Why be Concerned with Substances of Very High Concern?

REACH SVHC’s

IEEE PSES
Ken Kapur
January 27, 2009
Agenda

1. Growing Environmental Regulations
   • How Does REACH SVHC Fit In?

2. REACH Article 33 Requirements
   • Duty To Communicate

3. Understanding the SVHC 15
   • Where used?

4. Questions & Discussion
Use of Chemicals are Rapidly Growing

- Significant increase in use:
  - 1930s: one million tons of chemicals were produced worldwide;
  - Today: excess of 500 million tons annually.

- Over 100,000 different substances in use within the European Union alone, according to Deutscher Naturschutzzring (German League for Nature Conservation and Environmental Protection).

- Chemicals support and improve our daily life.
  - EU Commission is reversing the burden of proof...

- Over 30,000 chemical substances produced or imported into the EU will need to be registered and tested to determine the health and the environmental impact.
Expanding Environmental Regulations

- REACH
- Norway RoHS
- EUP Energy
- Packaging Directive
- China RoHS
- JIG-101A
- Korea RoHS
- Battery Regulations
- Joint Industry Guide/ SVHC
- Sustainability
- EU RoHS II
- RoHS – Cat 8 & 9
- LSIIT Exemption Phase Out
- EU Life Cycle Analysis
- Carbon Disclosure Project
- China RoHS Catalog

# of New Regulations

2007 2008 2009 2010 2011 2012
REACH is……..

Registration, Evaluation & Authorisation of Chemicals

The most ambitious chemicals policy change in history
(40 Directives ⇒ 1 Regulation)

FACT:
REACH will impact the electronics industry,
…and many more industries downstream

FACT:
REACH will have impact globally
…and not just within the EU

FACT:
REACH will bring benefits, opportunities
…and as well as many challenges

FACT:
REACH will set the clock back to zero, it will require registration of
substances in commerce in the EU above 1 tpa
…and no exemption for “existing” substances
Our Dependency on the Supply Chain
REACH Incorporates Requirements from Various Directives

67/548/EEC The Dangerous Substances Directive (DSD)
- Not Repealed
- Modified by 2006/121/EC to work better with REACH

76/769/EEC The Marketing and Use Directive [of certain dangerous substances and preparations]
- Repealed as of 1 Jun 2009
- Essentially equivalent to REACH Restriction Criteria

91/155/EEC The Safety Data Sheet Directive (SDSD)
- Repealed by REACH as of 1 Jun 2007
- Essentially equivalent to REACH SDS Criteria

- Repealed as of 1 Aug 2008

1999/45/EC The Dangerous Preparations Directive (DPD)
- Not Repealed
- Article 14, SDS criteria, deleted by REACH [Art 140]
- Annex II, III and IV modified by 2006/8/EC to work better with REACH
Are you ready for REACH?

Registration, Evaluation and Authorisation of Chemicals

- ‘No Data….No Market’
- ‘RoHS on Steroids’
- **Aggressive** EU Policy
- Customer Data Requests
- Supplier Surveys
- Understand use of all chemicals in products:
  - Adhesives, Grease, Paints, Solvents, cleaning materials…

TIMELINE:
- June 1, 2007 – REACH went into effect (law)
- Oct 28, 2008 – SVHC Obligations effective
- Dec 1, 2008 Pre-Registration Deadline
- Nov 30, 2010 - Registration
The REACH Regulation

- Objective: Regulation should ensure a high level of protection of human health and the environment as well as the free movement of substances…while enhancing competitiveness and innovation.
- Establishes a European Chemicals Agency (ECHA)
- Extensive Regulation with a wide scope (849 page document). Guidance, and data sharing systems have been established.
- Legal Penalties
  - Failure to comply will be a criminal offence
  - UK Fines: £5,000+
  - 3 months – 2 years imprisonment
When is Registration Required?

**Registration** (Article 7.1) of substances in articles is obligatory for an article producer or importer only if the following conditions are met:

- The substances are intended to be released from the produced or imported article(s) during normal and reasonable foreseeable conditions of use.
  - Ex: Release of perfume from a perfumed eraser
- The total amount of the substance present in the articles with intended releases produced and/or imported by that actor exceeds 1 tonne per year per producer or importer.
REACH Classifications

- **Article**: An object composed of one or more substances or preparations given a specific shape, surface or design.
  - Example: Electronic equipment, Computers

- **Preparation**: A mixture or solutions of two or more substances/chemicals, pigments and/or solvents
  - toner cartridge is a special container containing a preparation

- **Substance**: Individual chemical elements, or compounds in the natural state or obtained by any manufacturing process
EU REACH
Pre-Registrations

- Pre-registration Breakdown per country
- Dec 16, 2008 Summary report
- Total # Companies: 65,758
- Total # Substances: 150,000
- Total # Pre-registrations: 2,624,529

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Sum: 65,758 | 2,624,529
Duty To Communicate (Art. 33)

- For an SVHC in an Article, concentration > 0.1% by weight, substance must be communicated to recipients.
- Information must be provided to user within 45 days of any request.
  - Identity of substance (at a minimum)
- Consider the entire life cycle of the article (raw materials, manufacturing, service, disposal).

**Duty to communicate information on substances in articles**

1. Any supplier of an article containing a substance meeting the criteria in Article 57 and identified in accordance with Article 59(1) in a concentration above 0,1% weight by weight (w/w) shall provide the recipient of the article with sufficient information, available to the supplier, to allow safe use of the article including, as a minimum, the name of that substance.
2. On request by a consumer any supplier of an article containing a substance meeting the criteria in Article 57 and identified in accordance with Article 59(1) in a concentration above 0,1% weight by weight (w/w) shall provide the consumer with sufficient information, available to the supplier, to allow safe use of the article including, as a minimum, the name of that substance.
REACH – Reportable Substances

- Substances of Very High Concern (SVHC)
- First Candidate List released October 28, 2008

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<td>4,4'-Diaminodiphenylmethane</td>
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<tr>
<td>3</td>
<td>Dibutyl phthalate (DBP)</td>
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<td>4</td>
<td>Cobalt dichloride</td>
<td>0.1</td>
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<tr>
<td>5</td>
<td>Diarsenic pentaoxide</td>
<td>0.1</td>
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<tr>
<td>6</td>
<td>Diarsenic trioxide</td>
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<tr>
<td>7</td>
<td>Sodium dichromate, dehydrate</td>
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<td>8</td>
<td>5-tert-butyl-2,4,6-trinitro-m-xylene (musk xylene)</td>
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<td>Bis(2-ethyl(hexyl)phthalate) (DEHP)</td>
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<td>Hexabromocyclododecane (HBCDD)</td>
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<td>11</td>
<td>Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins)</td>
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<td>12</td>
<td>Bis(tributyltin)oxide</td>
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<td>13</td>
<td>Lead hydrogen arsenate</td>
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<tr>
<td>14</td>
<td>Triethyl arsenate</td>
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<tr>
<td>15</td>
<td>Benzyl butyl phthalate (BBP)</td>
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</table>
General Industry Uses of SVHC’s

- **Anthracene**
  - pyrotechnics

- **4,4’- Diaminodiphenylmethane**
  - hardener for epoxy resins, hardener in adhesives, intermediate in the manufacture of high-performance polymers

- **Dibutyl phthalate**
  - softener (plasticizer in PVC), softener (printing inks), softener (paper and packaging, wood building and automobile industry), etc...

- **Cobalt dichloride**
  - gas masks, humidity indicator, dye mordant for glass industry, drying agent in paints, lacquers, varnishes and printing inks, etc...

- **Diarsenic pentaoxide**
  - dyeing industry, metallurgy (to harden copper, lead or gold in alloys), etc...

- **Diarsenic trioxide**
  - decolorizing agent for glass and enamels, oxidizing agent special glass and lead crystal formulations

- **Sodium dichromate, dihydrate**
  - metal finishing, aiding corrosion resistance, coloured glass and ceramic glazes

- **5-tert-butyl-2,4,6-trinitro-m-xylene (musk xylene)**
  - unclear

- **Bis (2-ethyl(hexyl)phthalate) (DEHP)**
  - plasticiser in polymer products, mainly PVC

- **Hexabromocyclododecane (HBCDD)**
  - Insulation, Electrical and electronic parts, Textile

- **Alkanes C10-13, chloro (Short Chain Chlorinated Paraffins)**

- **Bis(tributyltin)oxide**
  - flooring, tiles and carpeting, biocides

- **Lead hydrogen arsenate**
  - Glass, Plastic/PVC, Electronics, Textiles, Cosmetics, etc...

- **Triethyl arsenate**
  - aquatic structures and vehicles

- **Benzyl butyl phthalate**
  - plasticizer (softener) of PVC, sealants, adhesives, paints, etc..
## Industry Response to EU REACH SVHC first candidate list

<table>
<thead>
<tr>
<th>ID</th>
<th>Substance Identification</th>
<th>Use in EEE</th>
<th>Computer mfr. #1</th>
<th>Computer mfr. #2</th>
<th>Computer mfr. #3</th>
<th>Computer mfr. #4</th>
<th>Computer mfr. #5</th>
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<td>4,4’- Diaminodiphenylmethane</td>
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<tr>
<td>3</td>
<td>Dibutyl phthalate (DBP)</td>
<td>Yes</td>
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<td></td>
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<td>✔</td>
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<tr>
<td>4</td>
<td>Cobalt dichloride</td>
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<td>5</td>
<td>Diarsenic pentaoxide</td>
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<td>6</td>
<td>Diarsenic trioxide</td>
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<td>Sodium dichromate, dihydrate</td>
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<td></td>
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<tr>
<td>9</td>
<td>Bis (2-ethyl(hexyl)phthalate)</td>
<td>Yes</td>
<td>✓</td>
<td>✔</td>
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<td>Triethyl arsenate</td>
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<td>Benzyl butyl phthalate (BBP)</td>
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**In process of retrieving information from suppliers**

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KKapur
Computer manufacturer #1 on REACH SVHC

Disclosure on EU REACH SVHC First Candidate List
Disclosure calculated based on total % w/w of part types listed

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<tr>
<th>Part Name</th>
<th>SVHC</th>
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<td>Notebook Docking Station</td>
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<tr>
<td>External power supply/ power adapter</td>
<td>DEHP</td>
<td>117-81-7</td>
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<tr>
<td>I/O Devices</td>
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<tr>
<td>Wired keyboard, wired mouse</td>
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<tr>
<td>Removable Mass Storage Device (HDD, floppy, optical drivers, card readers, tape, etc.) Memory and Media</td>
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<td>External RMSD</td>
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<td>Power Supplies and Cables</td>
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<td>External power supply/ power adapter</td>
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<tr>
<td>External cables (DVI, HDMI, USB)</td>
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<tr>
<td>Power cord</td>
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<tr>
<td>Audio and Video Accessories</td>
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<td>Stand-alone speakers, external microphone, wired webcam and headphone, external power adapter</td>
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<tr>
<td>External Communication Devices</td>
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<td>Wired communication devices</td>
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JIG – REACH SVHC

- Joint Industry Guide JIG-101 Ed.2
  - US, EU, Japanese Organizations
  - Added REACH SVHC first candidate list chemicals
    - JIG Revision: Dated Nov 24, 2008
- JIG REACH screening process concept
  - REACH covers chemicals from all industrial sectors
  - Screening process for chemicals developed based on applicability to electronic industry
- JIG REACH screening process purpose is
  - To increase efficiency in supply chain disclosures
  - To assist suppliers and downstream manufacturers in identifying the most likely substances of the potential SVHCs in electronic parts/product
**Joint Industry Guide – REACH Criteria**

**JIG REACH Screening Methodology for Relevance to Electronic Equipment/Parts/Products**

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<td>1</td>
<td>1</td>
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<td>1</td>
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</tbody>
</table>

**Categories –**

- Colorant / dye
- Surface finish
- Surfactant / lubricant
- Antioxidant
- Additives
  - Dielectrics
  - Wood
  - Metals and metal alloys
  - Glass and ceramics
  - Plastic and other polymers
REACH – Market Drivers

NGO Sample Letter

Date

Dear Sir/Madam,

In accordance with the new European regulation on Chemicals, REACH, I am writing to ask you to inform me about the presence in the product X or its packaging of any chemical from the group of “substances of very high concern” as specified by REACH.

Should any of these substances be present in the product X or its packaging, I wish to be informed about the name of this substance, I would be grateful to receive this information within 45 days as required by REACH.

I would also be grateful if you would inform me about steps you are taking to provide products intended for the same use but which do not contain such potentially hazardous chemicals.

Yours faithfully,

Of course, you don’t need to wait until 2009 to put pressure on companies. Responsible retailers and brand manufacturers should supply you with information on the hazardous substances they use, regardless of REACH. In fact, many companies are already substituting hazardous substances with safer alternatives, ahead of REACH, in response to consumer concern. Public pressure works, often faster than regulation, and even though REACH has now been agreed, companies still need to know that people want safe products now.

As a consumer you can use this model letter to send a strong signal to companies that people are very concerned about the safety of products they buy, and spur them to move away from hazardous substances and use or develop safer alternatives. It will also show regulators that the public continues to be concerned about chemical safety – and encourage them to improve the provisions of REACH in the future.
Providing Safety Instructions

- Consider Exposure controls and Personal protection
  - Handling and storage
  - Disposal consideration
  - Fire-fighting measures
  - Transport information
- Instructions For Use Required
  - Packaging
  - Labeling
Examples:
- Information on safe handling including safe disposal
- Prevent from heating above 60 °C
- Keep article out of reach of children
- This article should be disposed of as hazardous waste.
- Do not dispose of via normal household waste
Examples of Safety Communication

- Metal article e.g. a sheet that would normally be grinded during use and dust containing the SVHC may be inhaled:
  - “Avoid inhalation of dust from grinding by using effective point ventilation systems and where necessary also appropriate personal protection.”

- Plastic sheets from which the SVHC may leak to the environment if exposed to rain:
  - “To avoid leakage to the environment do not use the sheets outdoors.”

- Brake lining from which a large fraction will wear during normal use and expose the environment to the SVHC:
  - “Will lead to exposure to the environment during outdoor use.”
Summary

- Environmental Regulations Continue to expand worldwide (Europe, USA, Asia)
- Increasing concerns with Materials and Substances in products and the impact to the environment and human health
- Article producers have a legal obligation to communicate the use of SVHC in products and parts
- If restricted substances are being used, identify where used, find alternatives, and phase out
- Ensure your products are compliant with EU REACH!
REACH SVHC Restricted Materials

Understanding the SVHC 15

Revati Pradhan-Kasmalkar
San Jose State University
January 2009
SVHC Impact to Human Health and the Environment

Criteria for inclusion as SVHC in REACH (Annex XIV)

1. **CMR (Carcinogenic, Mutagenic or Toxic to Reproduction)**
   - Carcinogenic - Chemicals that may cause cancer
   - Mutagenic - Chemicals that induce heritable genetic defects
   - Toxic - Chemicals that are known to impair fertility or cause developmental toxicity in humans

2. **PBT (Persistent, Bioaccumulative and Toxic)**
   - Chemicals that are toxic, persist in the environment and bioaccumulate in food chains

3. **vPvB (very Persistent and very Bioaccumulative)**
   - Bioconcentration factor greater than 5,000

4. **Substances of equivalent concern (such as endocrine disruptors)**
   - When there is scientific evidence of probable serious effects to human health or the environment
1] Anthracene

- **Applications in EEE**
  - In making optically tunable soft mask (OTSM) to improve optical metrology measurements
  - In dielectric deposition, for augmentation of native oxide removal by photo excitation
  - In development of new organic semiconductors with improved electrical performance and enhanced environmental stability

- **Other Applications**
  - Used in EU-15 for manufacture of pyrotechnic products for film and theater productions as part of black smokes
  - Intermediate for production of anthraquinone

- **Alternative substances**
  - No information on environmentally friendly alternatives for these applications

- **Comments**
  - Production in EU-15 of pure anthracene (1150 tpa) and crude anthracene (400 tpa with 50% anthracene content) totalled 1350 tpa in 2001.
Applications of organic thin film transistors

Optically tunable soft masks: Arrays

Anthracene

1] Anthracene

Anthraquinone
2] MDA

<table>
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<tr>
<th>Substance</th>
<th>CAS Number</th>
<th>Authority</th>
<th>Reason</th>
<th>Threshold limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,4'- Diaminodiphenyl methane</td>
<td>101-77-9</td>
<td>Germany</td>
<td>CMR</td>
<td>0.1% w/w</td>
</tr>
</tbody>
</table>

- **Applications in EEE**
  - In adhesive sheet to improve reliability of semiconductor device for high density packaging
  - In formation of polyimide resins used in semiconductor processes

- **Other Applications**
  - In manufacture of epoxy resins, adhesives and high performance polymers

- **Alternative substances**
  - No information on environmentally friendly alternatives for these applications

- **Comments**
  - Germany concerned about occupational exposure during open use of preparations in skilled trade applications
Polyimide resins used in manufacture of bushings, seal rings, multifunctional electrical insulating parts

High density packaging in diode arrays]

4,4'- Diaminodiphenylmethane (MDA)
3] Dibutyl phthalate

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Dibutyl Phthalate</td>
<td>84-74-2</td>
<td>Austria</td>
<td>CMR</td>
<td>0.1% w/w</td>
</tr>
</tbody>
</table>

- **Applications in EEE**
  - One of the Airborne Molecular Contaminants (organic) found in semiconductor Fab cleanrooms due to outgassing of polymer materials used in cleanrooms
  - In abrasive composite to be used as alternative to CMP slurry to refine semiconductor surface

- **Other Applications**
  - In plasticizer for PVC, other polymers and resins
  - In sealants, adhesives and paints

- **Alternative substances**
  - No information on environmentally friendly alternatives for these applications

- **Comments**
  - Since 2005, marketing and use above certain concentration prohibited in toys and childcare articles
3] Dibutyl phthalate

- Sealants and adhesives
- Plasticizer in various PVC products
- Paints

DBP
4] Cobalt dichloride

- Applications in EEE
  - For visual indication of moisture content in humidity indicator cards (HICs) and silica gel used in packaging—changes color from blue to pink if RH level greater
  - For forming cobalt silicon film

- Other Applications
  - As "oxyvore" to remove oxygen gas during metal production
  - As additive in rubber tire manufacture

- Alternative substances
  - Cobalt-free Orange silica gel, changing color from orange to light green (Qingdao Yadong Rubber Machinery Group Co., Ltd., China)
  - Silica gel Rubin, changing color from red/pink to yellow/orange (Sigma-Aldrich product # 72917)
  - Cobalt-free HIC cards (SIZI Corp., Korea)

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<tbody>
<tr>
<td>Cobalt dichloride</td>
<td>7646-79-9</td>
<td>France</td>
<td>CMR</td>
<td>0.1% w/w</td>
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</table>
4] Cobalt dichloride

Colorless silica gel colored blue by cobalt dichloride for color indication of moisture presence

Humidity Indicators

Desiccant
5] Diarsenic pentaoxide

<table>
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<tr>
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<th>Authority</th>
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<th>Threshold limit</th>
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<tbody>
<tr>
<td>Diarsenic pentaoxide</td>
<td>1303-28-2</td>
<td>France</td>
<td>CMR</td>
<td>0.1% w/w</td>
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</table>

- Applications in EEE
  - Used as hardener for lead, copper and gold alloys.

- Other Applications
  - Used in production of dyes, metal alloys and glass
  - Used as wood preservative

- Alternative substances
  - No information on environmentally friendly alternatives for these applications

- Comments
  - Should have been phased out by September 2006 under the EU biocidal products directive
6] Diarsenic trioxide

<table>
<thead>
<tr>
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<th>Authority</th>
<th>Reason</th>
<th>Threshold limit</th>
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</thead>
<tbody>
<tr>
<td>Diarsenic trioxide</td>
<td>1327-53-3</td>
<td>France</td>
<td>CMR</td>
<td>0.1% w/w</td>
</tr>
</tbody>
</table>

- **Applications in EEE**
  - In III-V GaAs semiconductor as arsenic compounds -
    - Photosensitive layer (5kg/year)
    - Infrared emitting diodes (Ireds) (6.1 Mpcs/year)
    - Laser diodes and Avalanche photodiodes (APDs) (650 Kpcs/year)
    - Analog optocoupler (1 Mpcs/year)

- **Other Applications**
  - As process agent in glass industry
  - In making leukemia drugs
  - As wood preservative and flame retardant

- **Alternative substances**
  - No information on environmentally friendly alternatives for these applications

- **Comments**
  - Use in glass industry phased out
7] Sodium dichromate

- **Applications in EEE**
  - Used in production of chromium compounds, pigments for paints, plastics, colored glass, metal finishing

- **Other Applications**
  - Used in manufacture of vitamin K, essential oils and perfumes

- **Alternative substances**
  - No information on environmentally friendly alternatives for these applications

<table>
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<th>Reason</th>
<th>Threshold limit</th>
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<tr>
<td>Sodium dichromate, dihydrate</td>
<td>7789-12-0</td>
<td>France</td>
<td>CMR</td>
<td>0.1% w/w</td>
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</table>

![Image of sodium dichromate applications]

![Image of other applications]
8] Musk Xylene

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<tr>
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<th>Authority</th>
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<th>Threshold limit</th>
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<tbody>
<tr>
<td>5-tert-butyl-2,4,6-trinitro-m-xylene</td>
<td>81-15-2</td>
<td>Netherlands</td>
<td>vPvB, borderline T</td>
<td>0.1% w/w</td>
</tr>
</tbody>
</table>

- Applications in EEE
  - No use found in EEE

- Other Applications
  - Used in making cosmetics, detergents, fabric softeners, household cleaning products, and other dispersive applications

- Alternative substances
  - No information on environmentally friendly alternatives for these applications

- Comments
  - Production of musk xylene in EU phased out
9] DEHP

- **Applications in EEE**
  - Plasticizer in flexible PVC for PVC insulated wires
  - As dielectric fluid in capacitors

- **Other Applications**
  - Plasticizer for different forms of PVC, other polymers and resins
  - Used in sealants, adhesives and paints

- **Alternative substances**
  - No information on environmentally friendly alternatives for these applications

- **Comments**
  - Since 2005, marketing and use above certain concentration prohibited in toys and childcare articles

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<table>
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<th>Reason</th>
<th>Threshold limit</th>
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<tbody>
<tr>
<td>Bis (2-ethyl(hexyl)phthalate</td>
<td>117-81-7</td>
<td>Sweden</td>
<td>CMR</td>
<td>0.1% w/w</td>
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Plasticizer in flexible PVC products

DEHP, BBP

9] DEHP, 15] BBP
10] HBCDD

<table>
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<tr>
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<tr>
<td>Hexabromocyclo dodecane</td>
<td>25637-99-4</td>
<td>Sweden</td>
<td>PBT, vB</td>
<td>0.1% w/w</td>
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</table>

- **Applications in EEE**
  - Used in polystyrene plastics used in insulation boards and electronic housings

- **Other Applications**
  - Used as flame retardant, mainly in polystyrene products and textiles

- **Alternative substances**
  - No information on environmentally friendly alternatives for these applications
Polystyrene plastics used for electrical housings

Polystyrene plastics used for insulation boards

HBCDD
11] Short chain chlorinated paraffins (SCCP)

- Applications in EEE
  - Used as plasticizers in PVC (cable)
  - Used as flame retardant plasticizers

- Other Applications
  - Used as flame retardants in textiles and rubber and in paints, sealants and adhesives

- Alternative substances
  - No information on environmentally friendly alternatives for these applications

- Comments
  - Use in metal cutting/working fluids and leather fat liquors prohibited in EU

<table>
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<tr>
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<th>CAS Number</th>
<th>Authority</th>
<th>Reason</th>
<th>Threshold limit</th>
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</thead>
<tbody>
<tr>
<td>Alkanes, C10-13, chloro</td>
<td>85535-84-8</td>
<td>UK</td>
<td>PBT, vPvB</td>
<td>0.1% w/w</td>
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</table>

Not used in EEE | Potential use in EEE | Used in EEE
12] Bis(tributyltin)oxide

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<th>Substance</th>
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<th>Authority</th>
<th>Reason</th>
<th>Threshold limit</th>
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</thead>
<tbody>
<tr>
<td>Bis(tributyltin) oxide</td>
<td>56-35-9</td>
<td>Norway</td>
<td>PBT (as tributyl tin in aqueous environment)</td>
<td>0.1% w/w</td>
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</table>

- **Applications in EEE**
  - No use found in EEE

- **Other Applications**
  - Used as biocide (fungicide and molluscicide), especially as wood preservative

- **Alternative substances**
  - No information on environmentally friendly alternatives for these applications

- **Comments**
  - Use as biocidal product in marine antifouling paints and other applications phased out in EU
13] Lead hydrogen arsenate

<table>
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<tr>
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<th>CAS Number</th>
<th>Authority</th>
<th>Reason</th>
<th>Threshold limit</th>
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<tbody>
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<td>Lead hydrogen arsenate</td>
<td>7784-40-9</td>
<td>Norway</td>
<td>CMR</td>
<td>0.1% w/w</td>
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</table>

- **Applications in EEE**
  - Used in semiconductor chip manufacturing as arsenic compound

- **Other Applications**
  - In pesticides and wood preservatives

- **Alternative substances**
  - No information on environmentally friendly alternatives for these applications

- **Comments**
  - Concern that arsenic compounds are entering EU via imported products, particularly in circuit boards of electrical and electronic equipment
  - EU legislations have restricted use in pesticides and wood preservatives
14] Triethyl arsenate (TEASAT)

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<td>Triethyl arsenate</td>
<td>15606-95-8</td>
<td>Norway</td>
<td>CMR</td>
<td>0.1% w/w</td>
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</table>

- **Applications in EEE**
  - Used in semiconductor chip manufacturing as arsenic compound
  - In forming an arsenic doped oxide dielectric layer in a process chamber using TEOS (tetraethylorthosilicate), ozone and TEASAT
  - Patent on assembly for ultrapure solvent purging states that it can be used for chemical delivery and purging of TEASAT in semiconductor processes

- **Other Applications**
  - Used in pesticides and wood preservatives

- **Alternative substances**
  - No information on environmentally friendly alternatives for these applications

- **Comments**
  - Concern that arsenic compounds are entering EU via imported circuit boards
  - EU legislations have restricted use in pesticides and wood preservatives
15] Benzyl butyl phthalate

- Applications in EEE
  - Used as plasticizer in PVC and various other polymers and resins

- Other Applications
  - Main application is plasticizer for different forms of PVC, other polymers and resins
  - Used in sealants, adhesives and paints

- Alternative substances
  - No information on environmentally friendly alternatives for these applications

- Comments
  - Since 2005, marketing and use above certain concentration prohibited in toys and childcare articles

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<th>Threshold limit</th>
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</thead>
<tbody>
<tr>
<td>Benzyl butyl phthalate</td>
<td>85-68-7</td>
<td>Austria</td>
<td>CMR</td>
<td>0.1% w/w</td>
</tr>
</tbody>
</table>
CONCLUSION

- REACH SVHC’s are commonly used in the electronics industry
- Per REACH, Article 33, there is legal obligation to provide the user with SVHC information (within 45 days) to allow safe use
- Companies should develop a communication strategy to obtain information through supply chain
- Helpful aids to accurately collect information:
  - Software tools adopted for RoHS & REACH compliance
  - Electronic or manual supplier surveys
  - Leveraging Off-shore support
  - Industry-accepted Material Declaration Datasheets such as those proposed by JIG and IPC

**REACH Motto: No Data, No Market**
REACH Acronyms

- Annex V – Information Required for Substances Manufactured or Imported in Quantities >1Tonne
- Annex XIV – List of Substances Subject to Authorization
- Article 33 – Article in REACH regulation (EC) No 1907/2006 on Duty to communicate information on substances in articles
- CAS - Chemical Abstracts Service
- CMR – Carcinogens, Mutagens, and Reproductive Toxicants
- COM – European Commission
- CSA - Chemical Safety Assessment
- CSR - Chemical Safety Report
- DSD – Dangerous Substances Directive
- DPD – Dangerous Preparations Directive
- DU - Downstream User
- ECHA - European Chemicals Agency
- EEC – European Economic Community
- EINECS - European Inventory of Existing Chemical Substances
- ELINCS - European List of New Chemical Substances
- ESR – Existing Substances Regulation
- EU – European Union
- GHS - Globally Harmonised System for the Classification and labelling of Chemicals
- M/I - Manufacturer or Importer
- MS - EU Member State
- (M)SDS – (Material) Safety Data Sheets
- OEL – Occupational Exposure Limit
- PBT - Persistent, Bioaccumulative and Toxic
- POP - Persistent Organic Pollutants
- REACH - Registration, Evaluation and Authorisation of Chemicals
- SDS - Safety Data Sheet
- SIA – Substances in Articles
- SVHC - Substances of Very High Concern
- vPvB - very Persistent and very Bioaccumulative