

EUROPEAN R.E.A.C.H. OVERVIEW

By Bonnie L. Stuck*

Akron Rubber Development Laboratory, Inc., Akron, Ohio, USA

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*Speaker

ABSTRACT

R.E.A.C.H. (Registration, Evaluation, Authorization and Restriction of Chemicals) is a single system for registering new and existing chemicals that are manufactured or imported into the EU (European Union). R.E.A.C.H. elements include:

Registration of substances

Supply chain information of substances

Evaluation of some substances by EU member states

Restrictions on substances of very high concern

R.E.A.C.H. will manage the chemical registration system

The priorities are on high volume substances and substances with high risks. R.E.A.C.H. will shift the responsibilities for testing from public authorities towards industry. This presentation will provide an overview of R.E.A.C.H. and how it affects the rubber industry.

INTRODUCTION

R.E.A.C.H. (Registration, Evaluation, Authorization and Restriction of Chemicals) is a single system for registering new and existing chemicals that are manufactured or imported into the EU (European Union). R.E.A.C.H. elements include registration of substances, supply chain information on substances, evaluation of some substances by EU member states, and restriction of some high risk substances. The priority will be on high volume substances and substances with high risks to humans and the environment. R.E.A.C.H. will shift the responsibilities for testing new and existing substances from public authorities towards the manufacturers and importers of the substances.

R.E.A.C.H. was adopted in June 2007 and replaces over 40 different legal acts on chemicals, substances and preparations, including the well-known EINECS, the European counterpart to TSCA in the US and DSL/NDSL lists in Canada. All companies importing substances into countries that are part of the EU (European Union) must comply with R.E.A.C.H. R.E.A.C.H. estimates that 70% of the existing chemicals will be classified as dangerous under R.E.A.C.H. and will need registration. A technical dossier is needed when a substance alone or in a preparation exceeds 1 tonne per year. A CSR (Chemical Safety Report) is needed if the quantity exceeds the 10 tonne per year. Certain high risk chemicals may be banned under R.E.A.C.H. R.E.A.C.H. is active now. The pre-registration period was June – December 2008. Registration deadlines (depending on the volume) are November 2010, May 2013 and May 2018.

STEPS IN R.E.A.C.H.

The timetables and steps in R.E.A.C.H. are dependent on the volume of the substance in question. R.E.A.C.H. refers to volumes in tonnes (EU) or metric tons (US, UK). One tonne is equivalent to 1,000 kilograms or 2,205 pounds. Below is list of the deadlines for R.E.A.C.H. registration:

- June 2007: entry into force of R.E.A.C.H.
- June 2008: European Chemicals Agency becomes operational
- June 1, 2008 to December 31, 2008: Pre-registration of phase-in substances
- Registration: It depends on the volume (higher sooner) and the level of concern of the substance. Deadlines are:
 - November 30, 2010: 1000 tonne/yr & above
 - November 30, 2010: carcinogens, mutagens & substances toxic to reproduction above 1 tonne/yr
 - November 30, 2010: substances classified as very toxic to aquatic organisms above 100 tonne/yr

- May 31, 2013: substances in quantities above 100 tonne/yr
- May 31, 2018: substances above 1 tonne/yr

The main steps of R.E.A.C.H. are:

- Registration of substances
- Evaluation of substances
- Authorization of high risk substances
- Restrictions or banning of very high risk chemicals

Registration requires producers and importers to provide information and testing results on chemical substances produced in or imported into EU countries in quantities of over 1 tonne/year. It involves submitting a technical dossier containing information on the substance and information on how to effectively manage the risk entailed by using it. Quantities above 10 tonnes per year will require the submission of a Chemical Safety Report (CSR) to document the safety assessment of the substance.

Evaluation of substances allows the regulatory authorities to decide on proposals for further testing and assess whether information provided by industry complies with the requirements. For substances which have suspected health or environmental risks, R.E.A.C.H. provides a path to require industry to do further evaluations. Evaluation may lead to the conclusion that action should be taken under the restrictions or authorization procedures. This may lead to banning certain high risk chemicals.

Authorization may be required for substances of very high health concern (carcinogens, mutagens, substances toxic to the reproductive system) or for substances of very high environmental concern (persistent, bio-accumulative and toxic, very persistent and very bio-accumulative or of equivalent concern).

Restrictions are the safety net of the system. Any substance on its own, in a preparation or in an article, may be subject to Community-wide restrictions if its use poses unacceptable risk to health or the environment. Restrictions can be decided either for the use of a substance in certain products, the use by consumers or even for all uses (complete ban of a substance).

WHO MUST BE CONCERNED WITH R.E.A.C.H.

Manufacturers and importers must register substances they produce or import in quantities over 1 tonne per year. The registration requirement applies to substances on their own, in preparations and in articles under special conditions (intentional release). Failure to register means that the substance cannot be manufactured, imported or used in the EU market.

Downstream users of chemicals must apply risk management analysis for dangerous substances identified on the supplier MSDS sheets. They must let the manufacturer/importer know the use of a substance and

that must be included in their supplier's chemical safety assessment. In this case they have to provide sufficient information to allow the supplier to prepare an exposure scenario for the use. If they consider the use proprietary they can conduct their own chemical safety assessment and report this use to R.E.A.C.H. Under R.E.A.C.H. the chemical uses must be covered on the MSDS sheet.

Who can register a substance (on its own or in a preparation)? EU-manufacturers, EU importers, or an EU-based representative of a non-EU manufacturer (called an only representative) are the only organizations that can register. It should be noted that the registrant always needs to be established in the EU, both in case of an importer and an only representative. The non-EU manufacturer is free to choose whether to appoint an 'only representative' or to let the importer register his substances. By appointing an 'only representative' the manufacturer gets more control over the registration process and avoids having to disclose potentially sensitive information to the importer. Also, for EU importers, the 'only representative' has advantages; the importer will be relieved from his obligation to act as a registrant under R.E.A.C.H. and will be regarded as a downstream user.

EXCHANGE OF INFORMATION, REPORTS ON SUBSTANCES, MSDS SHEETS

R.E.A.C.H. encourages sharing of information and testing on substances through SIEF – Substance Information Exchange Forums. The SIEF promotes the exchange of data and information to prevent unnecessary animal testing. There is mandatory sharing of animal data. The SIEF requires agreement on classification and labeling of substances between manufacturers of the same substance.

A Technical Dossier is needed if the volume of the substance either manufactured or imported into the EU is 1 to 10 tonne per year. The Technical Dossier must have the following information:

- Identity of the manufacturer or importer
- Identity of the substance
- Information on the manufacture and uses of the substance
- Classification and labeling of the substance
- Guidance on safe use of the substance
- Study summaries of the information derived from the application Annexes VII to XI under R.E.A.C.H.
- External control by an assessor having appropriate experience
- Proposal for testing where listed in Annexes IX and X Under R.E.A.C.H.
- Substances in quantities of 1 to 10 tonnes, exposure information

- Request for confidentiality of certain parts of the submitted data if applicable.

A Chemical Safety Report is needed if the volume of the substance either manufactured or imported into the EU is greater than 10 tonnes per year. The Chemical Safety Report must have all the information in the Technical Dossier plus the following information:

- Human health hazard assessment
- Human health hazard assessment of physio-chemical properties
- Environmental hazard assessment
- PBT (persistent bioaccumulative) and vPvB (very persistent, very bioaccumulative) assessment
- Exposure assessment
- Risk characterization

There is also a standard format for a R.E.A.C.H. compliant MSDS sheet (material safety data sheet). The official R.E.A.C.H. name for a MSDS is Safety Data Sheet (SDS) but most companies refer to it as MSDS. All pages of the MSDS should be labeled with both the page number and the total number of pages. The MSDS should state the date of issue and any revision number(s). The MSDS is a 16 part format with following sections:

- 1) Identification of the substance/preparation and of the company who makes the substance
 - a) Product name
 - b) Chemical name
 - c) Synonyms
 - d) Use of the substance/preparation
 - e) Company name, address and contact
 - f) Emergency contact phone number
- 2) Hazards identification
 - a) Physical state and color
 - b) Emergency overview
 - c) Classification according to Directive 1999-45-EC and its amendments
 - d) Any additional hazards
- 3) Composition/information on ingredients

- a) Indication if it is a substance or a preparation
 - b) Ingredient name(s), CAS number(s), concentration(s), EC number(s) and classification(s)
 - c) R-phrases or statement about where the R-phrases are in the MSDS if they are not in this section
 - d) Occupation and workplace exposure limits, if applicable, or their location if not in this section
- 4) First-aid measures
- a) Eye contact
 - b) Skin contact
 - c) Inhalation
 - d) Ingestion
 - e) Protection for emergency personnel
 - f) Notes to physician
- 5) Fire-fighting measures
- a) Flammability
 - b) Extinguishing media, suitable and not suitable
 - c) Special exposure hazards
 - d) Hazardous decomposition products
 - e) Special protective equipment for fire-fighters
 - f) Explosion hazards
- 6) Accidental release measures
- a) Personal precautions
 - b) Environmental precautions
 - c) Directions for cleaning up small and large spills
- 7) Handling and storage
- a) Handling precautions
 - b) Storage precautions

- c) Packaging materials
- 8) Exposure controls/personal protection
 - a) Exposure limit values (if not included in Section 3)
 - b) Recommended monitoring procedures
 - c) Occupational controls (ventilation)
 - d) Hygiene
 - e) Personal protection: respiratory, hands, eyes, skin
 - f) Environmental exposure controls
- 9) Physical and chemical properties
 - a) Appearance – physical state and color
 - b) Physical properties – pH, boiling point, melting point, flash point, auto-ignition temperature, explosive properties, vapor pressure, density, solubility, partition coefficient (n-octanol/water), viscosity, vapor density, evaporation rate
- 10) Stability and reactivity
 - a) Stability
 - b) Hazardous reactions
 - c) Hazardous decomposition products
 - d) Incompatibility with other substances
- 11) Toxicological information
 - a) Potential acute health effects such as inhalation, eyes, skin, etc.
 - b) Acute toxicity such as LD50 dermal, skin, etc.
 - c) Potential chronic health effects
 - d) Chronic toxicity
 - e) Irritation/Corrosion effects
 - f) Sensitization properties
 - g) Carcinogenicity including classification by ACGIH, IARC, EPD, NIOSH, NTP, OSHA, etc.

- h) Mutagenicity
 - i) Teratogenicity
 - j) Reproductive toxicity
 - k) Over exposure symptoms
- 12) Ecological information
- a) Environmental effects
 - b) Aquatic ecotoxicity
 - c) Biodegradability
- 13) Disposal considerations
- a) Methods of disposal
 - b) Any hazardous waste regulations or classifications
- 14) Transport information
- a) Any regulations with transportation such as DOT classification (US), TDG Classification (Canada), ADR/RID Class, IMDG Class, IATA-DGR Class
- 15) Regulatory information
- a) Risk phrases (R-phrases) if not included in Section 3
 - b) Europe inventory statement
 - c) May also include other regulation for the EU or other non-EU countries
- 16) Other information
- a) May contain HMIS label (Hazardous Material Information System) or National Fire Protection Association label
 - b) Any other information the supplier wishes to convey to the customer
 - c) Date of issue and/or revision number

R.E.A.C.H. PROGRAM

Below are some steps to starting your R.E.A.C.H. compliance program.

- Inventory your materials and uses.
- Determine if you have a substance, preparation, or article. R.E.A.C.H. only registers substances, not preparations or articles. However, preparations or articles may have substances within which need to be registered if they meet certain criteria.
- Communicate with your suppliers about your uses and their possible exposure scenarios.
- R.E.A.C.H. requires that how the substance is used be identified and communicated up and down the supply chain. The use has to go on the MSDS.
- Ask your customers about their uses.
- Develop partnerships in your supplier chain.
- Develop partnerships with similar users of your substances.
- A Chemical Safety Assessment must be prepared if the use is kept confidential.

A substance is a chemical element and its compounds in the natural state or obtained by any manufacturing process, including any additive necessary to preserve its stability and any impurity deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition. Below is a list of substances that require registration:

- Explosive chemicals
- Oxidizing chemicals such as peroxides
- Extremely flammable substances – flash point $<0^{\circ}\text{C}$ and boiling point $\leq 35^{\circ}\text{C}$
- Highly flammable – may become hot and catch fire in contact with air at ambient temperature
 - Liquids with flash point $<21^{\circ}\text{C}$
 - Gases which are flammable at normal pressure
 - Substances which in contact with water or damp air evolve highly flammable gases in dangerous quantities
- Flammable substances – liquids with flash point $>21^{\circ}\text{C}$ and $\leq 55^{\circ}\text{C}$
- Very toxic substances which if they are inhaled or ingested or if they penetrate the skin may involve extremely serious acute or chronic health risks or death

- Toxic substances – same as above only without the word extremely
- Harmful substances – if they are inhaled or ingested or if they penetrate the skin an may involve limited health risks
- Corrosive substances- may on contact with living tissues destroy them
- Irritant – non-corrosive substance through which immediate, prolonged or repeated contact with skin or mucous membrane can cause inflammation
- Dangerous for the environment – presents or may present immediate or delayed risks for the environment

Below is a list of substances that do not need to be registered with R.E.A.C.H.:

- Low risk chemicals such as water, oxygen, noble gases and cellulose pulp
- Substances in nature such as minerals and/or concentrates, cement clinker - even if the mineral contains carcinogens such as asbestos and crystalline silica.
- Substances in food, in medicinal products because they are regulated in other specific legislation. This includes carcinogens such as tobacco and nitrosamines in beer and cured meat (bacon)!
- Chemical intermediates in closed chemical manufacturing systems.
- Polymers – however the monomers in the polymer have to be registered.

A preparation is a mixture or solution composed of two or more substances. If I have a mixture or prepared blend – what do I register? R.E.A.C.H. registration is only for substances not preparations or articles – it is only for individual substances. However, if any substances in your preparation exceeds the 1 tonne limit you must register that substance. Also, if any substance in the preparation is on the substances of very high concern list (SVHC List) at greater 0.1% you must register.

An article is object which during production is given a special shape, surface or design which determines its function to a greater degree than does its chemical composition. Articles containing substances not intended for release, examples would include tires, rubber goods, furniture, etc. However, a polymer bound dispersion of a chemical whether it is in a slab or pellet form would not be considered an article because its primary function is the active chemical ingredient not the shape of the dispersion. The dispersion would be considered a preparation. Articles do not need to be registered unless they meet the following criteria:

- Contains a substance meeting authorization criteria (SVHC List) - > 1 tonne/yr and present at > 0.1% w/w. An exemption could be had if there is no exposure during use and disposal. You must disclose the substance ID to R.E.A.C.H. and they could require registration.

- Substances intended to be released from articles will have to be registered such as ink from markers/pens if amount released meets the 1 tonne/year threshold and it is not registered further up the supply chain.

R.E.A.C.H. can be expensive for a company. See Table 1 below for a summary of the fees.

Category (yearly, tonnes)	Full Base Fee	Consortium Participants	SMEs	SMEs Participating in consortium
1-10	1,200	804	900	504
10-100	3,257	2,182	2,443	1,368
100-1,000	8,842	5,924	6,631	3,714
>1,000	24,000	16,080	18,000	10,080
PPORD application	500	500	500	500
PPORD renewal	250	250	250	250
Authorization Application	58,000	58,000	58,000	58,000
Appeal fee	1,500	1,500	1,500	1,500

Table 1. - R.E.A.C.H. fee schedule in EUROS

REGULATORY TRENDS FOR NON-EU COUNTRIES

Countries outside the EU that are likely to adopt a R.E.A.C.H. type system are Switzerland, Norway, Canada, Japan, Korea, New Zealand and China. The US is now debating in Congress whether the current TSCA system is enough or whether to adopt something like R.E.A.C.H.

APPENDIX A: R.E.A.C.H. AND REGULATORY ACRONYMS

CA – Competent Authorities
CAS – Chemical Abstracts Service
CBI – Confidential Business Information
C&L - classification and labeling
CMR - substances that are carcinogenic, mutagenic, toxic for reproduction
CSA - chemical safety assessment
CSR - chemical safety report
DPD – Dangerous Preparations Directive
DNEL(s) - derived no effect level(s);
DSD – Dangerous Substances Directive
DSL/NDSL Lists – Domestic Substance List/Non-domestic Substance List (Canada chemical lists)
DU - downstream user
ECA – European Chemicals Agency
EINECS – European Inventory of Existing Commercial Chemical Substances
ELINCS – European List of New Commercial Chemical Substances
ES - exposure scenario
EU – European Union
GHS – Globally Harmonized System
GLP - good laboratory practice
HPC – High Production Volume
I – Importer
IUPAC – International Union of Pure and Applied Chemistry
M - Manufacturer
M/I - manufacturer / importer
MSDS - material safety data sheet
OECD – Organization for Economic Co-operation and Development
OSOR - one substance one registration
PBT - substances that are persistent, bioaccumulative and toxic
PNEC – Predicted No Effect Concentration
POP – Persistent Organic Pollutants
PPORD - product- and process- orientated research and development
PNEC(s) - predicted no effect concentration(s)
(Q)SAR – (Quantitative) Structure Activity Relationships
R.E.A.C.H. – Registration, Evaluation, Authorization and Restriction of Chemicals
RIPs – R.E.A.C.H. Implementation Projects
RMM - risk management measures
SAICM – Strategic Approach too International Chemicals Management
SDS - safety data sheet
SIEF - substance information exchange forum
SME – Small and Medium Sized Enterprises
SVHC – Substances of Very High Concern
TGD – Technical Guidance Document
TSCA - Toxic Substances Control Act (US chemical list).
UVCB – Unknown or Variable Composition, Complex Reaction Products and Biological Materials
vPvB - substances that are very persistent, very bioaccumulative

APPENDIX B: R.E.A.C.H. SVHC – SUBSTANCES OF VERY HIGH CONCERN

http://echa.europa.eu/chem_data/authorisation_process/candidate_list_table_en.asp				
Substance Name	EC Number	CAS Number	Inclusion Date	Reason for Inclusion
Cobalt dichloride	231-589-4	7646-79-9	6/20/2011	Carcinogenic and toxic for reproduction
1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich	276-158-1	71888-89-6	6/20/2011	Toxic for reproduction
1,2,3-Trichloropropane	202-486-1	96-18-4	6/20/2011	Carcinogenic and toxic for reproduction
1-Methyl-2-pyrrolidone	212-828-1	872-50-4	6/20/2011	Toxic for reproduction
Hydrazine	206-114-9	302-01-2	6/20/2011	Carcinogenic
		7803-57-8		
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters	271-084-6	68515-42-4	6/20/2011	Toxic for reproduction
Strontium chromate	232-142-6	7789-06-2	6/20/2011	Carcinogenic
2-Ethoxyethyl acetate	203-839-2	111-15-9	6/20/2011	Toxic for reproduction
Chromic acid, Oligomers of chromic acid and dichromic acid, Dichromic acid	231-801-5	7738-94-5		
Chromium trioxide	215-607-8	13530-68-2	12/15/2010	Carcinogenic
		1333-82-0	12/15/2010	Carcinogenic and mutagenic
2-Ethoxyethanol	203-804-1	110-80-5	12/15/2010	Toxic for reproduction
2-Methoxyethanol	203-713-7	109-86-4	12/15/2010	Toxic for reproduction
Cobalt(II) diacetate	200-755-8	71-48-7	12/15/2010	Carcinogenic and toxic for reproduction
Cobalt(II) carbonate	208-169-4	513-79-1	12/15/2010	Carcinogenic and toxic for reproduction
Cobalt(II) dinitrate	233-402-1	10141-05-6	12/15/2010	Carcinogenic and toxic for reproduction
Cobalt(II) sulphate	233-334-2	10124-43-3	12/15/2010	Carcinogenic and toxic for reproduction
Sodium chromate	231-889-5	7775-11-3	6/18/2010	Carcinogenic, mutagenic and toxic for reproduction
Potassium chromate	232-140-5	7789-00-6	6/18/2010	Carcinogenic and mutagenic
Ammonium dichromate	232-143-1	7789-09-5	6/18/2010	Carcinogenic, mutagenic and toxic for reproduction
Potassium dichromate	231-906-6	7788-50-9	6/18/2010	Carcinogenic, mutagenic and toxic for reproduction
Tetraboron disodium heptaoxide, hydrate	235-541-3	12267-73-1	6/18/2010	Toxic for reproduction
Disodium tetraborate, anhydrous	215-540-4	1303-96-4	6/18/2010	Toxic for reproduction
		1330-43-4		
		12179-04-3		
Boric acid	233-139-2	10043-35-3	6/18/2010	Toxic for reproduction
		234-343-4		
Trichloroethylene	201-167-4	79-01-6	6/18/2010	Carcinogenic
Acrylamide	201-173-7	79-06-1	3/30/2010	Carcinogenic and mutagenic
Zirconia Aluminosilicate Refractory Ceramic Fibres are fibres covered by index number 650-017-00-8 in Annex VI, part 3, table 3.2 of Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, and fulfil the two following conditions: a) Al ₂ O ₃ , SiO ₂ and ZrO ₂ are present within the following concentration ranges: •Al ₂ O ₃ : 35 – 36 % w/w, and •SiO ₂ : 47.5 – 50 % w/w, and •ZrO ₂ : 15 - 17 % w/w, b) fibres have a length weighted geometric mean diameter less two standard geometric errors of 6 or less micrometres (µm).		Extracted from Index no. 650-017-8	1/13/2010	Carcinogenic
Tris(2-chloroethyl)phosphate	204-118-5	115-96-8	1/13/2010	Toxic for reproduction
Pitch, coal tar, high temp.	266-028-2	65996-93-2	1/13/2010	Carcinogenic, PBT and vPvB
Lead sulfochromate yellow (C.I. Pigment Yellow 34)	215-693-7	1344-37-2	1/13/2010	Carcinogenic and toxic for reproduction
Lead chromate molybdate sulphate red (C.I. Pigment Red 104)	235-759-9	12656-85-8	1/13/2010	Carcinogenic and toxic for reproduction
Lead chromate	231-846-0	7758-97-6	1/13/2010	Carcinogenic and toxic for reproduction
Diisobutyl phthalate	201-553-2	84-69-5	1/13/2010	Toxic for reproduction
Anthracene oil, anthracene paste, distn. lights	295-278-5	91995-17-4	1/13/2010	Carcinogenic, mutagenic, PBT, and vPvB
Anthracene oil, anthracene paste, anthracene fraction	295-275-9	91995-15-2	1/13/2010	Carcinogenic, mutagenic, PBT, and vPvB
Anthracene oil, anthracene paste	292-603-2	90640-81-6	1/13/2010	Carcinogenic, mutagenic, PBT, and vPvB
Anthracene oil, anthracene-low	292-604-8	90640-82-7	1/13/2010	Carcinogenic, mutagenic, PBT, and vPvB
Anthracene oil	292-602-7	90640-80-5	1/13/2010	Carcinogenic, mutagenic, PBT, and vPvB

APPENDIX B (continued): R.E.A.C.H. SVHC – SUBSTANCES OF VERY HIGH CONCERN

Substance Name	EC Number	CAS Number	Inclusion Date	Reason for Inclusion
Aluminosilicate Refractory Ceramic Fibres are fibres covered by index number 650-017-00-8 in Annex VI, part 3, table 3.2 of Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, and fulfil the two following conditions: a) Al ₂ O ₃ and SiO ₂ are present within the following concentration ranges: •Al ₂ O ₃ : 43.5 – 47 % w/w, and SiO ₂ : 49.5 – 53.5 % w/w, or •Al ₂ O ₃ : 45.5 – 50.5 % w/w, and SiO ₂ : 48.5 – 54 % w/w, b) fibres have a length weighted geometric mean diameter less two standard geometric errors of 6 or less micrometres (µm).		Extracted from Index no.: 650-017-00-8	1/13/2010	Carcinogenic
2,4-Dinitrotoluene	204-450-0	121-14-2	1/13/2010	carcinogenic
Triethyl arsenate	427-700-2	15606-95-8	10/28/2008	Carcinogenic
Sodium dichromate	234-190-3	7789-12-0	10/28/2008	Carcinogenic, mutagenic and toxic for reproduction
Lead hydrogen arsenate	232-064-2	10588-01-9	10/28/2008	Carcinogenic and toxic for reproduction
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified: Alpha-hexabromocyclododecane Beta-hexabromocyclododecane Gamma-hexabromocyclododecane	247-148-4 and 221-695-9	25637-99-4 3194-55-6 (134237-50-6) (134237-51-7) (134237-52-8)	10/28/2008	PBT
Dibutyl phthalate (DBP)	201-557-4	84-74-2	10/28/2008	Toxic for reproduction
Diarsenic trioxide	215-481-4	1327-53-5	10/28/2008	Carcinogenic
Diarsenic pentaoxide	215-116-9	1303-28-2	10/28/2008	Carcinogenic
Bis(tributyltin)oxide (TBTO)	200-268-0	56-35-9	10/28/2008	PBT
Bis (2-ethylhexyl)phthalate (DEHP)	204-211-0	117-81-7	10/28/2008	Toxic for reproduction
Benzyl butyl phthalate (BBP)	201-622-7	85-68-7	10/28/2008	Toxic for reproduction
Anthracene	204-371-1	120-12-7	10/28/2008	PBT
Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins)	287-476-5	85535-84-8	10/28/2008	PBT and vPvB
5-tert-butyl-2,4,6-trinitro-m-xylene (musk xylene)	201-329-4	81-15-2	10/28/2008	vPvB
4,4'- Diaminodiphenylmethane (MDA)	202-974-4	101-77-9	10/28/2008	Carcinogenic

APPENDIX C: REFERENCES

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