on either list.

The sections Chemicals of Concern and High Priority Chemicals below detail the chemicals that are under consideration for inclusion on each respective list and the evidence the Department has identified to justify their inclusion. A key follows each section to explain any markings throughout the table and the source each number corresponds to. The section Organohalogen Flame Retardants details the Department's efforts to date on evaluating the chemical class organohalogen flame retardants, as required by ECL § 37-0905(b)(ixvii), and tentative decisions on the information reviewed. Finally, the section Practical Quantification Limits details the level(s) under consideration for each chemical named in the previous sections. This section is separated by the source of the level under consideration.

**Written public comment on the presented and below information may be submitted until October 15, 2021 at 5:00 pm EST.**

## Table 1. Chemicals of Concern

Chemical	CASRN	C	RT/DT	N	A	ED	PBT	vPvB	Other State
Ethylbenzene	100-41-4	1, 9		5					16, 17, 18
Styrene	100-42-5	1, 2, 9		5, 6	10				16, 17, 18
MOCA	101-14-4	1, 2, 3, 9							
MDI	101-68-8			6	11				
DEHA	103-23-1	9							
4-nonylphenol	104-40-5					7, 28			16, 17, 18
p-Xylene	106-42-3		9						
1,4-Dichlorobenzene	106-46-7	1, 2, 9							
4-chloroaniline	106-47-8	1							16, 17, 18
1,2-Dibromoethane	106-93-4	1, 2, 4, 9							
1,3-butadiene	106-99-0	1, 2, 3, 4, 9	1	5					
1,2-dichloroethane	107-06-2	1, 2, 4, 9							
Acrylonitrile	107-13-1	1, 2, 4, 9		5, 6					16, 17, 18
Ethylene glycol	107-21-1		1						16, 17, 18
Chloromethyl methyl ether	107-30-2	1, 2, 3							
Chlorinated paraffins	108171-26-2	1, 2							16
m-Xylene	108-38-3		9						
Toluene	108-88-3		1	5, 6					16, 17, 18
Phenol	108-95-2		28, 31						16, 17, 18
Ethylene glycol monomethyl ether	109-86-4		1						16, 17, 18
1,2-Dimethoxyethane	110-71-4		9						
Ethylene glycol monoethyl ether	110-80-5		1						16, 17, 18
Triphenyl phosphate	115-86-6						9		16, 17, 18
Tris(2-chloroethyl) phosphate	115-96-8	1							16, 17, 18
BDE-209	1163-19-5		9	6			9, 12, 14	15	16, 17, 18
DEHP	117-81-7	1, 2, 4	1		10	7, 28			16, 17, 18
DMEP	117-82-8		22						16, 18
DNOP	117-84-0		9						16, 17, 18
Hexachlorobenzene	118-74-1	1, 2, 4	1			28	12, 13		16, 17, 18



Chemical	CASRN	C	RT/DT	N	A	ED	PBT	vPvB	Other State
4-(1,1,3,3-tetramethylbutyl)phenol	140-66-9					7, 28	9		16, 17, 18
Estragole	140-67-0	1							16, 17, 18
Chlordecone	143-50-0	1, 2, 4	1				12		
2-ethylhexanoic acid	149-57-5		20, 21						16, 17, 18
TCDD	1746-01-6	1, 2, 3	1				12		
PFOS	1763-23-1		1				12		16, 17, 18
4-Octylphenol	1806-26-4					26, 28			16, 17, 18
TBB	183658-27-7		9						16, 17, 18
Chromium (VI)	18540-29-9	2, 3, 4			11				
Benzo(g,h,i)perylene	191-24-2						12, 13, 14	15	
1,2,3,7,8,9-HxCDD	19408-74-3								
4-Heptylphenol	1987-50-4					7			
Henicosfluoroundecanoic acid	2058-94-8							15	
Fluoranthene	206-44-0						12, 14	15	
Benzo[k]fluoranthene	207-08-9	1, 2					12, 14	15	
Chrysene	218-01-9	1					12, 14	15	
2-{2-[4-(2,4,4-trimethylpentan-2-yl)phenoxy]ethoxy}ethanol	2315-61-9					7			
2-[[4-(2,4,4-trimethylpentan-2-yl)phenoxy]ethan-1-ol	2315-67-5					7			
Mirex	2385-85-5	1, 2		5			12		
20-[4-(1,1,3,3-tetramethylbutyl)phenoxy]-3,6,9,12,15,18-hexaooxaicosan-1-ol	2497-59-8					7			
BHA	25013-16-5	1, 2							16, 17, 18
Nonylphenol	25154-52-3					7, 28			16, 17, 19
<b>HB</b> CD	25637-99-4						9, 12, 13, 14		16, 17, 18, 19
UV-328	25973-55-1						14	15	
4-nonylphenol, ethoxylated	26027-38-3					7			19

Chemical	CASRN	C	RT/DT	N	A	ED	PBT	vPvB	Other State
TBPH	26040-51-7		9, 24	24					16, 18
Tris(nonylphenyl) phosphite	26523-78-4					7			
DIDP	26761-40-0		1, 8, 9						16, 17, 18
n-nitrosomethyl-n-hexylamine	28538-70-7	1, 2							
4-nonylphenol phosphite (3:1)	3050-88-2					7			
Tricosafuorododecanoic acid	307-55-1							15	
Aldrin	309-00-2	1, 4					12, 13		
1,2,5,6,9,10-hexabromocyclododecane	3194-55-6						14		
1,2,3,4,6,7,8,9-OCDD	3268-87-9						12		
PFOA	335-67-1		1				14		16, 18
Nonadecafluorodecanoic acid and its salts	335-76-2						14		
PFHxS	355-46-4							15	
1,2,3,4,6,7,8-HpCDD	35822-46-9						12		
UV-350	36437-37-3							15	
Isononylphenol, ethoxylated	37205-87-1					7			19
Perfluoroheptanoic acid	375-85-9						30		
Perfluorononan-1-oic acid and its salts	375-95-1						14		
Heptacosafuorotetradecanoic acid	376-06-7							15	
V6	38051-10-4		24						16, 18
UV-320	3846-71-7						14	15	
UV-327	3864-99-1							15	
1,2,3,4,6,7,8,9-OCDF	39001-02-0						12		
1,2,3,4,7,8-HxCDD	39227-28-6						12		
1,2,3,7,8-PeCDD	40321-76-4						12		
Isodrin	465-73-6						13		
Formaldehyde	50-00-0	1, 2, 3, 4, 9			10, 11				16, 17, 18, 19

Chemical	CASRN	C	RT/DT	N	A	ED	PBT	vPvB	Other State
DDT	50-29-3	1, 2, 4	1	5			12		
Benzo[a]pyrene	50-32-8	1, 2, 3, 4					14	15	
2,3,7,8-TCDF	51207-31-9						12		
D6	540-97-6						14	15	
D5	541-02-6						14	15	
2-Ethyl-hexyl-4-methoxycinnamate	5466-77-3					28			16, 17, 18
D4	556-67-2		9				14	15	18
1,2,3,4,7,8,9-HpCDF	55673-89-7						12		
Carbon tetrachloride	56-23-5	1, 2, 4, 9							
TBTO	56-35-9				10, 11		14		
Benz[a]anthracene	56-55-3	1, 2					14	15	
2,3,4,7,8-PeCDF	57117-31-4	3					12		
1,2,3,7,8-PeCDF	57117-41-6						12		
1,2,3,6,7,8-HxCDF	57117-44-9						12		
1,2,3,6,7,8-HxCDD	57653-85-7	4							
TDI	584-84-9	2			11				
Lindane	58-89-9	1, 2, 3							
2,3,4,6,7,8-HxCDF	60851-34-5						12		
Hexachlorocyclohexane	608-73-1	1, 2, 4		5					
Pentachlorobenzene	608-93-5					28	12, 13		16, 17, 18
3,3'-Dichlorobenzidine dihydrochloride	612-83-9	1, 2, 9							
Bisphenol F	620-92-8		23						16, 18
Aniline	62-53-3	1, 4, 9							16, 17, 18
N-nitrosodimethylamine	62-75-9	1, 2, 4							16, 17, 18
Methanol	67-56-1		1, 8	6					
1,2,3,4,6,7,8-HpCDF	67562-39-4						12		
Chloroform	67-66-3	1, 2, 4	1	5					
Hexachloroethane	67-72-1	1, 2, 4		5, 6					
Nonylphenol, branched, ethoxylated	68412-54-4					7			19
DINP	68515-48-0	1	8, 9						16, 17, 18
IPTPP	68937-41-7		24	9, 24			9		16, 18

Chemical	CASRN	C	RT/DT	N	A	ED	PBT	vPvB	Other State
1,2,3,4,7,8-HxCDF	70648-26-9						12		
Benzene	71-43-2	1, 2, 3, 4	1	5					16, 17, 18
Endrin	72-20-8		1	5, 6			12		
Methoxychlor	72-43-5						13		
Phenol, heptyl derivs.	72624-02-3					7			
Pentacosafuorotridec anoic acid	72629-94-8							15	
1,2,3,7,8,9-HxCDF	72918-21-9						12		
Lead and lead compounds	7439-92-1	1, 2	1	5			13		18
Mercury and mercury compounds, including methyl mercury (22967-92-6)	7439-97-6		1	5, 6			13		16, 17, 18, 19
Molybdenum and molybdenum compounds	7439-98-7						9		18
Nickel and nickel compounds	7440-02-2	1, 2, 3			11				
Thorium-232 and its decay products	7440-29-1	3							
Antimony and antimony compounds	7440-36-0	9	9						16, 17, 18
Arsenic and arsenic compounds, including arsenic trioxide (1327-53-3) and dimethyl arsenic (75- 60-5)	7440-38-2	1, 2, 3, 4, 9		5, 9					16, 17, 18, 19
Beryllium and beryllium compounds	7440-41-7	1, 2, 3, 4							
Cadmium and cadmium compounds	7440-43-9	1, 2, 3, 4, 9		5					16, 17, 18, 19
Chromium and chromium compounds	7440-47-3	9	9		10, 11				
Cobalt and cobalt compounds	7440-48-4	1, 2			10, 11				16, 17, 18





Chemical	CASRN	C	RT/DT	N	A	ED	PBT	vPvB	Other State
Short-chain chlorinated paraffins	85535-84-8						12, 14	15	16, 17, 18
BBP	85-68-7		1, 8			7, 28			16, 17, 18, 19
N-Nitrosodiphenylamine	86-30-6	1, 4, 9							16, 17, 18
NMP	872-50-4		1, 9						16, 17, 18
HCDB	87-68-3	1, 9					12		16, 17, 18
Pentachlorophenol	87-86-5	1, 2, 3, 4							
2-[[4-(2,4,4-trimethylpentan-2-yl)phenoxy]ethanol	9002-93-1					7			
Nonylphenol, ethoxylated	9016-45-9					7			19
Anthracene oil	90640-80-5						14	15	
Anthracene oil, anthracene paste	90640-81-6						14	15	
Anthracene oil, anthracene-low	90640-82-7						14	15	
Naphthalene	91-20-3	1, 2, 9		5, 6					
2-Naphthylamine	91-59-8	1, 2, 3							
3,3'-Dichlorobenzidine	91-94-1	1, 2, 3, 9							
Anthracene oil, anthracene paste, anthracene fraction	91995-15-2						14	15	
Anthracene oil, anthracene paste, distn. lights	91995-17-4						14	15	
4-Aminobiphenyl	92-67-1	1, 2, 3							
Benzidine and its salts	92-87-5	1, 2, 3, 4		5, 6					
Propyl paraben	94-13-3					28			16, 17, 18
Butyl paraben	94-26-8					7, 28			16, 17, 18
o-Toluidine	95-53-4	1, 2, 3							16, 17, 18
2,4-Diaminotoluene	95-80-7	1, 2							16, 17, 18
4-tert-butylphenol	98-54-4					7			
Nitrobenzene	98-95-3	1, 2, 4	1	5, 6					



## Table 1: Chemicals of Concern Key

C:	Carcinogen
RT/DT:	Reproductive or Developmental Toxicant
N:	Neurotoxicant
A:	Asthmagen
ED:	Endocrine Disruptor
PBT:	Persistent, Bioaccumulative, and Toxic
vPvB:	Very Persistent and Very Bioaccumulative

Chemical names **highlighted in blue** are organohalogen flame retardants that fall within one of the subclasses named at the end of the table. If the applicable subclass is included on the list of Chemicals of Concern in the forthcoming regulations, these individual chemicals will not be listed separately. Additionally, these chemicals are not listed individually within the Practical Quantification Limits section.

Number that are in **red** signify that the applicable source listed the chemical as suspected of having or probable of having the identified hazard.

The chemicals in the last four rows are marked with an asterisk (\*), which signifies that the justification for including each is contained in the Organohalogen Flame Retardants section.

1. State of California. Barclays Official California Code of Regulations § 27001 (Chemicals Known to the State to Cause Cancer or Reproductive Toxicity.) <https://govt.westlaw.com/calregs/Document/I54B9D2B0D45011DEA95CA4428EC25FA0?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=%28sc.Default%29&bhcp=1>
2. National Toxicology Program. 2016. "Report on Carcinogens, Fourteenth Edition." Research Triangle Park, NC: U.S. Department of Health and Human Services, Public Health Service. <https://ntp.niehs.nih.gov/go/roc14>
3. World Health Organization International Agency for Research on Cancer. "Agents classified by the IARC Monographs, Volumes 1–129." <https://monographs.iarc.fr/list-of-classifications>
4. Integrated Risk Information System. "IRIS Advanced Search" filtered for cancer. <https://cfpub.epa.gov/ncea/iris/search/index.cfm>
5. Agency for Toxic Substances and Disease Registry. "Toxic Substances Portal, Neurological." <https://www.atsdr.cdc.gov/substances/toxorganlisting.asp?sysid=18>
6. Integrated Risk Information System. "IRIS Advanced Search" filtered for nervous system affected. <https://cfpub.epa.gov/ncea/iris/search/index.cfm>

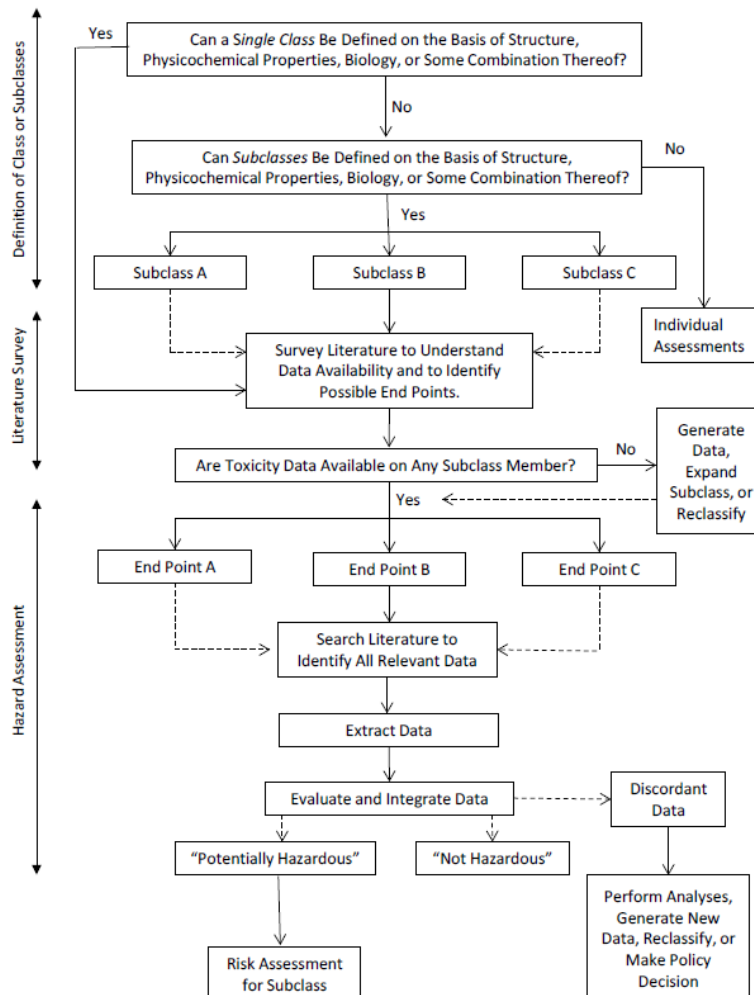
7. European Chemicals Agency. "Candidate list of substances of very high concern for authorization, published in accordance with Article 59(10) of the REACH Regulation" filtered for endocrine disrupting properties (Article 57(f)). <https://echa.europa.eu/candidate-list-table>
8. National Toxicology Program. "NTP Monographs." <https://ntp.niehs.nih.gov/publications/monographs/index.html?type=NTP>
9. U.S. Environmental Protection Agency. 2014. "TSCA Work Plan for Chemicals Assessment: 2014 Update." <https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/tsca-work-plan-chemical-assessments-2014-update>
10. Quebec Commission of Standards, Equity, Occupational Health and Safety. "Agents Causing Occupational Asthma with Key References." <https://reptox.cnesst.gouv.qc.ca/en/occupational-asthma/Documents/AgentsAnglais.pdf>
11. Association of Occupational and Environmental Clinics. "AOEC exposure codes" filtered for asthmagens. <http://www.aoecdata.org/ExpCodeLookup.aspx>
12. State of Washington. WAC 173-333-310 (What chemicals or chemical groups are included on the PBT list?). <https://apps.leg.wa.gov/wac/default.aspx?cite=173-333-310>
13. Environmental Protection Agency. "Persistent bioaccumulative toxic (PBT) chemicals covered by the TRI program." <https://www.epa.gov/toxics-release-inventory-tri-program/persistent-bioaccumulative-toxic-pbt-chemicals-covered-tri>
14. European Chemicals Agency. "Candidate list of substances of very high concern for authorization, published in accordance with Article 59(10) of the REACH Regulation" filtered for PBT (Article 57(d)). <https://echa.europa.eu/candidate-list-table>
15. European Chemicals Agency. "Candidate list of substances of very high concern for authorization, published in accordance with Article 59(10) of the REACH Regulation" filtered for vPvB (Article 57(e)). <https://echa.europa.eu/candidate-list-table>
16. State of Washington. WAC 173-334-130 (The reporting list of chemicals of high concern to children). <https://apps.leg.wa.gov/wac/default.aspx?cite=173-334-130>
17. State of Oregon. Oregon Administrative Rules 333-016-2020 (Chemicals of High Concern to Children). <https://secure.sos.state.or.us/oard/viewSingleRule.action?ruleVrsnRsn=276962>.
18. State of Vermont. Chemicals of High Concern in Children's Products Rule Section 5 (Chemicals of High Concern to Children). [https://www.healthvermont.gov/sites/default/files/documents/pdf/Env\\_CDP\\_PQL.pdf](https://www.healthvermont.gov/sites/default/files/documents/pdf/Env_CDP_PQL.pdf)
19. State of Maine. 06-096 CMR Chapters 880-890. <https://www.maine.gov/dep/safechem/childrens-products/priority/index.html>
20. European Chemicals Agency. "Substance infocard; 2-ethylhexanoic acid." <https://echa.europa.eu/substance-information/-/substanceinfo/100.005.222>
21. Department of Health and Human Services National Toxicology Program. 2006. "NTP-CERHR Monograph on the Potential Human Reproductive and Developmental Effects of Di(2-Ethylhexyl) Phthalate (DEHP)." Publication

- number: 06-4476. <https://ntp.niehs.nih.gov/ntp/ohat/phthalates/dehp/dehp-monograph.pdf>
22. European Chemicals Agency. "Candidate list of substances of very high concern for authorization, published in accordance with Article 59(10) of the REACH Regulation" filtered for toxic for reproduction (Article 57(c)).  
<https://echa.europa.eu/candidate-list-table>
  23. Environmental Protection Agency, Design for the Environment. 2015. "Bisphenol A Alternatives in Thermal Paper."  
[https://www.epa.gov/sites/default/files/2015-08/documents/bpa\\_final.pdf](https://www.epa.gov/sites/default/files/2015-08/documents/bpa_final.pdf)
  24. Environmental Protection Agency, Design for the Environment. 2015. "Flame Retardants Used in Flexible Polyurethane Foam: An Alternatives Assessment Update." [https://www.epa.gov/sites/default/files/2015-08/documents/ffr\\_final.pdf](https://www.epa.gov/sites/default/files/2015-08/documents/ffr_final.pdf)
  25. European Chemicals Agency. "Candidate list of substances of very high concern for authorization, published in accordance with Article 59(10) of the REACH Regulation" filtered for carcinogenic (Article 57(a)).  
<https://echa.europa.eu/candidate-list-table>
  26. European Commission DG Environment. 2002. "Endocrine disruptors: study on gathering information on 435 substances with insufficient data." Reference: B4-3040/2001/325850/MAR/C2. [https://ec.europa.eu/environment/chemicals/endocrine/pdf/bkh\\_report.pdf](https://ec.europa.eu/environment/chemicals/endocrine/pdf/bkh_report.pdf)
  27. Environmental Protection Agency. 2014. "An Alternatives Assessment for the Flame Retardant Decabromodiphenyl Ether (DecBDE)." [www.epa.gov/saferchoice/partnership-evaluate-flame-retardant-alternatives-decabde](http://www.epa.gov/saferchoice/partnership-evaluate-flame-retardant-alternatives-decabde).
  28. State of Washington Department of Ecology. "Children's Safe Products Reporting Rule Rationale for Reporting List of Chemicals of High Concern to Children 2011-2017." Revised May 2021.  
<https://apps.ecology.wa.gov/publications/documents/1804025.pdf>
  29. European Chemicals Agency. "Harmonized Classification- Annex VI of Regulation (EC) No 1272/2008, General information on tributyl phosphate."  
<https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/17424>
  30. Minnesota Department of Health. 2019 "Chemicals of High Concern List, 2019."  
<https://www.health.state.mn.us/communities/environment/childenvhealth/docs/child/mdhchc2019.pdf>
  31. California Office of Environmental Health Hazard Assessment. 2015. "Evidence on the Developmental and Reproductive Toxicity of Phenol."  
<https://oehha.ca.gov/media/downloads/proposition-65/chemicals/phenolhidcorr.pdf>

# Organohalogen Flame Retardants

The Toxic Chemicals in Children's Products law (ECL Article 37 Title 9) requires the Department to promulgate a list of chemicals of concern, at a minimum taking into consideration 77 chemicals or groups named in the law (ECL § 37-0905(1)(b)). One of the included groups is organohalogen flame retardants (OFRs). The Department did not find evidence from any government entity assigning a qualifying hazard to this entire group of chemicals. Therefore, it needed to review the group based on credible scientific evidence. In searching for information on OFRs as a group, the Department found a report from the National Academies of Sciences, Engineering, and Medicine "A Class Approach to Hazard Assessment of Organohalogen Flame Retardants" (the report).

In summary, the report evaluated OFRs and determined that this group of chemicals was too diverse to be evaluated as only one group. However, the report broke OFRs into fourteen subclasses based on chemical structure and physiochemical properties



and devised a process by which these subclasses, and any qualifying group of chemicals, can be evaluated.

The first step in evaluating chemicals as a class is to determine if the chemical class of interest can be defined by some metric by which data can be found (structure, biology, etc.). If the class is determined to be viable, a literature survey should be conducted to determine the availability of toxicity data and to identify relevant end points to investigate. If relevant data are available on any chemical for a given end point, the next steps are to extract, evaluate, and integrate the relevant data to reach a decision regarding potential hazard that can be applied to the entire class or subclass. This process is summarized in the flow chart, shown above, taken from the report. Based on the amount of data found, the report then outlines a number of possible scenarios and options for moving forward in each scenario.

The report evaluated two subclasses as examples. The Department reviewed these, and, although the data were discordant for both subclasses on developmental toxicity, elected to make a policy decision, as recommended in the report, and determined both subclasses qualify for inclusion on the Chemical of Concern list. These two subclasses are polyhalogenated organophosphates and polyhalogenated bisphenol aliphatics.

The twelve remaining subclasses were prioritized for evaluation based on how many chemicals are in the subclass and how many chemicals within the subclass have been banned or otherwise regulated by another state, as this suggests a fair amount of information is available on these chemicals. The Department then reviewed three additional subclasses, as described below. Only data relevant to the hazards listed in ECL § 37-0905, which the Department may use to identify Chemicals of Concern, is included in the analysis below.

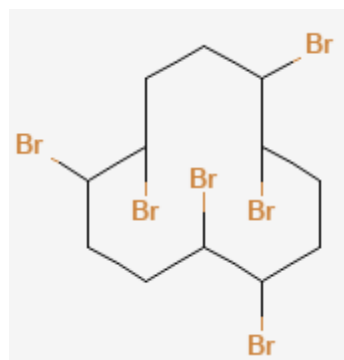
The Department will continue evaluating subclasses to fulfill its statutory obligation and will incorporate additional qualifying subclasses in future regulatory updates. The next three subclasses that will be evaluated under the devised prioritization structure are polyhalogenated aliphatic chains, polyhalogenated phenol-aliphatic ethers, and polyhalogenated phthalates/benzoates/imides.

## Polyhalogenated Alicycles

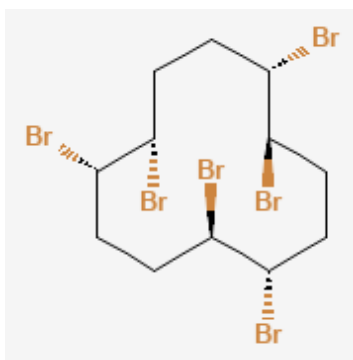
Table 2. Members of the Polyhalogenated Alicycles Subclass

Chemical Name	Abbreviation	CAS No.
Hexabromocyclodecane	HBCYD	25495-98-1
1,1,2,2,3,3- Hexabromocyclododecane	HBCD	25637-99-4
1,2,5,6,9,10-Hexabromocyclododecane	HBCDD	3194-55-6
1,2,5,6-Tetrabromocyclooctane	TBCO	3194-57-8
alpha- Hexabromocyclododecane	alpha-HBCD	134237-50-6
beta- Hexabromocyclododecane	beta-HBCD	134237-51-7
gamma- Hexabromocyclododecane	gamma-HBCD	134237-52-8
(+)-gamma- Hexabromocyclododecane	(+)-gamma-HCBD	678970-17-7
(+)-beta- Hexabromocyclododecane	(+)-beta-HBCD	678970-16-6
(-)-alpha- Hexabromocyclododecane	(-)-alpha-HBCD	678970-15-5
(-)-gamma- Hexabromocyclododecane	(-)-gamma-HBCD	169102-57-2
(+)-alpha- Hexabromocyclododecane	(+)-alpha-HBCD	138257-19-9
(-)-beta- Hexabromocyclododecane	(-)-beta-HBCD	138257-18-8
1,2-Dibromo-4-(1,2-dibromoethyl)cyclohexane	TBECH	3322-93-8
Hexachlorocyclopentadiene	HCCPD	77-47-4
1,2,3,4,5-Pentabromo-6-chlorocyclohexane		87-84-3
1,2,3,4,5,6-Hexabromocyclohexane		1837-91-8

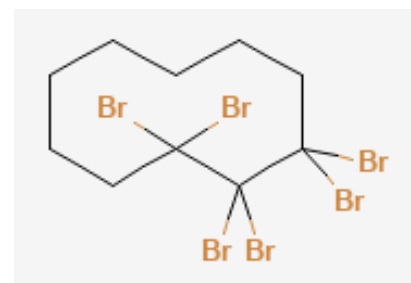
The seventeen chemicals that are identified as polyhalogenated alicycles in the report's seed set are listed in Table 2 and example chemical structures are in Figure 1. For this subclass, the three chemicals with the most information available were selected for research. An initial literature search was conducted to identify which hazards the selected chemicals each have and if there are any in common. From this search, potential developmental toxicity and endocrine disruption became the hazard focuses. Of note, a number of the studies on HBCD used multiple stereoisomers of the chemical and thus reflect results for a number of individual chemicals in this subclass.



1,2,5,6,9,10-Hexabromocyclododecane



(+)-beta- Hexabromocyclododecane



Hexabromocyclodecane

Figure 1. Representative members of the polyhalogenated alicycles subclass.

Available epidemiological studies on HBCD have shown potential thyroid effects (EPA 2018). Most of the evidence available on HCCPB are retrospective epidemiological studies on employees of facilities that produced or used HCCPB in manufacturing. All of these studies



focused on mortality and found that employees did not die at significantly different levels nor did their rates of cancer differ significantly from the general population (EPA 2001).

Table 3. Mammalian studies on polyhalogenated alicycles.

Chemical Name	Result	Source
<b>HBCD</b>	Disturbances in thyroid hormone system and effects on the thyroid in male and female rats	Chengelis 2001
	Neonatal exposure in mice affected spontaneous motor behavior, learning and memory	Eriksson et al 2006
	Two-generation study in rats, HBCD showed treatment-related reproductive effect (a significant decrease in the number of primordial follicles in the F1 females); Developmental effects were observed including delays in eye opening in the second (F2) generation and transient changes in learning and memory in F1 males, but exposure did not cause any changes in spontaneous behavior. In addition, there was high and dose-dependent pup mortality during lactation	Ema et al 2008
	No developmental effects observed in Wistar rats	Murai et al., 1985
	No developmental effects observed in rats	Stump 1999
	Resulted in increased thyroid weight and decreased serum T <sub>3</sub> concentrations in rats in both adult stage exposure and in offspring. Also exerted impaired oligodendroglial development	Saegusa et al 2009
<b>HCCPB</b>	No significant effects were seen in mice or rabbits for number of implantations, fetus viability, resorptions, or mean fetal body measurements. Maternal toxicity in the form of severe diarrhea and subsequent death in an unspecified number of rabbits was seen at 75 mg/kg.	Murray et al 1980
	A dose-related increase in the proportion of rabbit fetuses with 13 ribs was seen and was statistically significant in the 75 mg/kg group.	
	No significant differences in maternal weight change, pup survivorship, or average pup weight were seen between treated mice and untreated controls	Chernoff and Kavlock 1983
	Degenerative changes in the adrenal glands of rats, mice, guinea pigs, and rabbits	Treon et al 1955
	Rabbits and mice occasionally became tremorous; diffuse degenerate of the brain in guinea pigs, rabbits, rats and mice	
	Adrenal gland weight in rats significantly reduced	Rand et al 1982
	No brain lesions found in rats and monkeys	Pub Chem
<b>TBECH</b>	Evidence of hormone disruption in rats including changes in serum testosterone in male and serum T <sub>3</sub> and T <sub>4</sub> in females	
	The mRNA expression of some proapoptotic genes was upregulated by TBECH in mouse macrophage cells. Accordingly, TBECH elevated caspase-3 activity.	Wang et al 2019(a)

### *Developmental Toxicity*

Neonatal exposure to HBCD has been shown to affect learning and memory in rats (Eriksson et al 2006, Ema et al 2008). Additional developmental effects including delays in eye opening were observed in rats (Ema et al 2008). However, other studies observed no developmental effects in rats, mice and rabbits (Murai et al 1985, Stump 1999, Murray et al 1980, Chernoff and Kavlock 1983).

HBCD was also shown to hinder neurodevelopment by impairing oligodendroglial development in rats (Seagusa et al 2019).

In zebrafish, HBCD and TBECH both produces oxidative stress and induced apoptotic effects through increased activity of caspase-3 enzymes (Deng et al 2009, Wang et al 2019(b)). These effects were also found in a study in which mouse macrophage cells were exposed to TBECH (Wang et al 2019(a)). Wang et al. 2019(b) also continued to study the zebrafish after hatching and found TBECH caused developmental and locomotive behavioral toxicity in the treated animals.

In frogs, TBECH was shown to have a masculinizing effect on gonadal differentiation and suggests androgenic activity (Liu et al 2017).

Table 4. Zebrafish studies on polyhalogenated alicycles.

<b>Chemical Name</b>	<b>Result</b>	<b>Source</b>
<b>HBCD</b>	Produces oxidative stress and induces apoptosis through involvement of caspases in zebrafish embryos	Deng et al 2009
<b>TBECH</b>	TBECH caused developmental and locomotor behavioral toxicity, immunotoxicity, oxidative stress and proapoptotic effects in early life zebrafish. Increased caspase-3 enzyme activity Reduced hatchability and increased malformation in larvae Diminished free swimming	Wang et al 2019(b)

#### *Endocrine Disruption*

Studies on HBCD and TBECH found disturbances to the thyroid hormone system in both male and female rats, specifically noting decreased T<sub>3</sub> serum concentrations (Chengelis 2001, Seagusa et al 2019, PubChem). Additionally, decreased adrenal gland weights were found in rats exposed to HCCPB (Treon et al 1955, Rand et al 1982).

Based on the information identified, the Department has determined this subclass of organohalogen flame retardants, polyhalogenated alicycles, qualifies for inclusion as a Chemical of Concern.

Table 5. Summary of experimental evidence of developmental effects (DT) and endocrine disruption (ED) in mammals and zebrafish associated with polyhalogenated alicycles.

<b>Chemical Name</b>	<b>Mammal</b>		<b>Zebrafish</b>	
	<b>DT</b>	<b>ED</b>	<b>DT</b>	<b>ED</b>
<b>HBCD</b>	+/-	+	+	Not determined
<b>HCCPB</b>	-	+	Not determined	Not determined
<b>TBECH</b>	Not determined	+	+	Not determined

## Polyhalogenated Diphenyl Ethers

Table 6. Members of the Polyhalogenated Diphenyl Ethers Subclass

Chemical Name	Abbreviation	CAS No.
Decabromodiphenyl ether	BDE-209	1163-19-5
Pentabromodiphenyl ether	PBDE	32534-81-9
2,2',4,4',5-Pentabromodiphenyl ether	BDE-99	60348-60-9
Octabromodiphenyl ether	Octa BDE	32536-52-0
Tetradecabromo-1,4-diphenoxybenzene	4'- PeBPOBDE208	58965-66-5
2,2',4,4'-Tetrabromodiphenyl ether	BDE-47	5436-43-1
2,2',3,4,4',5',6-Heptabromodiphenyl ether	BDE-183	207122-16-5
2,2',3,4,4',5,6-Heptabromodiphenyl ether	HBPE	189084-67-1
2,4,4'-Tribromodiphenyl ether	BDE-28	41318-75-6
2,2',4,4',6-Pentabromodiphenyl ether	BDE-100	189084-64-8
2,2',4,4',5,5'-Hexabromodiphenyl ether	BDE-153	68631-49-2
2,2',4,4',5,6'-Hexabromodiphenyl ether	BDE-154	207122-15-4

The twelve chemicals that are identified as polyhalogenated diphenyl ethers in the report's seed set are listed in Table 6 and example chemical structures are in Figure 2. For this subclass, five chemicals were selected for research. An initial literature search was conducted to identify which hazards the selected chemicals each have and if there are any in common. Significant evidence of thyroid and liver effects was found for a number of the selected chemicals as well as limited evidence of carcinogenicity, but developmental toxicity was selected as the hazard endpoint to evaluate initially for inclusion of the subclass as a Chemical of Concern.

IRIS toxicological reviews for four of the five chemicals reported no available or adequate epidemiological studies (EPA 2008(a-d)).

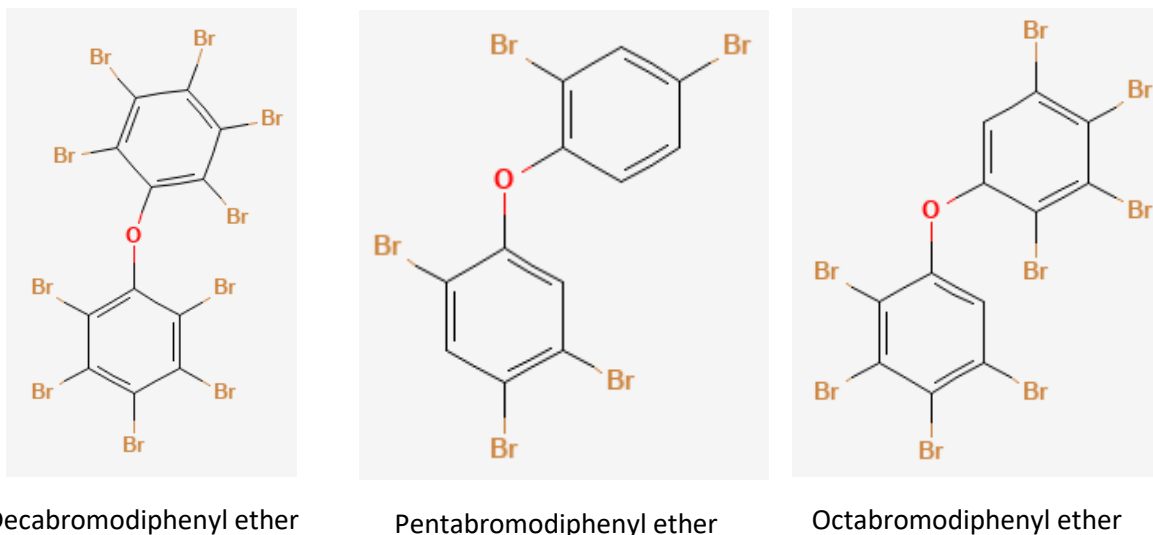


Figure 2. Representative members of the polyhalogenated diphenyl ethers subclass.

### *Developmental toxicity*

Exposures to polyhalogenated diphenyl ethers consistently show decreased habituation capabilities in mice and rats, with decreases in cholinergic nicotinic receptor densities, which is thought to explain decreased learning and memory capabilities (Viberg et al 2003, Viberg et al 2004, Eriksson et al 2001, Viberg et al 2007, EPA 2008(b), EPA 2008(d)). Other studies observed neurotoxic effects in rats and mice including increased neuronal apoptosis (Zhang et al 2017, Alm et al 2006). Finally, some studies observed a wider array of developmental effects including decreased fetal body weight and fetal malformation (EC 2003).

Table 7. Mammalian studies on polyhalogenated diphenyl ethers.

<b>Chemical Name</b>	<b>Result</b>	<b>Source</b>
<b>BDE-153</b>	Habituation capability in mice (locomotion, rearing, and total activity) decreased with age compared to controls Mice exposed to BDE-153 showed significantly longer latencies in swim maze tests compared to controls Density of nicotinic receptors was significantly decreased in mice exposed to BDE-153 at the same doses that showed decreases in learning and memory Rats exposed to BDE-153 had significantly increased neuronal apoptosis in vivo and ex vivo compared to controls	Viberg et al 2003    Zhang et al 2017
<b>BDE-99</b>	Identified responses in mice that can contribute to consistent neurotoxic effects Neonatal exposure in NMRI mice decreased cholinergic nicotinic receptors in hippocampus at an adult age. Also showed disrupted spontaneous behavior	Alm et al 2006  Viberg et al 2004
<b>BDE-47</b>	Adult mice exposed to BDE-47 displayed decreased habituation capability (locomotion, rearing, and total activity), which continued to decrease over time Learning and memory was not shown to be affected at any exposure dose in a swim maze test	Eriksson et al 2001
<b>BDE-209</b>	No treatment-related neurobehavioral changes were observed in rats nor were any neuropathological or morphometric alterations found Neonatal exposure in Sprague-Dawley rats resulted in disruptions to normal behavior and different response to nicotine treatment compared to controls.	Biesemeir et al 2011  Viberg et al 2007
<b>Octa BDE</b>	Two rat studies observed developmental effects including decrease of fetal body weight, increase of post-implantation loss with late resorptions, increase in dead or resorbed conceptuses per litter; decrease in the average number of live fetuses per litter and fetal malformation/variation and delayed skeletal ossification	EC 2003

In zebrafish, exposure to a number of polyhalogenated diphenyl ethers significantly affected spontaneous movement (Usenko et al 2011, Chen et al 2012). Exposures were found to have other developmental effects including curved body axis, reduced survival rates and increased malformation rates (Usenko et al 2011, Wu et al 2019)

Table 8. Zebrafish studies on polyhalogenated diphenyl ethers.

<b>Chemical Name</b>	<b>Result</b>	<b>Source</b>
<b>BDE-153</b>	Malformations such as curved body axis and pericardial edema were not observed for BDE-153 exposure but were observed for exposure to other PBDEs including BDE 28, 47, 99, and 100. Exposure to BDE-153 significantly increased spontaneous movement as did all other chemicals tested except BDE 183.	Usenko et al 2011
<b>BDE-99</b>	Exposure to BDE-99 lowered T4 levels and increased T3 levels in both females and males. Offspring showed reduced survival rates and body length as well as increased malformation rates	Wu et al 2019
<b>BDE-47</b>	BDE-47 exposure significantly affected spontaneous movement, decreased touch response and free swimming speed, altered larvae swimming behavior in response to light stimulation in developing zebrafish	Chen et al 2012

Many studies that show neurodevelopmental effects, across chemicals in this subclass, show that such effect occurs via disturbances in the cholinergic system. Thus, not only do these chemicals all have similar effects on organisms across species, it occurs via the same pathway. Based on this evidence, the Department has determined this subclass of organohalogen flame retardants, polyhalogenated diphenyl ethers, qualifies for inclusion as a Chemical of Concern.

Table 9. Summary of experimental evidence of developmental effects in mammals and zebrafish associated with polyhalogenated diphenyl ethers.

<b>Chemical Name</b>	<b>Mammal</b>		<b>Zebrafish</b>	
	<b>Teratogenic</b>	<b>Developmental Neurotoxicity</b>	<b>Teratogenic</b>	<b>Developmental Neurotoxicity</b>
<b>BDE-153</b>	Not determined	+	Not determined	+
<b>BDE-99</b>	Not determined	+	+	Not determined
<b>BDE-47</b>	Not determined	+	Not determined	+
<b>BDE-209</b>	Not determined	+	Not determined	Not determined
<b>Octa BDE</b>	+	Not determined	Not determined	Not determined

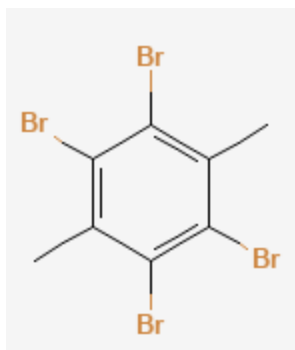
## Polyhalogenated Benzene Aliphatics and Functionalized

Table 10. Members of the Polyhalogenated Benzene Aliphatics and Functionalized Subclass

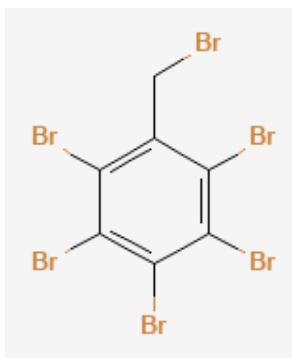
Chemical Name	Abbreviation	CAS No.
2,4,6-Tribromo-3-(tetrabromopentadecyl)phenol	TBPD-TBP	168434-45-5
2,3,5,6-Tetrabromo-p-xylene	TBX	23488-38-2
2,3,4,5-Tetrabromo-6-chlorotoluene	TBCT	39569-21-6
2,3,4,5,6-Pentabromotoluene	PBT	87-83-2
2,3,4,5,6-Pentabromoethylbenzene	PBEB	85-22-3
Pentabromobenzyl bromide	PBBB	38521-51-6
1,2,3,4,5-Pentabromo-6-(chloromethyl)benzene	PBBC	58495-09-3
(2,2-Dibromovinyl)benzene	DBS	31780-26-4
Decabromodiphenyl ethane	DBDPE	84852-53-9
1,1'-[Oxybis(methylene)]bis(pentabromobenzene)	DBDBE	497107-13-8
Pentabromobenzyl acrylate	PBBA	59447-55-1
1,2,3,4,7,7-Hexachloro-5-(tetrabromophenyl)bicyclo(2.2.1)hept-2-ene	HCTBPH	34571-16-9
(rel)-(1R,2S,3S,4S)-1,2,3,9-tetrabromo-1,2,3,4-tetrahydro-1,4-methanonaphthalene		855993-01-0
(rel)-(1R,2R,3S,4S)-1,2,3,9-tetrabromo-1,2,3,4-tetrahydro-1,4-methanonaphthalene		855992-98-2
2,4,6-Tribromoaniline		147-82-0
Pentabromophenyl benzoate		57011-47-9
Tribromostyrene		61368-34-1
(1,2-Dibromoethyl)benzene		93-52-7
3,6-Bis(bromomethyl)-1,2,4,5-tetrabromobenzene		39568-99-5

The nineteen chemicals that are identified as polyhalogenated benzene aliphatics and functionalized in the report's seed set are listed in Table 10 and example chemical structures are in Figure 3. For this subclass, the three chemicals with the most information available were selected for research. An initial literature search was conducted to identify which hazards the selected chemicals each have and if there are any in common. However, limited information was found. From this search, no common hazards were able to be identified among the selected chemicals. Based on this result, the Department is not considering including this subclass on the list of Chemicals of Concern.

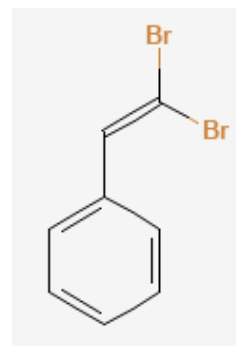
A Screening Assessment conducted on DBDPE by Environment and Climate Change Canada and Health Canada determined that the chemicals posed no hazards to human health. DBDPE is persistent in the environment but does not meet criteria for bioaccumulation (Canada 2019). Additionally, a study on potential maternal toxicity, developmental toxicity or teratogenicity of DBDPE in rats and rabbits found no evidence of such effects (Hardy et al 2010). Evidence of endocrine disruption has been found for DBDPE as well as cytotoxic and anti-proliferation effects and induction of apoptosis in Hep2G cells (Sun et al 2018, Sun et al 2012).



2,3,5,6-Tetrabromo-p-xylene



Pentabromobenzyl bromide



(2,2-Dibromovinyl) benzene

Figure 3. Representative members of the polyhalogenated benzene aliphatics and functionalized subclass.

The EPA CompTox Chemicals Dashboard(a) for PBT identified no hazards for the chemical but listed GHS hazard statements for skin, eye, and respiratory irritation, none of which are hazards included in ECL § 37-0905. Tests of PBT for evidence for mutagenicity in four *Salmonella typhimurium* strains were negative (Zeiger et al 1987).

Similarly, the EPA CompTox Chemicals Dashboard(b) for (1,2-Dibromoethyl) benzene only identified the GHS hazard for skin burns and eye damage. Denmark's Environmental Protection Agency has classified PBT as a category 2 carcinogen but no supporting evidence was identifiable.

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Table 11. High Priority Chemicals

Chemical	CASRN	Designated in Statute	Present in a children's product	Found to be present in humans	Found to be present in household dust, indoor air, drinking water, or elsewhere in the home	Found to be present in fish, wildlife, or the natural environment
Ethylbenzene	100-41-4		1	4	4	4
Styrene	100-42-5		1	4	4	4
1,3-butadiene	106-99-0		2		5	
1,2-dichloroethane	107-06-2		3	4	4	4
Acrylonitrile	107-13-1		1		4	4
Toluene	108-88-3		1	5	5	
Triphenyl phosphate	115-86-6		1	7	6	
BDE-209	1163-19-5		1	5	5	
Hexachlorobenzene	118-87-1		1	5		
Ethyl paraben	120-47-8		1	5	5	
1,4-Dioxane	123-91-9		1		4	4
EHDPP	1241-94-7		1		8	
PERC	127-18-4		1	4	4	4
DPP	131-18-0		1	10	9	
Tricresyl phosphate	1330-78-5		1		11	
Asbestos	1332-21-4	X				
TCPP	13674-84-5	X				
4-(1,1,3,3-tetramethylbutyl) phenol	140-66-9		1	4	4	
PFOS	1763-23-1		1	5	5	
4-Octylphenol	1806-26-4		1		5	
TBB	183658-27-7		1		4	4
HBCD	25637-99-4		1	5	5	
TBPH	26040-51-7		1		4	

V6	38051-10-4		1		12	
Formaldehyde	50-00-0		1		4	4
D4	556-67-2		1	4	4	4
Pentachlorobenzene	608-93-5		1	5		
Bisphenol F	620-92-8		1	14	13	
Aniline	62-53-3		1			4
Benzene	71-43-2	X				
Mercury and mercury compounds, including methyl mercury (22967-92-6)	7439-97-6	X				
Nickel and nickel compounds	7440-02-2		15	5	5	
Antimony and antimony compounds	7440-36-0		1	4	4	4
Arsenic and arsenic compounds, including arsenic trioxide (1327-53-3) and dimethyl arsenic (75-60-5)	7440-38-2	X				
Cadmium and cadmium compounds	7440-43-9	X				
Vinyl Chloride	75-01-4		1		4	4
Acetaldehyde	75-07-0		1		4	4
Methylene chloride	75-09-2		1		4	4
TBBPA	79-94-7		1	5	5	
DCHP	84-61-7		1	5	5	
N-Nitrosodiphenylamine	86-30-6		1			4
NMP	872-50-4		1		4	
HCDB	87-68-3		1		4	4
Propyl paraben	94-13-3		1	5		
Butyl paraben	94-26-8		1	5	5	
Methyl paraben	99-76-3		1	5	5	
Organohalogen FRs in upholstered bedding or furniture		X				

**Table 11. High Priority Chemical Key**

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## Practical Quantification Limits

### PQLs Drawn From Other States

The practical quantitation limits (PQLs) listed in Table 12 are based on the PQLs established by other state children's product disclosure programs. The majority of these thresholds have been in place for over decade, and manufacturers and their suppliers have become accustomed to reporting these chemicals at these levels. For these reasons, the Department believes these levels are technically and economically feasible for the regulated community, are widely adhered to across the children's product market, and are readily achievable.

Table 12. PQLs from Other States

Chemical Name	Alt Name	CAS	Chemical Category	PQL (ppm)	State
4-Nonylphenol	4-NP	104-40-5	Alkylphenol (Nonylphenol)	10.00	WA
Nonylphenol and its isomer mixtures		25154-52-3	Alkylphenol (Nonylphenol)	25.00	WA
4-nonylphenol, branched	4-NP and its isomer mixtures including CAS 84852-15-3 and CAS 25154-52-3	84852-15-3	Alkylphenol (Nonylphenol)	25.00	WA
4-Octylphenol		1806-26-4	Alkylphenol (Octylphenol)	10.00	WA
4-(1,1,3,3-tetramethylbutyl)phenol		140-66-9	Alkylphenol (Octylphenol)	10.00	WA
3,3'-Dimethylbenzidine and dyes metabolized to 3,3'-dimethylbenzidine		119-93-7	Benzidine, its salts and benzidine derivatives	10.00	OR
Bisphenol F	BPF	620-92-8	Bisphenol	1.00	WA
Bisphenol A	BPA	80-05-7	Bisphenol	20.00	OR
Bisphenol S	BPS	80-09-1	Bisphenol	1.00	WA
Ethylene Glycol		107-21-1	Glycol	5.00	OR
Ethylene glycol monomethyl ether	2-Methoxyethanol	109-86-4	Glycol ether	10.00	WA
Ethylene glycol monoethyl ether		110-80-5	Glycol ether	10.00	WA
Mercury & mercury compounds		7439-97-6	Inorganic (Heavy Metal)	0.50	WA
Molybdenum & molybdenum compounds		7439-98-7	Inorganic (Heavy Metal)	1.00	VT
Antimony & antimony compounds		7440-36-0	Inorganic (Heavy Metal)	1.00	WA
Arsenic & arsenic compounds		7440-38-2	Inorganic (Heavy Metal)	1.00	WA
Cadmium & cadmium compounds		7440-43-9	Inorganic (Heavy Metal)	1.00	WA
Cobalt & cobalt compounds	Cobalt metal powder	7440-48-4	Inorganic (Heavy Metal)	1.00	WA



Lead and lead compounds		7439-92-1	Inorganic (Heavy Metal)	1.00	VT
Triphenyl phosphate	TPP; Phosphoric acid, triphenyl ester	115-86-6	Organophosphate	50.00	WA
Ethyl hexyl d-phenol phosphate	EHDPP	1241-94-7	Organophosphate	50.00	WA
Tri-n-butyl phosphate	TNBP	126-73-8	Organophosphate	50.00	WA
Tricresyl phosphate	TCP	1330-78-5	Organophosphate	50.00	WA
Isopropylated triphenyl phosphate	IPTPP	68937-41-7	Organophosphate	50.00	WA
Propyl paraben		94-13-3	Paraben	30.00	OR
Methyl paraben		99-76-3	Paraben	30.00	OR
Ethyl paraben		120-47-8	Paraben	30.00	OR
Butyl paraben		94-26-8	Paraben	30.00	OR
Chlorinated Paraffins	C10-12	108171-26-2	Paraffin, chlorinated	50.00	WA
Short-chain chlorinated paraffins	SCCP; Alkanes, C10-13, chloro	85535-84-8	Paraffin, chlorinated	50.00	WA
Perfluorooctane sulfonate	PFOS; Perfluorooctane sulfonic acid and its salts	1763-23-1	PFAS	1.00	OR
Perfluorooctanoic acid and its salts	PFOA	335-67-1	PFAS	0.001	WA
Bis (2-ethylhexyl)phthalate	DEHP	117-81-7; 15495-94-0; 8033-53-2	Phthalate	20.00	OR
Di-(2-methoxyethyl) phthalate	DMEP	117-82-8	Phthalate	25.00	WA
Di-n-octyl phthalate	DNOP	117-84-0	Phthalate	5.00	OR
Dipentyl phthalate	DPP	131-18-0	Phthalate	50.00	WA
Di-Isodecyl Phthalate	DIDP	26761-40-0, 68515-49-1	Phthalate	50.00	OR
Diisononyl phthalate	DINP	68515-48-0, 28553-12-0	Phthalate	50.00	OR
Dicyclohexyl phthalate	DCHP	84-61-7	Phthalate	25.00	WA
Diethyl phthalate	DEP	84-66-2	Phthalate	5.00	OR
Diisobutyl phthalate	DIBP	84-69-5	Phthalate	25.00	WA
Di-n-Butyl Phthalate	DBP	84-74-2	Phthalate	5.00	OR
Di-n-Hexyl Phthalate	DnHP	84-75-3	Phthalate	5.00	OR
Butyl Benzyl Phthalate	BBP	85-68-7	Phthalate	5.00	OR

Decabromodiphenyl ethane	DBPE; DBDPE	84852-53-9	Polyhalogenated benzene aliphatics and functionalized	50.00	WA
Bis(2-ethylhexyl) tetrabromophthalate	TBPH	26040-51-7	Polyhalogenated phthalates/benzoates/imides	50.00	WA
2-Ethyl-hexyl-2, 3, 4, 5 tetrabromobenzoate	TBB	183658-27-7	Polyhalogenated phthalates/benzoates/imides	50.00	WA
p-Chloroaniline	4-Chloroaniline	106-47-8	Semivolatile Organic	60.00	OR
Aniline	Benzenamine	62-53-3	Semivolatile Organic	1.00	WA
2,4-Diaminotoluene		95-80-7	Semivolatile Organic	10.00	OR
N-Nitrosodimethylamine		62-75-9	Semivolatile Organic	1.00	WA
1,4-Dioxane		123-91-1	Semivolatile Organic	1.00	OR
N-Methylpyrrolidone	NMP	872-50-4	Semivolatile Organic	50.00	OR
Hexachlorobenzene		118-74-1	Semivolatile Organic	30.00	OR
Pentachlorobenzene		608-93-5	Semivolatile Organic	1.00	WA
N-Nitrosodiphenylamine		86-30-6	Semivolatile Organic	1.00	WA
Octamethylcyclotetrasiloxane	D4	556-67-2	Siloxane	10.00	VT
Ethylbenzene		100-41-4	Volatile Organic	1.00	WA
Styrene		100-42-5; 79637-11-9	Volatile Organic	1.00	WA
Acrylonitrile		107-13-1	Volatile Organic	1.00	WA
Toluene		108-88-3	Volatile Organic	1.00	OR
Tetrachloroethylene	PERC; Perchloroethylene; Tetrachloroethene	127-18-4	Volatile Organic	0.50	WA
Benzene		71-43-2	Volatile Organic	1.00	WA
Vinyl Chloride		75-01-4	Volatile Organic	1.00	OR
Methylene Chloride	Dichloromethane	75-09-2	Volatile Organic	1.00	WA
Carbon disulfide		75-15-0	Volatile Organic	10.00	OR
1,1,2,2-Tetrachloroethane		79-34-5	Volatile Organic	1.00	WA
2-Aminotoluene	o-Toluidine; ortho-Toluidine	95-53-4	Volatile Organic	1.00	WA
Hexachlorobutadiene	HCDB	87-68-3	Volatile Organic	30.00	OR
Methyl ethyl ketone	2-Butanone	78-93-3	Volatile Organic	1.00	WA
2-Ethylhexanoic acid		149-57-5	Misc	1.00	OR
C.I. Solvent Yellow 14		842-07-9	Misc	1.00	WA
P-hydroxybenzoic acid	4-Hydroxybenzoic acid	99-96-7	Misc	10.00	OR
Phenol		108-95-2	Misc	60.00	OR

Formaldehyde	Formalin	50-00-0; 1227476- 28-9	Misc	5.00	WA
Acetaldehyde		75-07-0	Misc	1.00	WA
Estragole		140-67-0	Misc	10.00	WA
Benzophenone-2	BP-2	131-55-5	Misc	20.00	OR
Butylated Hydroxyanisole	BHA	25013-16- 5	Misc	10.00	WA
2-Ethyl-hexyl-4- methoxycinnamate		5466-77-3	Misc	5.00	WA

### PQLs Based on a Publicly Available Method and Associated Detection Limit

The PQLs listed in Table 13 are based on a paired analytical method and detection limit reported by an authoritative government agency or published in a peer-reviewed scientific journal or report. Sources for the levels listed here include the U.S. Environmental Protection Agency (EPA), the U.S. Occupational Safety and Health Administration (OSHA), and two published studies regarding the use of liquid chromatography with tandem mass spectrometry (LC-MS/MS) to quantify tris(nonylphenyl)phosphite compounds in a variety of polyethylene resins and food packaging. Test methods published by government entities are well-established and widely used, and LC-MS/MS is a common analytical method in use today and is amenable to automation and unattended analysis. The Department is therefore considering the PQLs in Table 13 based on evidence that such levels are technically feasible.

Table 13. PQLs from Publicly Available Methods

Chemical Name	Alt Name	CAS	Chemical Category	PQL (ppm)	Source
Tris(4-nonylphenyl, branched and linear) phosphite with $\geq$ 0.1% w/w of 4-nonylphenol, branched and linear			Alkylphenol (Nonylphenol, phosphite)	10.00	Celiz et al. 2020
tris(4-nonylphenyl, branched) phosphite			Alkylphenol (Nonylphenol, phosphite)	10.00	Celiz et al. 2020
Tris(nonylphenyl) phosphite		26523-78-4	Alkylphenol (Nonylphenol, phosphite)	10.00	Celiz et al. 2020
Phenol, 4-nonyl-, phosphite (3:1)		3050-88-2	Alkylphenol (Nonylphenol, phosphite)	10.00	Celiz et al. 2020
Methylene Diphenyl Diisocyanate and Related Compounds	Methylene Diphenyl Diisocyanate (monomeric MDI) and polymeric MDI (PMDI)	101-68-8	Diisocyanate	0.02	OSHA 18; OSHA 5002
Toluene Diisocyanate and Related Compounds		584-84-9; 91-08-7; category	Diisocyanate	0.02	OSHA 18; OSHA 5002
Beryllium and compounds		7440-41-7	Inorganic (Heavy Metal)	5.00	EPA 7000B
Thorium-232 and its decay products		7440-29-1	Inorganic (Heavy Metal)	10.00	EPA 6200
Erionite		66733-21-9	Inorganic	30.00	Berry et al. 2019
Hexachloroethane		67-72-1	Volatile Organic	0.015	EPA 8121

## PQLs Based on Company Restricted Substances Lists

The PQLs listed in Table 14 are based on a paired analytical method and detection level or restriction limit established by a manufacturer or other commercial entity in their company's restricted substances list (RSL). Over the past decade, RSLs have become more widely adopted by companies as way to ensure that chemicals of concern are not contained in materials and components furnished by their suppliers or products sold in their stores, which are often part of a complex global supply chain. Some chemicals are not allowed above detection levels, while for others, the company has established a reporting limit or restriction limit above which chemicals of concern must be reported or may not be present.

Detection levels are the lowest level at which a chemical can be detected in a product using the test method specified for that chemical and product in the RSL. Some, but not all, RSLs list different detection levels, and sometimes different test methods, for different products. Reporting limits are a concentration at or above which the company requires the presence of a chemical to be reported. Such levels may be set at the detection level (often referred to as "non-detect" or "nd") but are frequently higher. Restriction limits are a concentration at or above which the company will not allow a chemical to be present in a product. Some restriction limits are set at the detection level but many are set at a level higher than the listed detection level.

The Department has identified twelve RSLs that list analytical methods paired with detection levels and/or restriction limits. In addition to manufacturers, entities with RSLs include retailers and industry associations. Examples include Bed, Bath and Beyond, Inc.; the apparel companies Columbia Sportswear Company; Deckers Brands; Peak Performance and Nike, Inc.; and the American Apparel and Footwear Association (AAFA) and the Apparel and Footwear International RSL Management Group (AFIRM). Company RSLs are a valuable source of information for determining readily achievable reporting thresholds because they often cover a wide range of products and materials, including textiles, leather, plastic and metal items. A number of RSLs have been in existence for multiple years, meaning industries have already been complying with similar disclosure and restriction requirements. The Department is considering the PQLs in Table 14 based on evidence that such levels are technically feasible.

Table 14. PQLs from Restricted Substances Lists

Chemical Name	Alt Name	CAS	Chemical Category	PQL (ppm)	Source
4-Nonylphenol, branched, ethoxylated		127087-87-0	Alkylphenol (Nonylphenol, ethoxylated)	50.00	BBB, Peak
4-Nonylphenol, ethoxylated	1 - 2.5 moles ethoxylated	26027-38-3	Alkylphenol (Nonylphenol, ethoxylated)	50.00	BBB, Peak
Nonylphenol, branched, ethoxylated	Poly(oxy-1,2-ethanediyl), a-(nonylphenyl)-w-hydroxy-	68412-54-4	Alkylphenol (Nonylphenol, ethoxylated)	50.00	BBB, Peak
Isononylphenol, ethoxylated		37205-87-1	Alkylphenol (Nonylphenol, ethoxylated)	50.00	BBB, Peak
Nonylphenol, ethoxylated		9016-45-9	Alkylphenol (Nonylphenol, ethoxylated)	50.00	BBB, Peak

2-{2-[4-(2,4,4-trimethylpentan-2-yl)phenoxy]ethoxy}ethanol		2315-61-9	Alkylphenol (Octylphenol)	30.00	Tesco, VF
2-[[4-(2,4,4-trimethylpentan-2-yl)phenoxy]ethan-1-ol		2315-67-5	Alkylphenol (Octylphenol)	30.00	Tesco, VF
20-[4-(1,1,3,3-tetramethylbutyl)phenoxy]-3,6,9,12,15,18-hexaoxaicosan-1-ol		2497-59-8	Alkylphenol (Octylphenol)	30.00	Tesco, VF
2-[[4-(2,4,4-trimethylpentan-2-yl)phenoxy]ethanol		9002-93-1	Alkylphenol (Octylphenol)	30.00	Tesco, VF
2-Naphthylamine		91-59-8	Azocolourants and Azodyes	5.00	BBB
4-Aminobiphenyl		92-67-1	Azocolourants and Azodyes	5.00	BBB
Benzidine, dyes metabolized to	CI Direct Brown 95 (16071-86-6); CI Direct Black 38 (1937-37-7); CI Direct Blue 6 (2602-46-2)	16071-86-6; 1937-37-7; 2602-46-2	Azocolourants and Azodyes	1.00	BBB
4,4'-Methylene bis(2-chloroaniline)	MOCA	101-14-4	Azocolourants and Azodyes	5.00	AFIRM, BBB, Peak
Benzidine and its salts		92-87-5	Azocolourants and Azodyes	5.00	AFIRM, BBB, Deckers
3,3'-Dichlorobenzidine		91-94-1	Azocolourants and Azodyes	5.00	AFIRM, BBB, Peak
3,3'-Dichlorobenzidine dihydrochloride		612-83-9	Benzidine, its salts and benzidine derivatives	5.00	BBB
Chlordane		12789-03-6, 57-74-9	Chlorinated cyclodiene	0.50	BBB, Peak
2,3,7,8-tetrachlorodibenzofuran	2,3,7,8-TCDF	51207-31-9	Dioxin and dioxin-like compounds (Polychlorinated Dibenzofurans)	0.0001	BBB, Tesco
1,2,3,7,8-pentachlorodibenzofuran	1,2,3,7,8-PeCDF	57117-41-6	Dioxin and dioxin-like compounds (Polychlorinated Dibenzofurans)	0.0001	BBB, Tesco
2,3,4,7,8-Pentachlorodibenzofuran	2,3,4,7,8-PeCDF	57117-31-4	Dioxin and dioxin-like compounds (Polychlorinated Dibenzofurans)	0.0001	BBB, Tesco
1,2,3,4,7,8-hexachlorodibenzofuran	1,2,3,4,7,8-HxCDF	70648-26-9	Dioxin and dioxin-like compounds (Polychlorinated Dibenzofurans)	0.0001	BBB, Tesco
1,2,3,6,7,8-hexachlorodibenzofuran	1,2,3,6,7,8-HxCDF	57117-44-9	Dioxin and dioxin-like compounds (Polychlorinated Dibenzofurans)	0.0001	BBB, Tesco

1,2,3,7,8,9-hexachlorodibenzofuran	1,2,3,7,8,9-HxCDF	72918-21-9	Dioxin and dioxin-like compounds (Polychlorinated Dibenzofurans)	0.0001	BBB, Tesco
2,3,4,6,7,8-hexachlorodibenzofuran	2,3,4,6,7,8-HxCDF	60851-34-5	Dioxin and dioxin-like compounds (Polychlorinated Dibenzofurans)	0.0001	BBB, Tesco
1,2,3,4,6,7,8-heptachlorodibenzofuran	1,2,3,4,6,7,8-HpCDF	67562-39-4	Dioxin and dioxin-like compounds (Polychlorinated Dibenzofurans)	0.0001	BBB, Tesco
1,2,3,4,6,8,9-heptachlorodibenzofuran	1,2,3,4,7,8,9-HpCDF	55673-89-7	Dioxin and dioxin-like compounds (Polychlorinated Dibenzofurans)	0.0001	BBB, Tesco
1,2,3,4,6,7,8,9-octachlorodibenzofuran	1,2,3,4,6,7,8,9-OCDF	39001-02-0	Dioxin and dioxin-like compounds (Polychlorinated Dibenzofurans)	0.0001	BBB, Tesco
2,3,7,8-Tetrachlorodibenzo-p-dioxin	TCDD	1746-01-6	Dioxin and dioxin-like compounds (Polychlorinated Dibenzo-para(p)-dioxins)	0.0001	BBB, Tesco
1,2,3,7,8-pentachlorodibenzo-p-dioxin	1,2,3,7,8-PeCDD	40321-76-4	Dioxin and dioxin-like compounds (Polychlorinated Dibenzo-para(p)-dioxins)	0.0001	BBB, Tesco
1,2,3,4,7,8-hexachlorodibenzo-p-dioxin	1,2,3,4,7,8-HxCDD	39227-28-6	Dioxin and dioxin-like compounds (Polychlorinated Dibenzo-para(p)-dioxins)	0.0001	BBB, Tesco
1,2,3,6,7,8-hexachlorodibenzo-p-dioxin	1,2,3,6,7,8-HxCDD	57653-85-7	Dioxin and dioxin-like compounds (Polychlorinated Dibenzo-para(p)-dioxins)	0.0001	BBB, Tesco
1,2,3,7,8,9-hexachlorodibenzo-p-dioxin	1,2,3,7,8,9-HxCDD	19408-74-3	Dioxin and dioxin-like compounds (Polychlorinated Dibenzo-para(p)-dioxins)	0.0001	BBB, Tesco
1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin	1,2,3,4,6,7,8-HpCDD	35822-46-9	Dioxin and dioxin-like compounds (Polychlorinated Dibenzo-para(p)-dioxins)	0.0001	BBB, Tesco
1,2,3,4,6,7,8,9-octachlorodibenzo-p-dioxin	1,2,3,4,6,7,8,9-OCDD	3268-87-9	Dioxin and dioxin-like compounds (Polychlorinated Dibenzo-para(p)-dioxins)	0.0001	BBB, Tesco
Hexachlorocyclohexane	BHC; HCH; t-HCH	608-73-1	Hexachlorocyclohexane	0.50	BBB, Peak
Lindane		58-89-9	Hexachlorocyclohexane	0.50	BBB, Peak
Nickel and nickel compounds		7440-02-0	Inorganic (Heavy Metal)	1.00	Columbia, Deckers, PVH, VF
Benzo[k]fluoranthene		207-08-9	PAH (Polynuclear Aromatic Hydrocarbon)	0.50	AAFA, Columbia, Decker, PVH
Benz[a]anthracene		56-55-3	PAH (Polynuclear Aromatic Hydrocarbon)	0.50	AAFA, Columbia, Decker, PVH

Chrysene		218-01-9	PAH (Polynuclear Aromatic Hydrocarbon)	0.50	AAFA, Columbia, Decker, PVH
Anthracene oil, anthracene-low		90640-82-7	PAH (Polynuclear Aromatic Hydrocarbon)	0.10	Peak
Anthracene oil, anthracene paste, distn. lights		91995-17-4	PAH (Polynuclear Aromatic Hydrocarbon)	0.10	Peak
Anthracene oil, anthracene paste, anthracene fraction		91995-15-2	PAH (Polynuclear Aromatic Hydrocarbon)	0.10	Peak
Anthracene oil, anthracene paste		90640-81-6	PAH (Polynuclear Aromatic Hydrocarbon)	0.10	Peak
Anthracene oil		90640-80-5	PAH (Polynuclear Aromatic Hydrocarbon)	0.10	Peak
Naphthalene		91-20-3	PAH (Polynuclear Aromatic Hydrocarbon)	0.20	AFIRM, Peak
Benzo[a]pyrene	BaP	50-32-8	PAH (Polynuclear Aromatic Hydrocarbon)	0.20	AFIRM, Columbia, Peak, Tesco
Benzo(g,h,i)perylene		191-24-2	PAH (Polynuclear Aromatic Hydrocarbon)	0.20	AFIRM, Peak
Pyrene		129-00-0	PAH (Polynuclear Aromatic Hydrocarbon)	0.20	AFIRM, Peak
Fluoranthene		206-44-0	PAH (Polynuclear Aromatic Hydrocarbon)	0.20	AFIRM, Peak
Anthracene		120-12-7	PAH (Polynuclear Aromatic Hydrocarbon)	0.20	AFIRM, Peak
Phenanthrene		85-01-8	PAH (Polynuclear Aromatic Hydrocarbon)	0.20	AFIRM, Peak
Pentachlorophenol		87-86-5	Pentachlorophenol and its salts and esters	0.50	AFIRM, Columbia, Peak, and PVH
Nonadecafluorodecanoic acid and its salts		335-76-2	PFAS	0.05	Tesco
Perfluoroheptanoic acid		375-85-9	PFAS	0.05	Tesco
Perfluorohexane-1-sulphonic acid and its salts	PFHxS	355-46-4	PFAS	0.05	Tesco
Henicosafleuroundecanoic acid		2058-94-8	PFAS	0.05	Tesco
Heptacosafleurotetradecanoic acid		376-06-7	PFAS	0.05	Tesco
Pentacosafleurotridecanoic acid		72629-94-8	PFAS	0.05	Tesco
Tricosafleurododecanoic acid		307-55-1	PFAS	0.05	Tesco



Perfluorononan-1-oi-acid and its salts		375-95-1	PFAS	0.05	Tesco
Polychlorinated Biphenyls	PCBs	1336-36-3, 67774-32-7, 32536-52-0, 1163-19-5, 32534-81-9, 57465-28-8	Polychlorinated Biphenyls	50.00	BBB
Methoxychlor		72-43-5	Semivolatile Organic	0.50	BBB, Peak
Endrin	Endrin aldehyde	72-20-8	Semivolatile Organic	0.50	BBB, Peak
Heptachlor	Heptachlorine	76-44-8	Semivolatile Organic	0.50	BBB, Peak
Chlordecone	Kepone	143-50-0	Semivolatile Organic	0.50	BBB, Peak
Dichlorodiphenyl-trichloroethane	DDT	50-29-3	Semivolatile Organic	0.50	BBB, Peak
Toxaphene	Polychlorinated camphenes	8001-35-2	Semivolatile Organic	0.50	BBB, Deckers, Peak, PVH, Tesco, VF
Aldrin		309-00-2	Semivolatile Organic	0.50	BBB, Peak
Isodrin		465-73-6	Semivolatile Organic	0.50	BBB, Peak
Mirex		2385-85-5	Semivolatile Organic	0.50	BBB, Peak
Carbon Tetrachloride		56-23-5	Volatile Organic	5.00	BBB, Tesco
1,2-Dibromoethane	Ethylene dibromide	106-93-4	Volatile Organic	0.50	AFIRM, PVH, Tesco
Chloroprene		126-99-8	Volatile Organic	50.00	Peak
Methanol		67-56-1	Volatile Organic	0.50	Tesco
1,3-Butadiene		106-99-0	Volatile Organic	1.00	Tesco
1,4-Dichlorobenzene	p-Dichlorobenzene	106-46-7	Volatile Organic	0.20	AFIRM
Acrylamide		79-06-1	Volatile Organic	0.10	Peak
Chloroform	trichloromethane	67-66-3	Volatile Organic	5.00	BBB, Columbia, Tesco
1,1,2-Trichloroethane		79-00-5	Volatile Organic	5.00	BBB
Trichloroethylene	TCE	79-01-6	Volatile Organic	5.00	BBB, Columbia, Tesco
1,2-Dimethoxyethane	EGDME	110-71-4	Misc	5.00	Columbia, Tesco

## PQLs Based on Commercial Laboratory Product Test Reports

The PQLs in Table 15 are based on a paired analytical method and detection or reporting level reported by a commercial laboratory to a client as part of a certified and signed laboratory test report. In response to the establishment of restricted substances lists (RSLs) by manufacturers and retailers, or the establishment of chemical disclosure or restrictions by government entities, manufacturers and suppliers are asking commercial, independent laboratories to test their products to ensure that they meet government or supply chain requirements. The laboratories generally work to ensure their detection limits comply with the limits set by governments or RSLs. The Department accessed these test reports via the websites of the clients of the commercial laboratories. Over time, the testing of products across the supply chain has become more routine. Since these test reports show the levels at which these chemicals can be detected in components containing plastic, glass and metal, it is reasonable to believe similar levels can be achieved in covered products. The Department is considering the PQLs in Table 15 based on evidence that the detection and reporting levels contained in commercial laboratory product test reports are technically feasible.

Table 15. PQLs from Commercial Test Reports

Chemical Name	Alt Name	CAS	Chemical Category	PQL (ppm)	Source
2-benzotriazol-2-yl-4,6-di-tert-butylphenol	UV-320	3846-71-7	Benzotriazole UV stabilizer	5.00	SGS 2020, 2021
2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol	UV-328	25973-55-1	Benzotriazole UV stabilizer	5.00	SGS 2020, 2021
2-(2H-benzotriazol-2-yl)-4-(tert-butyl)-6-(sec-butyl)phenol	UV-350	36437-37-3	Benzotriazole UV stabilizer	5.00	SGS 2020, 2021
2,4-di-tert-butyl-6-(5-chlorobenzotriazol-2-yl)phenol	UV-327	3864-99-1	Benzotriazole UV stabilizer	5.00	SGS 2020, 2021
1,6,7,8,9,14,15,16,17,17,18,18-Dodecachloropentacyclo[12.2.1.16,9.02,13.05,10]octadeca-7,15-diene	Covering any of its individual anti- and syn-isomers or any combination thereof	13560-89-9	Dechlorane	20.00	IST 2018
Asbestos (all forms)		1332-21-4	Inorganic (Asbestos)	0.10	SGS 2019, 2021
Nitrobenzene		98-95-3	Nitroaromatic	1.00	SGS 2021
Reaction products of 1,3,4-thiadiazolidine-2,5-dithione, formaldehyde and 4-heptylphenol, branched and linear (RP-HP) with ≥0.1% w/w 4-heptylphenol, branched and linear (4-HPbl)			Reaction products of formaldehyde	20.00	IST 2018
1,2-Dichloropropane		78-87-5	Volatile Organic	0.10	SGS 2021
Ethylene oxide		75-21-8	Volatile Organic	5.00	SGS 2021
bis(2-Ethylhexyl) adipate	DEHA	103-23-1	Misc	30.00	SGS 2021

### PQLs Based on Chemical Class

The PQL under consideration for all four OFR subclasses that the Department has identified qualify for inclusion on the Chemical of Concern list is 50 parts per million (ppm). Each of the subclasses includes at least one chemical that has been included in another state's equivalent program and assigned a PQL. As shown in Table 16, the PQL assigned by other states varies in some cases, but as this level would apply to an entire subclass, the Department is considering 50 ppm as the most achievable level.

Table 16. PQLs based on Chemical Class

OFR subclass	PQL (ppm)	PQL seed chemical	Other state	PQL in other state, respectively (ppm)
Polyhalogenated Organophosphates	50	Tris(2-chloroethyl) phosphate (115-96-8)	WA, OR, VT	50, 50, 50
		Tris(2,3-dibromopropyl) Phosphate (126-72-7)	WA, VT	50, 50
		Tris(1-chloro-2-propyl) phosphate (13674-84-5)	WA, OR, VT	50, 50, 50
		Tris(1,3-dichloro-2-propyl) phosphate (13674-87-8)	WA, OR, VT	50, 50, 50
		Bis(chloromethyl) propane-1-3-diyl tetrakis-(2-chloroethyl) bis(phosphate) (38051-10-4)	WA, VT	50, 50
Polyhalogenated Bisphenol Aliphatics	50	Tetrabromobisphenol A (79-94-7)	WA, OR, VT	50, 20, 20
Polyhalogenated Alicycles	50	Hexabromocyclododecane (25637-99-4)	WA, OR, VT	50, 10, 10
Polyhalogenated Diphenyl Ethers	50	2,2',3,3',4,4',5,5',6,6'-Decabromodiphenyl ether (1163-19-5)	WA, OR, VT	50, 10, 10

## PQLs Based on Information Received from Commercial Laboratory Product Testing Experts

The PQLs in Table 17 are based on a paired analytical method and detection level provided to the Department by commercial laboratories that regularly test consumer products. As methods and practical quantitation limits are often confidential business information for commercial laboratories, the Department was asked not to reveal specific sources of this information. However, this data is valuable as it shows levels that are achievable in a wide range of materials and products. The Department is considering these chemicals and the listed PQLs even though it was not able to identify additional sources of PQL information, as it could for the other groups listed above, because information from commercial laboratories is reliable and shows technical achievability.

Table 17. PQLs from Commercial Laboratories

Chemical Name	Alt Name/Description	CAS	Chemical Category	PQL (ppm)
4-(1,1,3,3-tetramethylbutyl)phenol, ethoxylated	covering well-defined substances and UVCB substances, polymers and homologues		Alkylphenol	1.00
p-(1,1-dimethylpropyl)phenol		80-46-6	Alkylphenol	10.00
4-tert-butylphenol		98-54-4	Alkylphenol (Butylphenol)	20.00
4-heptylphenol, branched and linear	substances with a linear and/or branched alkyl chain with a carbon number of 7 covalently bound predominantly in position 4 to phenol, covering also UVCB- and well-defined substances which include any of the individual isomers or a combination thereof	Category	Alkylphenol (Heptylphenol)	10.00
4-heptylphenol		1987-50-4	Alkylphenol (Heptylphenol)	10.00
Phenol, heptyl derivs.		72624-02-3	Alkylphenol (Heptylphenol)	10.00
Dodecamethylcyclohexasiloxane	D6	540-97-6	Siloxane	5.00
Decamethylcyclopentasiloxane	D5	541-02-6	Siloxane	5.00
Bis(tributyltin) oxide	TBTO	56-35-9	Tributyltin Compounds	0.05

## Chemicals with Multiple Potential PQL Values

For each chemical listed in Table 18, the Department has identified multiple sources of evidence indicating that the chemical can be detected at a quantifiable level in covered products, but those potential detection levels vary. For these chemicals, the Department is particularly interested in receiving comments from the public on the technical feasibility of the levels listed or any other potentially applicable levels. All of the chemicals in this group are listed in multiple methods applicable to the testing of volatile organic chemicals (VOCs) in the U.S. Environmental Protection Agency's (EPA's) "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods Compendium" (SW-846). That document is EPA's official collection of methods for use in complying with the Resource Conservation and Recovery Act (RCRA) regulations.

### *Types of Evidence*

Two broad types of evidence are used as sources in Table 18. The first is detection, reporting or restriction levels assigned to other VOCs that can be detected by two or more of the same EPA test methods as the chemical named in the table. These test methods are identified in the column "Test Method." For example, tert-amyl methyl ether (CASRN 994-05-8) can be detected by SW-846 test methods 8015C and 8260D, but no detection limit is provided for this chemical in either method. However, a number of other VOCs that can be detected by the same test methods have been assigned PQLs under another state's chemical disclosure law for children's products; detection, reporting or restriction limits in identified restricted substances lists (RSLs); or detection limits in commercial laboratory test reports.

The second type of evidence in Table 18 is detection, reporting or restriction limits in identified RSLs for the chemical named in the table. In these instances, the cell is green to highlight that the type of evidence displayed is different.

### *Instructions for Reading the Table*

There is a lot of information summarized in the table below, so the following describes how the information is displayed to assist with interpreting the table. The columns "PQL 1," "PQL 2," etc. list the practical quantitation levels that could, based on the sources listed to the right, be assigned to the chemical named in the row. In the source columns, the name listed prior to the parentheses indicates the source of the potential PQL value. Full citations for each of these sources are at the end of this section. In parentheses, the first, and in some case only, part refers to the nature of the source value (i.e. a detection level (D), reporting limit (Rep), or restriction limit (Res)). If a number follows, it refers to the number of other VOCs that can be detected by the listed test methods which have been assigned a detection, reporting or restriction value equivalent to that noted in the previous column. For cells that contain two potential PQLs, a slash (/) in the applicable source cell indicates which of the two listed potential PQLs the source supports.

For example, m-xylene lists "0.1 / 0.2" as potential PQL values under PQL 1 with the source "Peak (Res, 1); SGS 2021 (D, 1) / AFIRM (D, 1)." The sources for the 0.1 ppm value are Peak Performance's RSL and a commercial laboratory test report prepared by SGS-CSTC Standards Technical Services dated 2021. The source for the 0.2 ppm value is the Apparel and Footwear International RSL Management Group's (AFIRM's) RSL. Peak Performance's RSL includes 0.1 ppm as a restriction limit (Res) for one (1) other VOC that can be detected with the same EPA test methods as m-xylene. Likewise, SGS 2021 and AFIRM's RSL include 0.1 ppm and 0.2 ppm, respectively, as the detection level (D) for one (1) other VOC that can be detected with the same EPA test methods as m-xylene.

Table 18. PQLs from Multiple Sources														
Chemical Name	Alt Name	CAS	Chemical Category	Test Method	PQL 1	Source	PQL 2	Source	PQL 3	Source	PQL 4	Source	PQL 5	Source
tert-Amyl methyl ether		994-05-8	Volatile Organic	8015C (8260D)	n/a	n/a	0.50	WA (D, 1); Tesco (D, 1)	1.00	WA (D, 5)	5.00	SGS 2021 (D, 1)		
m-Xylene		108-38-3	Volatile Organic	8021B (8260D)	0.10/ 0.20	Peak (Res, 1); SGS 2021 (D, 1) / AFIRM (D, 1)	0.50	WA (D, 1); AFIRM, PVH & Tesco (D, 1)	1.00	Columbia (Res)	5.00	BBB (D, 3); Tesco (D, 3); Columbia (D, 1), (Res, 1)	20.00	AFIRM (Rep)
p-Xylene		106-42-3	Volatile Organic	8021B (8260D)	0.10/ 0.20	Peak (Res, 1); SGS 2021 (D, 1) / AFIRM (D, 1)	0.50	WA (D, 1); AFIRM, PVH & Tesco (D, 1)	1.00	Columbia (Res)	5.00	BBB (D, 3); Tesco (D, 3); Columbia (D, 1), (Res, 1)	20.00	AFIRM (Rep)
1,2-Dichloro ethane	ethylene dichloride	107-06-2	Volatile Organic	8021B (8260D)	0.10/ 0.20	Peak (Res, 1); SGS 2021 (D, 1) / AFIRM (D, 1)	0.50	WA (D, 1); AFIRM, PVH & Tesco (D, 1)	1.00	Columbia (D)	5.00	Tesco (D)	20.00	AFIRM (Rep)
Chlorom ethyl Methyl Ether		107-30-2	Volatile Organic	8021B (8260D)	0.10/ 0.20	Peak (Res, 1); SGS 2021 (D, 1) / AFIRM (D, 1)	0.50	WA (D, 1); AFIRM, PVH & Tesco (D, 1)	1.00	WA (D, 5); OR (D, 2); Columbia (Res, 4)	5.00	BBB (D, 3); Tesco (D, 3); Columbia (D, 1), (Res, 1)	30.00	OR (D, 1)
Tribromo methane	Bromo form	75-25-2	Volatile organic	8021B (8260D)	0.10/ 0.20	Peak (Res, 1); SGS 2021 (D, 1) / AFIRM (D, 1)	0.50	WA (D, 1); AFIRM, PVH & Tesco (D, 1)	1.00	WA (D, 5); OR (D, 2); Columbia (Res, 4)	5.00	BBB (D, 3); Tesco (D, 3); Columbia (D, 1), (Res, 1)	30.00	OR (D, 1)

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