HP Business Justification for the Use of GreenScreen

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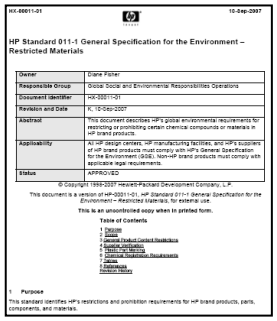
HP Br and Cl Content Specifications

- PVC-free cables must meet the Br and Cl limits in the General Specification for the Environment (**GSE**)
- Do not use BFRs to meet flammability requirements
- 3.15.1 When “BFR/PVC-free” is specified in HP product and component specifications, bromine in the form of flame retardants must not be used in parts, components, materials, or products in concentrations equal to or greater than 0.1% (1000 ppm) by weight in any homogeneous plastic material.
- 3.15.2 When “BFR/PVC-free” is specified in HP product and component specifications, chlorine in the form of polyvinyl chloride, polyvinyl chloride copolymers or flame retardants must not be used in parts, components, materials, or products in concentrations equal to or greater than 0.1% (1000 ppm) by weight in any homogeneous plastic material.

Material-Level Approval for PVC-Free

Correct Agency Approval (incl proof VW1)

GSE compliance



HP Standard 011-1 General Specification for the Environment – Restricted Materials

Owner	Diane Fisher
Responsible Group	Global Social and Environmental Responsibilities Operations
Document Identifier	HX-00011-01
Revision and Date	K, 10-Sep-2007
Abstract	This document describes HP's global environmental requirements for restricting or prohibiting certain chemical compounds or materials in HP brand products.
Applicability	All HP design centers, HP manufacturing facilities, and HP's suppliers of HP brand products must comply with HP's General Specification for the Environment (GSE). Non-HP brand products must comply with applicable legal requirements.
Status	APPROVED

This document is a version of HP-00011-01, *HP Standard 011-1 General Specification for the Environment – Restricted Materials*, for external use.

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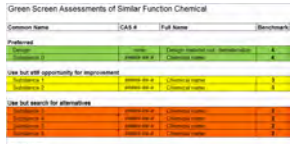
Table of Contents

1 Purpose

This standard identifies HP's restrictions and prohibition requirements for HP brand products, parts, components, and materials.

Green Screen Benchmark 2+



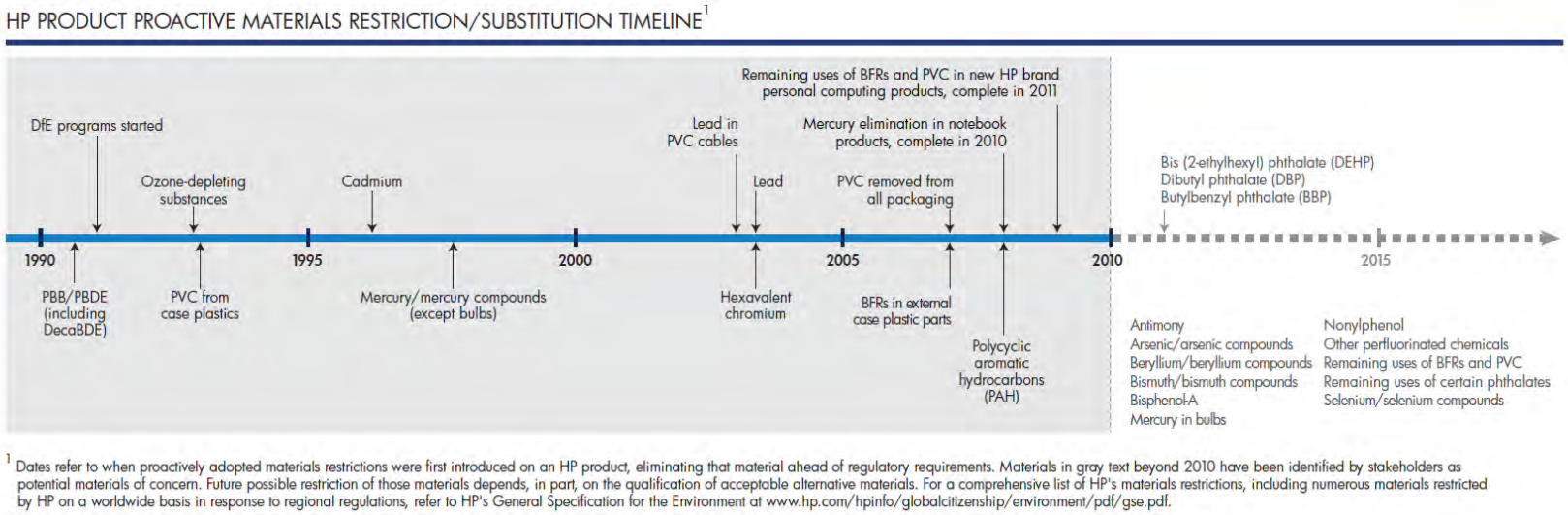
Green Screen Assessments of Similar Function Chemical

Common Name	CAS #	Full Name	Benchmark
Preferred			
Substance 1	[illegible]	[illegible]	4
Use but still opportunity for improvement			
Substance 1	[illegible]	[illegible]	3
Substance 2	[illegible]	[illegible]	3
Use but search for alternatives			
Substance 1	[illegible]	[illegible]	2
Substance 2	[illegible]	[illegible]	2
Substance 3	[illegible]	[illegible]	2
Substance 4	[illegible]	[illegible]	2
Substance 5	[illegible]	[illegible]	1

Approved Material List

Material Restriction = Major Class of Regulation

- Ensures specific substances are not in products
  - Example of how to comply:
    HP's General Specification for the Environment (GSE)

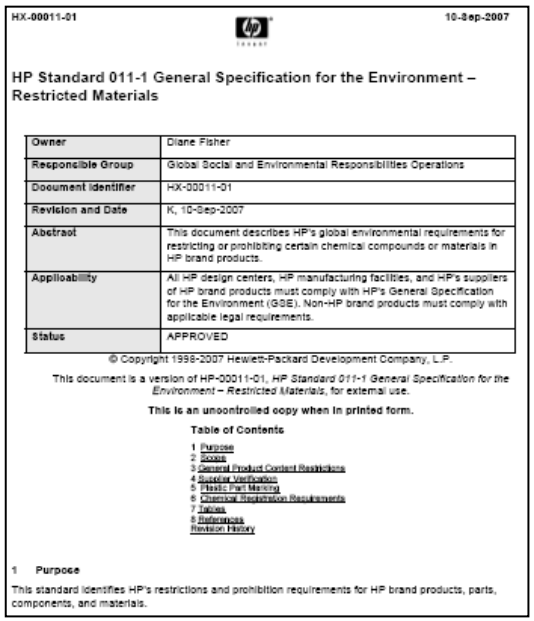


[1] Dates refer to when proactively adopted materials restrictions were first introduced on an HP product, eliminating that material ahead of regulatory requirements. Materials in gray text beyond 2010 have been identified by stakeholders as potential materials of concern. Future possible restriction of those materials depends, in part, on the qualification of acceptable alternative materials. For a comprehensive list of HP's materials restrictions, including numerous materials restricted by HP on a worldwide basis in response to regional regulations, refer to HP's General Specification for the Environment at www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf.

http://www.hp.com/hpinfo/globalcitizenship/i/charts/HP_materials_timeline_2010.pdf

hp invent

Restriction-Based Materials Control



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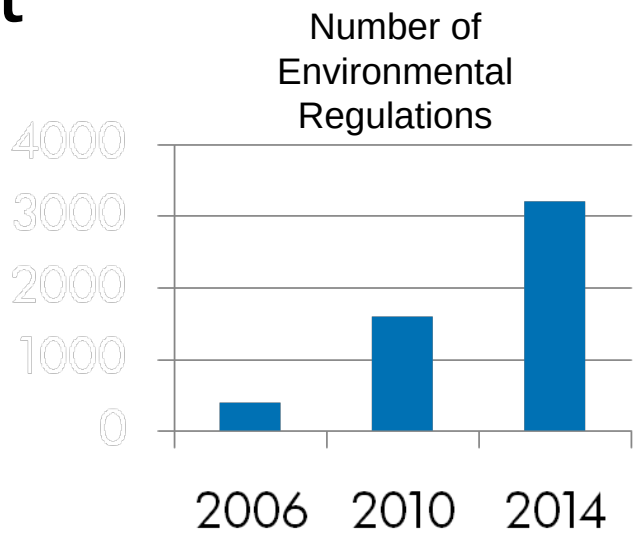
This standard identifies HP's restrictions and prohibition requirements for HP brand products, parts, components, and materials.

- Most suppliers currently treat all unregulated substitutes as equal
  - Replacements may be as bad or worse for environment or human health
- Long lists are hard to manage up the supply chain
  - Additional substances continue to be added under REACH and other legislation
  - Requirements vary between companies

Business Environment

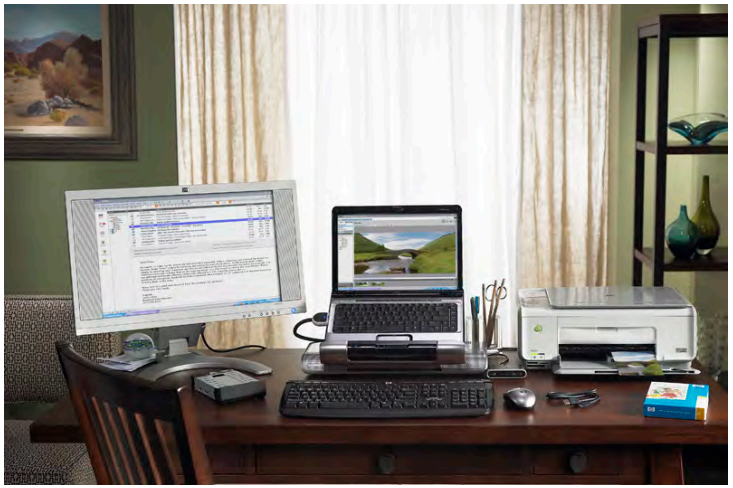
- Increasing regulations
  - Number of environmental regulations doubled twice in the last four years
  - Estimated to double again in the next four years
  - More substances being restricted
  - More reporting requirements
  - More supplier responsibility for product content and recycling
  - Difficult for multinational companies to comply when there is no harmonization between countries/regions



- World-wide customer trend to more interest in chemicals and exposure

Adapting to the New Environment

- Better business results from anticipating regulation and adapting to new business environment
  - Create processes and systems to minimize impact of increasing regulation
  - The focus on alternatives assessment for replacement substances

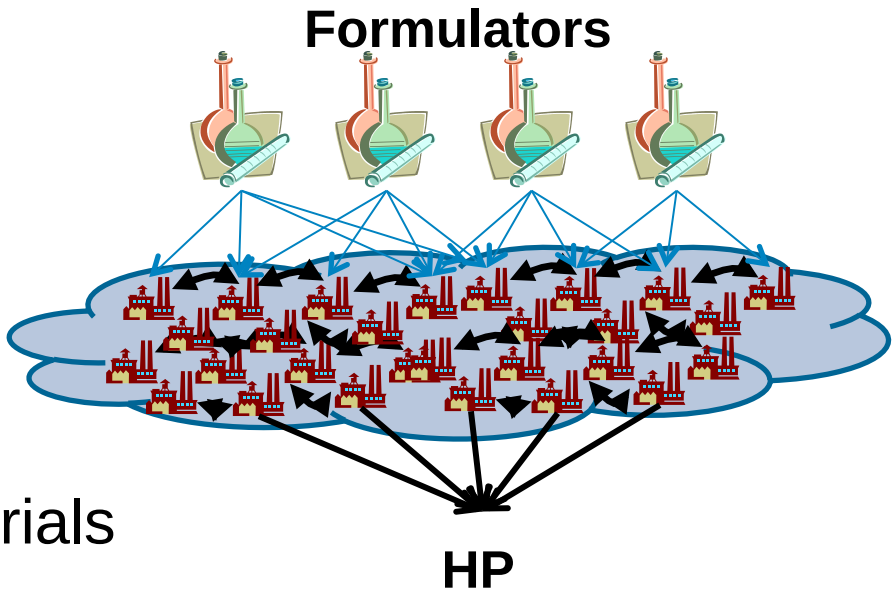


Why do alternatives assessments?

- Reason #1: Replacing materials multiple times is extremely expensive and undesirable
  - Want to select alternatives that won't be restricted in the future to avoid multiple substitutions
  - Regulatory bodies are increasingly using hazard as a screen for substances of concern, so hazard screening is useful an indicator of future restriction
    - Aligns business process with regulatory process

Why do alternatives assessments?

- Reason #2: We need to prioritize material substitution programs
  - Finite resources
  - Complexity of supply chain management
  - Address materials that have the most impact
  - Helps us articulate materials goals to suppliers



Why do alternatives assessments?

- Reason #3: It only makes sense to replace materials with alternatives that are better with respect to EH&S
  - Need a way to assess alternatives to ensure that they are inherently less hazardous (not just unrestricted)
  - Want to be able to select into good materials (not just unrestricted)
    - Supply chain wants WHITE LISTS
  - Meets Sustainability Goal of: “[Meeting] the needs of the present without compromising the ability of future generations to meet their own needs.”

Informed Substitution

- Considering the environment and human health impact of alternatives to restricted substances to ensure that the new materials represent a move to safer chemical or nonchemical alternatives.

Material Selection Goals

- Reduce business risk by anticipating legislation
- Prioritize substitutions
- Use more benign substances in products

Need comparative tools for alternatives assessment

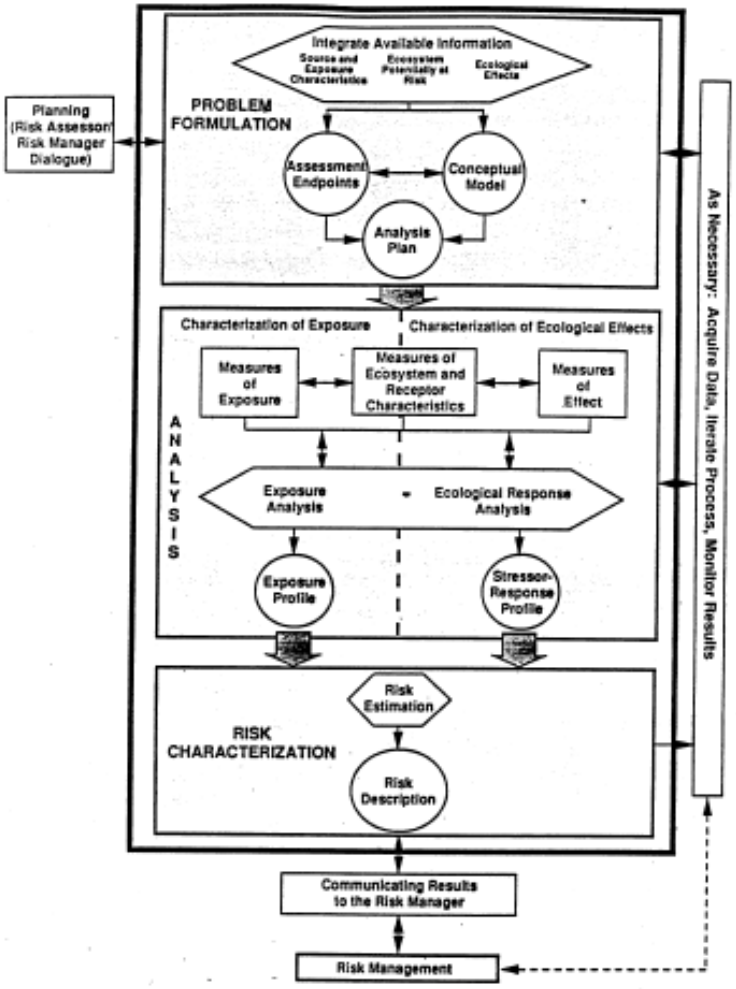
Risk vs Hazard

- Hazard is the inherent property of a substance having the potential to cause adverse effects when an organism, system or (sub) population is exposed to that it. [possible]
- Risk is the probability of an adverse effect in an organism, system or (sub) population caused under specified circumstances by exposure to a substance. [probable]

- Risk is a function of hazard and exposure

Risk Assessment

- Evaluation of the risk to human health and the environment by the actual or potential presence of pollutants
- Structured, well-defined, established
- Much more detailed than LCA
- Considers:
  - Source of the chemical
  - Fate and transport mechanisms
  - Exposure scenarios
  - Dose and thresholds



Good Uses of Risk Assessment

- Life cycle and risk assessment needed for development and implementation of effective environmental regulations
  - Hazard assessment is necessary, but not sufficient for regulatory decisions
  - Volume, exposure potential, etc. are critical
- Very useful for formulators
  - Industrial EH&S more challenging for raw chemicals than finished materials and products

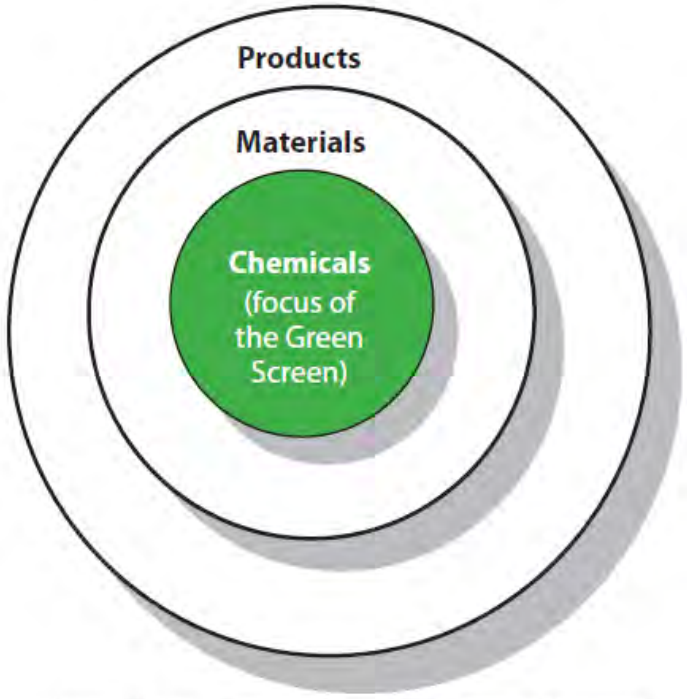
Can we make comparative decisions on alternatives with Risk Assessments alone?

Need for Comparative Tools

- Databases hold chemical information, including Risk Assessments
- Not organized in a way that chemists, formulators, or users need for alternatives assessment
- Green Screen is a tool that is well suited for electronics supply chain
  - Especially since results are easy to use

Comparative Hazard Works for Alternatives Assessment in the Same Application

- Exposure is equal for the same application
- Hazard assessment becomes an effective proxy for risk for the same application
- Hazard assessments are faster, easier to complete than LCA or Risk
  - Narrower, endpoints are relatively well defined
  - Scientifically rigorous
  - Facilitates relatively quick chemical assessments



Source: M. Rossi, J. Tickner, K. Geiser 2006, *Alternatives Assessment Framework*, Lowell Center for Sustainable Production

More Reasons to Shift to Hazard

- Reducing risk through hazard reduction is more effective and efficient than exposure reduction
- Exposure reduction is not an option for most end users of materials (out of HP's control)

To read more about the EU shift from risk to hazard, check out Mark Schapiro's book *Exposed*

Green Screen for Alternatives Assessment

- Green Screen is the tool that HP will be using for alternatives assessment when replacing a restricted substance
- Green Screen enables identification of better materials, not just minimum acceptable
- Green Screen results are only part of decision
  - Still must meet performance and cost targets
- HP will continue to use Risk Assessment, LCA, and Carbon Footprint tools as appropriate

PVC/BFR Elimination Green Screen Pilot

- Introducing GS to the material approval process
- PVC/BFR elimination is a pilot for using GS in selection
  - GS is required
- Materials tests and component assessments usually evolve into supplier self-certification

HP Experiences with Contract Manufacturers

- GreenScreen has been communicated to CMs
- Response was favorable
  - Choices are easier
  - Easy way to please HP
- Not willing to perform the screens
- Willing to pay for screens and access to data
- Would like “white lists” of materials

HP Experiences Farther Down the Supply Chain

- Formulators are very engaged, actively performing GreenScreens
- Willing to invest considerable time and money into the process
- Formulations changing as a result of the GS
- Highly technical discussions are occurring
- Reinforces the need to have highly trained individuals in all levels of the supply chain
- Risk versus Hazard still an issue

Thanks for your attention!