Memo on the California Green Chemistry Program and the Critical Needs of Downstream Users
June 1, 2009

Downstream businesses, consumers, investors and governments need chemicals and products that have low to no toxicity and degrade into innocuous substances in the environment. But the current lack of data on the hazardous properties of chemicals and their presence in products -- along with other weaknesses in the existing regulatory structure -- makes it extremely difficult to meet this need. In many cases, we are unable to identify safer chemicals on the market. We believe this in turn presents a serious market barrier to the development of safer chemicals and products based on the principles of green chemistry.

In many cases, even for large organizations, it is difficult to get chemical hazard information, even when we request it directly from suppliers. Making such a request typically requires extensive vendor education and persistent demands for hazard and ingredient information. If the information is provided, it is often of little value due to the vendor's lack of knowledge, trade secret caveats or the general absence of hazard information for the thousands of chemicals in commerce today.

We are committed to advancing an economy that rewards investment in the design of increasingly safer chemicals and products. We have demonstrated a willingness to invest time and resources in collecting and analyzing chemical hazard data and purchasing environmentally preferable products based on green chemistry. New policies are needed to support the efforts of downstream users in taking these and other steps.

In particular, the California Green Chemistry Initiative would help our work by:

1. **Categorizing chemicals** into levels of high, moderate, low or unknown concern.
2. **Requiring greater disclosure of the chemical constituents of products**, especially chemicals of high concern.
3. **Providing** i**nformation on the availability of safer alternatives** to chemicals of high concern.

1. **Categorizing Chemicals**

We need a credible, transparent source of information that categorizes chemicals into high, moderate, low or unknown levels of concern. Two examples include:

- The categorization system specified by the State of Maine in *An Act to Protect Children's Health and the Environment from Toxic Chemicals in Toys and Children's Products*, which identifies four categories of concern: high, moderate, low and unknown concern.
- A similar categorization system specified in the Green Screen for Safer Chemicals (Clean Production Action, 2007) that categorizes chemicals into one of four benchmarks, ranging from Benchmark 1: Avoid - Chemical of High Concern to Benchmark 4: Prefer - Safer Chemical. Washington State and Maine have used the Green Screen approach to assess the availability of safer alternatives to the flame retardant, decabromodiphenyl ether (decaBDE).

A credible transparent categorization system will help us to clarify what we know and don't know about chemicals on the market and will provide a means for transitioning from the top tier to lower tier substances.

An initial step for the State of California in chemicals categorization might be to establish a designated list of chemicals of high concern. Washington State, Maine and the European Union, for example, have developed criteria for identifying chemicals of high concern. Within the United States a frequently cited list of carcinogens and reproductive/developmental toxicants is the list of chemicals identified under Proposition 65.

Under AB 1879, the State is required to "establish a process to identify and prioritize those chemicals or chemical ingredients in consumer products that may be considered as being a chemical of concern." To categorize chemicals of high concern, we suggest that the State consider expanding the hazard criteria under Proposition to include:

- PBTs (persistent, bioaccumulative and toxic substances),
- vPvBs (very persistent and very bioaccumulative substances),
- vPTs (very persistent and toxic substances),
- vBTs (very bioaccumulative and toxic substances),
- mutagenic substances,
- neurotoxicants,
- endocrine disruptors, as well as
- the criteria already used under Prop 65 - carcinogenic and reproductive/developmental toxicants.

[Note that "toxic" ("T") includes ecotoxicity as well as human toxicity.]

The State of California should rapidly create this list of substances by way of referencing existing authoritative lists, including Prop 65 (for examples of other authoritative lists, see: the State of Maine's *An Act to Protect Children's Health and the Environment from Toxic Chemicals in Toys and Children's Products*; and the list of lists in Appendix 1).

Secondly, the state needs to address chemicals for which data are unavailable, incomplete or uncertain. Such chemicals need to be flagged and prioritized for action if they have the potential for high exposure. We realize that for many chemicals hazard data are not available. For this reason, it will be essential for California to require a minimum dataset from producers that will allow these databases to be populated. California should consider requiring minimum data on some or all of these measures as a condition of sale.

2. **Requiring Greater Disclosure of Chemical Ingredients in Products & Articles**

As recommended in the *California Green Chemistry Initiative - Final Report* (2008), we need an "online product ingredient network" (policy recommendation #3). A significant barrier to implementing green chemistry at the user level is the lack of information on the chemical constituents in products. We've been concerned and frustrated by the way confidential business information has been used to block access to information on chemicals in products.

Ingredient transparency in products is therefore an essential element in implementing the principles green chemistry. While this is especially true of chemicals of high and moderate concern, downstream users ultimately need to know the identity of all chemical ingredients in products.

While a handful of businesses and health care organizations require full or partial disclosure of chemicals in products from their suppliers, and a few suppliers publicly provide such information (see Box 1), government action is needed to instill transparency on chemical ingredients in products. As a first step, California could require disclosure of chemicals of high concern in products.

Box 1. Examples of Chemical Disclosure

Downstream Users

- Kaiser Permanente requires vendors to fill in a chemicals disclosure form for all large national purchasing contracts.
- True Textiles and Herman Miller require vendors to disclose chemical constituents in products down to 100 parts per million (or 0.01% by weight of the product).

Suppliers/Producers of Chemical Intensive Products

- SC Johnson (manufacturer of Windex and other home cleaning products) - launched it's "What's Inside" program in 2008, where the company discloses chemical ingredients in products.
- Method and Seventh Generation -- manufacturers of household cleaning products -- list all the ingredients in their products (with the exception of fragrances and colorants).

For ingredient disclosure to be effective, it will be necessary for California to greatly limit trade secret claims by producers. Trade secret claims should be time-limited and allowed only on the basis of stringent criteria. A trade secret claim that is permitted for a product sold in California should be identified as such on the publicly accessible database.

3. Providing Information on the Availability of Safer Alternatives

We need a credible, transparent source of information on safer alternatives to chemicals of moderate and high concern on the market. We suggest a two-part strategy to promote safer alternatives: a) use market forces to generate a database of acceptable alternatives to chemicals of high concern; and b) implement a regulatory process that requires a justification by those who want to continue to use chemicals of high concern and State authority to restrict chemicals where the justification case by the user is not made.

a. **Harness Market Forces -- Create an Alternatives to Chemicals of High Concern Database or Wiki** . Policy recommendation #5 in the *California Green Chemistry Initiative - Final Report* identifies the need to "accelerate the quest for safer products". We agree wholeheartedly with this recommendation and suggest the state create a resource -- such as a database or wiki -- that lists safer alternatives. Some considerations in creating the database/wiki:

   i. We suggest that only government agencies populate the database/wiki, but allow submissions from any interested party, including companies, government agencies inside and outside of California, NGOs and members of the public.
   ii. A number of options are available to make the management of the wiki manageable, including collaborating with other government entities (such as the Interstate Chemicals Clearinghouse) and soliciting submissions from experts representing end users, such as the electronics, buildings, health care and retail sectors.
   iii. Define key terms, for example:
      a. "Alternative" is "a substitute process, product, material, chemical, strategy or combination of these that serves a functionally equivalent purpose to a chemical of high concern." Thus an alternative is broader than just another chemical substitute.
      b. "Functionally equivalent" is "an alternative to the use of a chemical of high concern that achieves similar technical performance, although the means of

achieving that performance may differ, potentially requiring changes in production processes or materials use to manufacture the product. A functionally equivalent alternative does not need to be a drop in replacement – requiring no changes to the production process or final product."

c. "Acceptable alternative" is "an alternative to the end use of a chemical of high concern that itself does not contain a chemical that:
   1. is already listed as a chemical of high concern,
   2. meets the criteria for chemicals of high concern (PBT, CMR, etc.), or
   3. degrades through metabolism, biodegradation, photodegradation, combustion, etc. into a chemical of high concern."

d. "Alternatives assessment" is "a process of identifying acceptable alternatives to end uses of chemicals of concern. An alternatives assessment does not involve a risk assessment, determinations are made based on the hazards and inherent toxicity of a chemical."

b. **Create a Level Playing Field -- Identify and Restrict Priority End Uses of Chemicals High Concern.** California should develop a process to ensure that end uses of chemicals of high concern that pose the greatest potential harm to human health and the environment can be restricted -- thus creating a level playing field for the market. The process by which the State arrives at a decision to restrict the use of a chemical of high concern is unclear in AB 1879. We recommend that the State clarify that process in AB 1879. An approach that is consistent with legislative initiatives in other states and Europe includes the following steps:

1. **Prioritize**: Establish a set of priority chemicals of high concern. based upon: (i) their presence in people based on biomonitoring studies; (ii) their potential effects during fetal, infant or child development; (iii) whether or not they are used in consumer and commercial chemical products; (iv) whether they would be used under uncontrolled conditions in workplaces; (iv) used in products in the highest proportions; or (v) used in workplaces in high volume in the state. For an example of a list of priority chemicals of high concern see: International Chemicals Secretariat (ChemSec) - Substitute It Now (SIN) List (http://www.chemsec.org/list/).
2. **Register End Uses**. For prioritized chemicals, require the registration of end uses by companies or their proxies (e.g., trade associations). An example of this process is the Interstate Mercury Education and Reduction Clearinghouse (IMERC).
3. **Prioritize End Uses**. Identify priority end uses of chemicals of high concern based on their likelihood to lead to exposure to the most vulnerable populations.
4. **Restrict or prohibit prioritized chemicals based on** their uses, beginning with those for which safer alternatives are readily available and followed by those for which safer alternatives have not yet been developed. A pending phase-out of the use of chemical or class of chemicals of concern will motivate industry investment and entrepreneurial activity in identifying safer alternatives.

Clean Production Action and Healthy Building Network
Chemicals of High Concern – List of Lists ("Red List of Lists")
January 2009

Chemicals of High Concern are a select group of chemicals that are the highest priority to eliminate from usage. In the Green Screen for Safer Chemicals[1] and the Pharos Project[2], chemicals of high concern have one or more of the following attributes, they are:

- Persistent, Bioaccumulative and Toxic (PBT),
- very Persistent and very Bioaccumulative (vPvB),
- very Persistent and Toxic (vPT)
- very Bioaccumulative and Toxic (vBT) or
- known or likely to be:
    - carcinogenic,
    - mutagenic,
    - reproductive or developmental toxicant,
    - neurotoxicant or
    - endocrine disrupting.

Our initial step to identifying chemicals that have these attributes begins from chemical lists developed by government entities. To generate the Clean Production Action (CPA) and Healthy Building Network (HBN) "Chemicals of High Concern – List of Lists" or "Red List" for short, we start from authoritative chemical lists developed by a body established by one or more government entities addressing any one of the hazard endpoints listed above.

Authoritative lists for all of the above endpoints – excepting neurotoxicants, vPTs, vBTs and endocrine disruptors – are provided below. No authoritative government lists currently exist for neurotoxicants, vPTs and vBTs and endocrine disruptors. For endocrine disruptors, the government lists are preliminary screening lists that identify chemicals that are prime candidates for the high concern label, but are in need of further assessment before they can be assigned with certainty. Since neurotoxicity and endocrine disruption are endpoints of high concern, we provide "watch" lists to flag chemicals that may meet these criteria. While these chemicals are under assessment, precautionary avoidance is warranted.

It is important to note that the authoritative lists are based on evaluation of only a limited set of the approximately 80,000 chemicals in commerce. Many chemicals have simply not been tested. Therefore it is important to assess the available toxicological literature on chemicals which are not listed and to use modeling tools and analogs to determine whether the weight of evidence indicates that a chemical is a chemical of high concern. The authoritative and watch lists that follow provide a starting point for identifying chemicals of high concern.

[1] M Rossi and L Heine, 2007, *Green Screen for Safer Chemicals* -- www.cleanproduction.org/Green.Greenscreen.php
[2] Healthy Building Network, *Pharos Project* -- www.pharosproject.net.

Persistent, Bioaccumulative and Toxic (PBT) Substances

1. United Nations Environment Programme (UNEP), Stockholm Convention Secretariat Stockholm Convention on Persistent Organic Pollutants (POPs)
   Source: For the list of 12 POPs under the convention, see: http://chm.pops.int/Convention/12POPs/tabid/296/language/en-US/Default.aspx (accessed 10/23/2008); and for chemicals in review process, see: http://chm.pops.int/Convention/POPsReviewCommittee/RecommendationsofthePOPRC/tabid/440/language/en-US/Default.aspx (accessed 01/29/2009).

2. US Environmental Protection Agency (EPA), Toxics Release Inventory (TRI) Program, "TRI PBT Chemical List"
   Source: http://www.epa.gov/triinter/trichemicals/pbt%20chemicals/pbt_chem_list.htm (accessed 1/26/09).

3. US Environmental Protection Agency (EPA), Persistent Bioaccumulative and Toxic (PBT) Chemical Program, Priority PBT Profiles
   Source: http://www.epa.gov/opptintr/pbt/pubs/cheminfo.htm (accessed 10/23/2008).

4. US Environmental Protection Agency (EPA), National Waste Minimization Program, Priority Chemicals
   Source: http://www.epa.gov/epawaste/hazard/wastemin/priority.htm (accessed 10/23/2008).

5. European Union, European Chemicals Bureau, European Chemical Substances Information System (ESIS) PBT list
   Source: http://ecb.jrc.it/esis/index.php?PGM=pbt (accessed 10/23/2008).

6. State of Washington, Department of Ecology, Chapter 173-333 WAC Persistent Bioaccumulative Toxins
   Source: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-333-310 (accessed 1/26/09).

very Persistent and very Bioaccumulative (vPvB) Substances

1. European Union vPvB list (vPvB's are included in the PBT list). See European Union, European Chemicals Bureau, European Chemical Substances Information System (ESIS)
   Source: http://ecb.jrc.it/esis/index.php?PGM=pbt (accessed 10/23/2008).

Carcinogenicity

1. US National Institutes of Health, National Institute of Environmental Health Sciences, National Toxicology Program (NTP), Report on Carcinogens (ROC)
   a. Known to be Human Carcinogens
   b. Reasonably Anticipated to be Human Carcinogens
   Source: http://ehis.niehs.nih.gov/roc (accessed 10/23/2008).

2. US Environmental Protection Agency (EPA), National Center for Environmental Assessment, Integrated Risk Information System (IRIS) Database
    a. 1999 and 2005 Guidelines:
        i. "Carcinogenic to humans"
        ii. "Likely to be carcinogenic to humans"
    b. 1996 Guidelines: "Known/likely human carcinogen"
    c. 1986 Guidelines:
        i. "Group A - Human Carcinogen"
        ii. "Group B1 - Probable human carcinogen"
        iii. "Group B2 - Probable human carcinogen"

    Source: http://www.epa.gov/ncea/iris/search_human.htm (accessed 10/23/2008).

3. International Agency for Research on Cancer (IARC), Agents Reviewed by the IARC Monographs
    a. Group 1: Agent is carcinogenic to humans
    b. Group 2A: Agent is probably carcinogenic to humans

    Source: http://monographs.iarc.fr/ENG/Classification/index.php (accessed 10/23/2008).

4. State of California Environmental Protection Agency, Office of Environmental Health Hazard Assessment (OEHHA) California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act Of 1986) Chemicals Known to the State to Cause Cancer or Reproductive Toxicity

    Source: http://www.oehha.ca.gov/prop65/prop65_list/Newlist.html (accessed 10/23/2008).

5. European Commission, Enterprise and Industry DG, Carcinogens List – See consolidated version of Annex I of Directive 76/769 EEC, which includes Annex I of Directive 65/548/EEC (which is to be replaced by Annex XVII of REACH on 1 June 2009).
    a. Carcinogen Category 1: "known"
    b. Carcinogen Category 2: "should be considered carcinogenic to humans"

    Source: http://ec.europa.eu/enterprise/chemicals/legislation/markrestr/index_en.htm (accessed 10/23/2008).

6. European Commission, Joint Research Centre (DG JRC), Institute for Health and Consumer Protection (IHCP), Consumer Products Safety & Quality (CPS&Q) Unit, Substances with EU Risk & Safety Phrases (Commission Directive 67-548-EEC)
    a. R45 "May cause cancer"
    b. R49 "May cause cancer by inhalation"

    Source: http://ecb.jrc.it/documentation/ (click on: "DOCUMENTS", "CLASSIFICATION-LABELLING", "DIRECTIVE 67-548-EEC", "ANNEX I OF DIRECTIVE 67-548-EEC", and then either of the files listed as: "Annex I of Directive 67548EEC") (accessed 10/23/2008).

7. National Institute for Occupational Safety and Health (NIOSH) Carcinogen List

    Source: http://www.cdc.gov/niosh/topics/cancer/npotocca.html (accessed 1/26/09).

Mutagenicity

1. European Commission, Enterprise and Industry DG, Mutagens List – See consolidated version of Annex I of Directive 76/769 EEC, which includes Annex I of Directive 65/548/EEC (which is to be replaced by Annex XVII of REACH on 1 June 2009).
    a. Mutagen Category 1: "Substances known to be mutagenic to man"
    b. Mutagen Category 2: "Substances which should be regarded as if they are mutagenic to man"

    Source: http://ec.europa.eu/enterprise/chemicals/legislation/markrestr/index_en.htm (accessed 10/23/2008).

2. European Commission, Joint Research Centre (DG JRC), Institute for Health and Consumer Protection (IHCP), Consumer Products Safety & Quality (CPS&Q) Unit, Substances with EU Risk & Safety Phrases (Commission Directive 67-548-EEC)
    a. R46 "May cause heritable genetic damage"

    Source: http://ecb.jrc.it/documentation/ (click on: "DOCUMENTS", "CLASSIFICATION-LABELLING", "DIRECTIVE 67-548-EEC", "ANNEX I OF DIRECTIVE 67-548-EEC", and then either of the files listed as: "Annex I of Directive 67548EEC") (accessed 10/23/2008).

Reproductive / Development Toxicity

1. European Commission, Enterprise and Industry DG, Reproductive Toxicants List – See consolidated version of Annex I of Directive 76/769 EEC, which includes Annex I of Directive 65/548/EEC (which is to be replaced by Annex XVII of REACH on 1 June 2009).
    a. Reproduction Category 1: "known" to impair fertility in humans or cause developmental toxicity in humans"
    b. Reproduction Category 2: "should be regarded as if" they impair fertility to humans or cause developmental toxicity to humans"

    Source: http://ec.europa.eu/enterprise/chemicals/legislation/markrestr/index_en.htm (accessed 10/23/2008).

3. European Commission, Joint Research Centre (DG JRC), Institute for Health and Consumer Protection (IHCP), Consumer Products Safety & Quality (CPS&Q) Unit, Substances with EU Risk & Safety Phrases (Commission Directive 67-548-EEC)
    a. R60 "May impair fertility"
    b. R61 "May cause harm to the unborn child"

    Source: http://ecb.jrc.it/documentation/ (click on: "DOCUMENTS", "CLASSIFICATION-LABELLING", "DIRECTIVE 67-548-EEC", "ANNEX I OF DIRECTIVE 67-548-EEC", and then either of the files listed as: "Annex I of Directive 67548EEC") (accessed 10/23/2008).

4. State of California Environmental Protection Agency, Office of Environmental Health Hazard Assessment (OEHHA) California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act Of 1986), Chemicals Known to the State to Cause Cancer or Reproductive Toxicity

    Source: http://www.oehha.ca.gov/prop65/prop65_list/Newlist.html (accessed 10/23/2008).

5. US National Institutes of Health, National Institute of Environmental Health Sciences, National Toxicology Program (NTP), Center for the Evaluation of Risks to Human Reproduction. Expert Panel Reports & Monographs on Reproductive and Developmental Toxicity. Review monographs to identify chemicals of high concern.

    Source: http://cerhr.niehs.nih.gov/chemicals/index.html (accessed 10/23/2008).

Neurotoxicants

Neurotoxicant Screening List. Chemicals listed in the article below are potential Red List chemicals. Precautionary avoidance is warranted.

Grandijean, P & PJ Landrigan. 2006. "Developmental neurotoxicity of industrial chemicals." *The Lancet*, v.368: 2167-2178. List of 201 Chemicals known to be neurotoxic in humans.

Endocrine Disruptors

Endocrine Disruptors Screening List. Chemicals listed in the European Union documents below are potential Red List chemicals. Precautionary avoidance is warranted.

1. European Union, Category 1 ("at least one in-vivo study providing c*lear evide*nce for endocrine disruption in at least one species using intact animals"), Endocrine Disruptor chemicals. SCREENING LISTS – potential Red List chemicals, still undergoing assessment.

    Sources:

    a. DHI. 2007. Study on Enhancing the Endocrine Disrupter Priority List with a Focus on Low Production Volume Chemicals. http://ec.europa.eu/environment/endocrine/documents/final_report_2007.pdf
    b. Commission Staff Working Document on the implementation of the "Community Strategy for Endocrine Disrupters" - a range of substances suspected of interfering with the hormone systems of humans and wildlife (COM (1999) 706), (COM (2001) 262) and (SEC (2004) 1372) (Brussels, 5 December 2007). http://register.consilium.europa.eu/pdf/en/07/st16/st16123.en07.pdf -- (accessed 6/9/08).