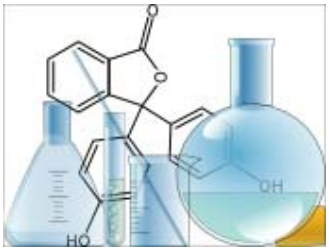

GREEN CHEMISTRY MEETING REPORT

TOXICS INFORMATION CLEARINGHOUSE:

A PRELIMINARY DISCUSSION OF HAZARD TRAITS, ENDPOINTS AND OTHER RELEVANT DATA

Summary of January 29, 2009 Meeting

Safer Alternatives Assessment and Biomonitoring Section
Office of Environmental Health Hazard Assessment
California Environmental Protection Agency

July 2009

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MEETING REPORT

TOXICS INFORMATION CLEARINGHOUSE: A PRELMINARY DISCUSSION OF HAZARD TRAITS, ENDPOINTS AND OTHER RELEVANT DATA

Meeting date and time: January 29, 2009, 9 am to 12 noon
Meeting location: Sierra Hearing Room, Cal/EPA Building, 1001 I Street, Sacramento

Summary

On January 29, 2009, the Office of Environmental Health Hazard Assessment (OEHHA) convened a panel of scientific experts to provide input on the Toxics Information Clearinghouse, established by SB 509 (Simitian, Statutes of 2008). A series of questions were posed to the panelists to initiate a preliminary discussion of the hazard traits, toxicological and environmental endpoints and other relevant data to be contained in the Clearinghouse. The public was also invited to comment on the questions.

A wide range of stakeholders from government, industry, and nongovernmental organizations as well as members of the general public participated in the discussion. The meeting was webcast and additional comments were received by electronic mail. This report will highlight key points that emerged from the panelists' discussion and public comment. The report also discusses follow up steps OEHHA is taking.

Meeting Goals

The primary goals of the meeting were to:

- Begin discussion of Clearinghouse hazard traits, toxicological and environmental endpoints, and other relevant data
- Explore how to address chemicals lacking adequate data
- Identify follow up questions and next steps

Background Materials

OEHHA developed discussion questions to help initiate the brainstorming session. Prior to the meeting, OEHHA provided these questions to the panelists and posted them on OEHHA's web site (http://www.oehha.ca.gov/multimedia/green/pdf/012909mats.pdf). The discussion questions are listed below:

1. What characteristics of a chemical should be considered a "hazard trait"? What hazard traits should be included in the Clearinghouse? Hazard traits could include things like reactivity, environmental half-life, bioaccumulation potential, a particular structural feature, or indicators of toxicity, such as ability to cause oxidative stress, for example.

2. What toxicological endpoints should be included in the Clearinghouse? For instance, a toxicological endpoint could include a frank toxicological endpoint, such as carcinogenicity or reproductive toxicity, or upstream endpoints such as genotoxicity, epigenetic alterations, or enzyme inhibition.

3. What environmental endpoints should be included in the Clearinghouse? For instance, environmental endpoints could be frank toxicity to wildlife such as decreased fertility in an indicator species or more upstream endpoints such as endocrine disruption.

4. What traits/endpoints/other relevant data would be useful in identifying chemicals of concern in the absence of a full toxicological database?

5. What traits/endpoints/other relevant data would be useful in evaluating exposure potential?

6. What traits/endpoints/other relevant data would be useful in evaluating potential effects on sensitive subpopulations, including infants and children?

A table was submitted as background information by Dr. Richard Denison of the Environmental Defense Fund, one of the panelists, which summarized required hazard data under various programs (see Appendix 1).

Expert Panel

The following scientists served on the expert panel provided input on the Toxics Information Clearinghouse:

- Richard A. Denison, Ph.D., Senior Scientist, Environmental Defense Fund
- Elinor Fanning, Ph.D., Assistant Director for Research of the Center for Occupational and Environmental Health, University of California, Los Angeles
- Michael L. Fischman, M.D., M.P.H., Worldwide Medical Director, Intel Corporation; Clinical Professor of Medicine, Division of Occupational and Environmental Medicine, UC San Francisco
- Dale Johnson, Ph.D., President and CEO of Emiliem, Inc.; Adjunct Professor, Nutritional Science and Technology, UC Berkeley
- Abby Li, Ph.D., Senior Managing Scientist, Exponent Health Science
- Meg Schwarzman, M.D., M.P.H., Research Scientist, Center for Occupational and Environmental Health, University of California, Berkeley.
- Patrick Wilson, Ph.D., M.P.H., Senior Regional Toxicologist, Regional Incident Coordination Team, U.S. Environmental Protection Agency, Region IX
- Tracey J. Woodruff, Ph.D., M.P.H., Associate Professor and Director, Program on Reproductive Health and the Environment, Department of Obstetrics, Gynecology, and Reproductive Sciences, University of California, San Francisco

Brief biographies of the panelists are provided in Appendix 2.

Highlights of Meeting Discussion

Sara Hoover of OEHHA initiated the meeting with an overview presentation (Appendix 3) that set the context for the brainstorming session. She introduced the panelists, who each made introductory remarks focused on the discussion questions. Following the introductory remarks, Ms. Hoover facilitated a discussion with the panelists and the public.

To prepare this report, OEHHA reviewed meeting notes, information captured on flip charts and comments submitted by electronic mail during the meeting. Some of the key points and challenges that emerged from the meeting discussion are highlighted below. This paraphrased information represents the viewpoints of external stakeholders, not OEHHA.

The comments are organized below according to the discussion questions posed by OEHHA and other more general topics.

Hazard trait definition and scope (Question 1)

Cast a broad net for hazard traits: Casting a broad net to encompass all possible hazard traits of chemicals was recommended. A hazard trait was considered to include physical and chemical properties (*e.g*, water solubility), structural alerts, early indicators of toxicological harm (*e.g*., perturbation of hormone systems), and frank toxicological endpoints (human and environmental health). The definition of hazard trait was also considered to include "exposure traits" such as persistence and bioaccumulation. A list of example hazard traits is included in Appendix 4.

Prioritize hazard traits to populate first: While a broad net for hazard traits was encouraged, commenters indicated the need for OEHHA to prioritize which hazard traits are of greatest importance to evaluate first.

Show how hazard traits link to toxicity endpoints: Indicate the significance of a particular hazard trait in terms of toxicological outcome.

Identify a common set of hazard traits, endpoints and other relevant data: Use the same set of traits for all chemicals. This will allow a comparison across chemicals, which could help identify safer alternatives and reveal key data gaps.

Data on chemical reactivity is important in evaluating potential hazards: Mixing chemicals can potentially create unintended products. This is critical information for formulators to consider in developing products.

Toxicological endpoints for inclusion in Clearinghouse (Question 2)

Include a broad range of toxicological information: Include traditional toxicity testing, but also use structural alerts, structure-activity relationships, *in vitro* data, mechanistic information, "upstream" toxicity indicators, read-across methods, *etc*.

Include upstream and emerging endpoints: Incorporate emerging endpoints such as endocrine disruption and disruption of other hormone systems. Include new endpoints even if the significance of them is not clear now or methods are not yet well developed. Design the Clearinghouse with a view to the future of toxicity testing.

Include endpoints that increase susceptibility to disease: Immune modulation, hormone-mimicking properties, and effects on the thyroid are examples of factors that increase susceptibility of an organism to disease.

Avoid overextending into new endpoints: A caution was expressed that while California should consider emerging toxicological endpoints of concern, the major focus should still be on the well-defined, well-understood endpoints. Extending too far into non-standard endpoints may dilute the focus on major concerns, and data on non-standard endpoints may not be available. Mechanistic data is primarily available and well understood only for chemicals that have been well tested.

Include cumulative/synergistic toxicological effects: It would be desirable to have the capacity to query the database to identify evidence of synergistic or cumulative effects. For example: identifying chemicals with different mechanisms of action that would only produce a measurable effect when co-exposures occur, or identifying chemicals with the same toxic endpoint that would produce a greater effect when combined.

Environmental endpoints for inclusion in Clearinghouse (Question 3)

Broaden environmental endpoints that are considered: Typically environmental toxicity is measured using aquatic toxicity. Broaden this to include more receptors: terrestrial, avian, sediment and soil dwelling organisms. Consider data on individual receptors as well as ecosystems.

Consider combinations of factors in evaluating environmental toxicity: For example, the collapse of an amphibian population was traced to the combined effects of a fungal infection and exposure to an immune modulator.

Consult more experts on environmental hazards: The focus of most of the discussion on hazard traits was human health. OEHHA was encouraged to identify and consult with experts on environmental hazards and to not neglect ecotoxicity.

Addressing data gaps (Question 4)

Adequate data is often absent: Significant gaps in data on hazard traits, toxicological and environmental endpoints, and other relevant characteristics of chemicals in commerce were noted as a challenge in developing the Clearinghouse.

Missing information may not be a data gap: It may be that a particular test was not conducted as a result of a tiered decision approach to testing. Not all “data gaps” actually need to be filled. The Clearinghouse should not just leave a blank with no explanation. A prioritization should be undertaken to determine which data gaps are critical and need to be filled.

Physical chemical properties useful in the absence of other data: Physical chemical properties can help predict toxicity, exposure potential, and other concerns such as the potential for static discharges and possible explosions in the workplace.

Consider structural alerts and other methods in the absence of test data: For chemicals without adequate test data, consider structural alerts, similarity to well-characterized chemicals, category "read across" and other approaches.

Include computational toxicology: A part of the clearinghouse should contain predictive models with very good explanation as to how to use the models. These models are becoming more widely available and easier to use, and this trend will likely continue. Computational toxicology can offer important insights into upstream events that precede the actual toxicological endpoint. A key issue is how well these surrogate events predict the toxicity.

Traits/endpoints/other data relevant to exposure potential (Question 5)

Consider a range of traits in evaluating exposure potential: Include physical chemical properties, persistence, bioaccumulation, toxicokinetics, environmental fate and transport, etc. Use direct exposure information (*e.g.*, biomonitoring data) and indirect information (*e.g.*, production volume). Use information should go beyond consumer use.

Include information on use patterns: Use patterns can help predict both human and environmental exposures. Chemicals that may seem unimportant can become very important environmentally when used in ways that disperse the chemical broadly or intensively in our ecosystems. The quantity of use of a chemical is also important but is not a substitute for use pattern information.

Include measures of workplace exposure: Include data from targeted biomonitoring of workers, for example.

Include body burden of bioaccumulative toxicants: Certain chronic toxicants are building up in populations world-wide. Body burden of these contaminants is an indicator of exposure.

Include information on occurrence of contaminants: The Clearinghouse should consider occurrence of contaminants in the environment. The occurrence of a contaminant can be an indicator of specific types of problems, such as the inability of wastewater facilities to remove/treat the chemical in water used as a drinking water source.

Traits/endpoints/other data relevant to sensitive subpopulations (Question 6)

Include emerging science on sensitive subpopulations: For example, consider "windows of vulnerability" during development.

Include early indicators of toxicity relevant to sensitive subpopulations: For example, thyroid hormone fluctuations in pregnancy can seriously affect fetal neurological development.

Address inhalation toxicity in children: Inhalation toxicity such as asthma is a particular concern in children and should be addressed.

Dose-response information versus intrinsic hazard

Dose information is critical in interpreting hazard data: It is not useful to know only that an effect is caused at some level. The relative effects are important. An effect may occur only at the maximum tolerated dose (MTD) for one chemical, while another chemical causes the same effect at a very low dose. This information would be critical in identifying safer alternatives.

Focus on hazard, not dose/risk: An alternative viewpoint was offered that "intrinsic hazard" of a chemical should be the focus of the Clearinghouse, without regard to dose or risk. Concern was expressed for the use of any hazardous chemical, as this inherently requires control measures to mitigate risks. The goal of the Green Chemistry Initiative should be to move toward inherently safer chemicals that would not require measures to control risks. Containment of hazardous chemicals is not a viable strategy as these harmful chemicals are nearly always released into the environment somewhere along the lifecycle. The containment approach also does not drive green chemistry solutions.

Chemical universe for Clearinghouse

Cast a broad net for chemicals: The Clearinghouse should include a broad universe of chemicals, including those with and without available data. California should not focus only on data-rich chemicals or "bad actors." In this way, the Clearinghouse can capture and characterize the extent to which information is not available. There will be a trade-off, however, between the depth of information versus the number of chemicals that can be included.

Existing information sources for Clearinghouse development

Leverage existing information: California should not reinvent the wheel, but should start with existing toxicological databases, sources for exposure and use information, and other sources to develop the Clearinghouse. The Integrated Risk Information System (IRIS) of the U.S. Environmental Protection Agency is an example of an existing clearinghouse. The CleanGredients® database should be considered as a source of information. California should be involved with the Interstate Chemicals Clearinghouse (IC2).

Consult other national and international sources for criteria for hazard traits and toxicological and environmental endpoints: Various sources were suggested as starting points for defining traits and endpoints. The criteria developed by the European Union in the REACH regulation as a starting point was named as an example. The table submitted by Dr. Denison (Appendix 1) was also referenced.

Include information on chemicals banned in other jurisdictions: It would be helpful for formulators considering chemicals to be informed of decisions made in other jurisdictions (*e.g.*, Europe) to restrict chemicals.

Trade secret/confidential business information will be an issue: It is difficult to obtain information on proprietary ingredients of products. Sometimes a major company can require a supplier to provide that information. Obtaining data held by industry will be a challenge in developing the Clearinghouse.

Conduct case studies to help determine hazard traits, toxicological and environmental endpoints: Specific chemicals could be investigated as a way to identify appropriate traits and endpoints, consult various data sources, determine feasibility of approaches to organize and evaluate traits and endpoints, and uncover potential challenges.

Structure of Clearinghouse

Develop a "mission statement" for the Clearinghouse: Define what the Clearinghouse is (*e.g.*, a web crawler/portal), who the users are and what the purpose is.

Make Clearinghouse a user friendly portal: One way that California could add value to existing databases is to create a user friendly interface for the Clearinghouse. A one-stop portal to other databases would be a useful service. The ability to query for specific chemicals, traits, diseases, safer alternatives, and ways to reduce exposures should be included.

Use "layered" user interfaces: For example, the consumer interface might include fact sheets and other materials for the public, while a formulator interface might include more detailed information on chemical hazards and other characteristics, and safer alternatives. The scientist interface might focus more on detailed mechanistic issues and the underlying studies supporting the hazard trait information.

Consider range of users in developing Clearinghouse: The structure of the Clearinghouse will depend on the target audience, which could include consumers trying to figure out if their shampoo is safe and manufacturers looking for safer ingredients to use in their products.

Consider including a "personal decision tree" regarding exposures: This would help users identify exposures to hazardous exposures (*e.g.*, personal care products, cleaning products) and ways to help reduce exposures.

Ensure transparency: Identify the sources of information used for the hazard traits, endpoints and other data.

Public Comment Submission

In March, 2009, The Green Chemistry Alliance submitted formal comments on the development of the Clearinghouse. These comments are provided in Appendix 5.

Next Steps

Since the January 29, 2009 meeting, OEHHA has continued to actively work on the Clearinghouse development, as summarized below.

OEHHA gave a presentation on the Clearinghouse at the April 29 and 30, 2009 meeting of the Green Ribbon Science Panel (GRSP). OEHHA's presentation is included here: http://www.dtsc.ca.gov/PollutionPrevention/GreenChemistryInitiative/upload/Staff-Presentations.pdf. The transcripts of the two day meeting, including extensive GRSP input to OEHHA, are available at: http://www.dtsc.ca.gov/PollutionPrevention/GreenChemistryInitiative/upload/GRSP_Transcript_042909.pdf and http://www.dtsc.ca.gov/PollutionPrevention/GreenChemistryInitiative/upload/GRSP_Transcript_043009.pdf.

On April 22, 2009, OEHHA met with the Consumer Specialty Products Association (CSPA) and provided an update on green chemistry and biomonitoring activities. OEHHA requested information from the members of CSPA on approaches they use to evaluate chemicals in products, including ways to address data gaps.

OEHHA sought input on the Clearinghouse from other state agencies at a meeting of the Green Chemistry Leadership Council (http://www.dtsc.ca.gov/PollutionPrevention/GreenChemistryInitiative/Council.cfm) held on May 28, 2009 in Sacramento. State agencies were asked for input on the following questions:

- Which are the highest priority hazard traits for inclusion in the Clearinghouse?
- What California specific data sources should be consulted?
- What elements should be included in the Clearinghouse that would add value for state agencies?
- How can OEHHA and DTSC best engage other state agencies in the Clearinghouse development?

Additional meetings will be set up to obtain input from expert scientists in other state agencies. OEHHA is also meeting with the Department of Toxic Substances Control on an ongoing basis to plan the Clearinghouse implementation.

In June 2009, OEHHA began participating in the Interstate Chemicals Clearinghouse (IC2). At the July meeting of the IC2, OEHHA joined the Chemical Data Work Group. This group will be a forum for states to share information and address challenges as they identify chemicals and products of concern.

OEHHA has arranged to meet with the developer of the GoodGuide (http://www.goodguide.com/), Dr. Dara O'Rourke of UC Berkeley, to seek opportunities to work together. The GoodGuide website is primarily designed to be used by consumers evaluating specific products for health hazards and other characteristics. The database that supports the GoodGuide contains approximately 80,000 chemicals that can be screened across more than 50 hazard lists (*e.g.*, California's Proposition 65 list, lists from the European Union).

OEHHA collaborated with the University of California, Los Angeles, and the University of California, Berkeley to win a grant from the UC Toxic Substances Research and Teaching Program for two workshops on the Toxics Information Clearinghouse. The first workshop will focus on the types of information that should be included in the Clearinghouse, available data sources for hazard traits, and the state of the science in toxicity testing including emerging methods. The second workshop will focus on chemical exposure in California, environmental toxicity endpoints, approaches for addressing large numbers of untested chemicals, and emerging concerns such as nano-materials. These workshops will be public and will be noticed in advance on OEHHA's web site.

Additional input to OEHHA on the Clearinghouse development is welcome. Send comments to Sara Hoover of OEHHA (shoover@oehha.ca.gov).

APPENDIX 1

TABLE SUMMARIZING HAZARD INFORMATION REQUIRED UNDER VARIOUS PROGRAMS[1]

[1.] Reprinted with permission from Dr. Richard Denison of the Environmental Defense Fund. Source: Environmental Defense Fund (2007). Not That Innocent: A Comparative Analysis of Canadian, European and United States Policies on Industrial Chemicals. Available at: http://www.edf.org/documents/6149_NotThatInnocent_Fullreport.pdf.

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TABLE 4

Comparison of Required Hazard Information Elements for All Chemicals under REACH and New Chemicals under CEPA, Optional Elements for New Chemicals under TSCA, and Voluntary Elements under US HPV/OECD SIDS [a]

NOTES FOR REACH: Most information requirements are caveated and made conditional on many factors, such as chemical type or properties, or results of preceding tests or availability of higher tests specified in the production volume-based hierarchy. Some of the most important ones are described in the notes accompanying certain entries to this table.

At Registration, all relevant data required under Annexes VII-VIII are to be submitted, but only test proposals for any additional tests (based on production volume) under Annexes IX-X. Determination by Agency or a member state as to which Annex IX-X tests are to be done is made as part of Evaluation.

In addition, numerous alternatives to direct testing are allowed, including use of estimation techniques, category-based extrapolation, etc. (see REACH Annex XI).

Grey highlights indicate tests that can be waived if exposure potential is demonstrated to be low.

REACH section ID	Called for under HPV/ SIDS	Endpoint	REACH Annex VII 1 to 10 t/yr		REACH Annex VIII 10 to 100 t/yr	REACH Annex IX 100 to 1000 t/yr	REACH Annex X > 1000 t/yr	CEPA new chem Sch. 5 NDSL >10,000 kg/yr; Non-NDSL >1,000 kg/yr	CEPA new chem Sch. 6 Non-NDSL >10,000 kg/yr	CEPA new chem. NSNR (C&P) §7(2) NDSL >50,000 kg/yr	CEPA new chem. NSNR (C&P) §7(3) NDSL >50,000 kg/yr	TSCA new chem >100,000 kg/yr and sign. env. release or human exposure
			phase-in chem	new chem or phase-in chem + SVHC or dang. w/ disp. use								
8.		**Mammalian Toxicological Data**										
8.1		Skin Irritation and Skin Corrosion in Vitro		√	NA	NA	NA		√ [b]			
8.1.1		Skin Irritation in vivo			√	√	√					
8.2		Eye Irritation in vitro		√	NA	NA	NA					
8.2.1		Eye Irritation in vivo			√	√	√					
8.3		Skin Sensitization in vivo		√	√	√	√		√			
8.4		Genetic Toxicity										
8.4.1	√	In vitro Gene Mutation in Bacteria		√	√	√	√	√	√	√	√	√
8.4.2	√	In vitro Cytogenicity/Chromosomal Aberrations in Mammalian Cells or Micronucleus Study			√	√	√		√		√	√
8.4.3		In vitro (Gene Mutation) in Mammalian Cells			(√) [c]	(√) [c]	(√) [c]					
8.4.X		Further in vivo Mutagenicity Studies			(√) [d]	(√) [d]	(√) [d]		√			
8.5	√	Acute Toxicity										
8.5.1		By Oral Route		√	√	√	√	√ [e]	√√ [f]	√ [e]	√ [e]	√
8.5.2/3		By Inhalation Route and/or by Dermal Route			√	√	√					
8.6		Repeated Dose Toxicity										
8.6.1	√	Short-Term (28 days)			√	√	√		√	√	√	√
8.6.2		Sub-Chronic (90 days)			(√) [g]	√	√					

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			phase-in chem	new chem or phase-in chem + SVHC or dang. w/ disp. use								
8.6.3		Long-Term (≥12 months)			(√) [h]	(√) [h]	(√) [i]					
8.6.4		Further Studies			(√) [h]	(√) [h]	(√) [j]					
8.7		Reproductive Toxicity										
8.7.1	√	Screening Reproductive/ Development Toxicity			√	NA	NA					(√) [k]
8.7.2	√	Developmental Toxicity (Pre-Natal)				√ [l]	√ [m]					(√) [k]
8.7.3		Two-Generation Reproductive Toxicity				√ [l]	√ [m]					
8.8		Toxicokinetics										
8.8.1		Toxicokinetic Behavior, if Information is available			√	√	√					
8.9		Carcinogenicity					(√) [n]					
9.		**Ecotoxicological Data**										
9.1		Aquatic Toxicity										
9.1.1	√	Aquatic Invertebrates (Daphnia) Acute Toxicity		√	√	√	√	√ [o]	√	√ [o]	√ [o]	√
9.1.2	√	Aquatic Plants (Algae) Toxicity (Growth Inhibition)		√	√	√	√		√			√
9.1.3	√	Fish Acute Toxicity			√	√	√		√			√
9.1.4		Activated Sludge Respiration Inhibition			√	√	√					
9.1.5	(√) [q]	Aquatic Invertebrates (Daphnia) Chronic Toxicity		(√) [p]	(√) [p]	√ [p]	√ [p]					(√) [q]
9.1.6		Fish Chronic Toxicity			(√) [r]	√ [r]	√ [r]					(√) [q]
9.1.6.1		Fish Early-Life Stage Toxicity			(√) [s]	(√) [s]	(√) [s]					
9.1.6.2		Fish Short-term Embryo/Sac-Fry Stage Toxicity										
9.1.6.3		Fish Juvenile Growth										
9.2		Degradation										
9.2.1		Biotic Degradation										
9.2.1.1	√	Ready Biodegradability		√	√	√	√	√	√	√	√	√
9.2.1.2		Surface Water Simulation				(√) [t]	(√) [t]					
9.2.1.3		Soil Simulation										
9.2.1.4		Sediment Simulation										
9.2.1.5		Further Studies					√					

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			phase-in chem	new chem or phase-in chem + SVHC or dang. w/ disp. use								
--		Soil Biodegradation										√
--		Anaerobic Biodegradation										√
9.2.2		Abiotic Degradation										
9.2.2.1	√	Stability in Water/Hydrolysis as Function of pH			√	√	√		√	√		√
9.2.3		Identification of Degradation Products				√	√	√	√	√	√	
9.3		**Fate and Behavior in the Environment**										
9.3.1		Adsorption/Desorption Screening			√	√	√		√	√		
9.3.2		Bioaccumulation in Aquatic Species				√	√					
9.3.3		Further Information on Adsorption/Desorption				√	√					
9.3.4		Further Environmental Fate and Behavior Studies					(√) [u]					
–		Fate in Wastewater Treatment										√
9.4		Terrestrial Organisms										
9.4.1		Invertebrates Short-Term Toxicity				√	√					
9.4.2		Soil Micro-Organisms Effects				√	√					
9.4.3		Plants Short-Term Toxicity				√	√					
9.4.4		Invertebrates Long-Term Toxicity				(√) [v]	(√) [w]					
9.4.6		Plants Long-Term Toxicity										
9.5		Sediment Organisms										
9.5.1		Sediment Organisms Long-Term Toxicity					(√) [x]					
9.6		Birds										
9.6.1		Birds Long-Term or Reproductive Toxicity					(√) [y]					
--	√	Photodegradation										√
--	√	Transport/Distribution between Compartments (Fugacity)										
10.		**Methods of Detection and Analysis**				√ [z]	√ [z]					
7.		**Physical-Chemical Data**										
7.1		State of the Substance at Standard Temperature and Pressure	√	√	√	√	√					
7.2	√	Melting/Freezing Point	√	√	√	√	√	√	√	√	√	

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REACH section ID	Called for under HPV/ SIDS	Endpoint	REACH Annex VII 1 to 10 t/yr		REACH Annex VIII 10 to 100 t/yr	REACH Annex IX 100 to 1000 t/yr	REACH Annex X > 1000 t/yr	CEPA new chem Sch. 5 NDSL >10,000 kg/yr; Non-NDSL >1,000 kg/yr	CEPA new chem Sch. 6 Non-NDSL >10,000 kg/yr	CEPA new chem. NSNR (C&P) §7(2) NDSL >50,000 kg/yr	CEPA new chem. NSNR (C&P) §7(3) NDSL >50,000 kg/yr	TSCA new chem >100,000 kg/yr and sign. env. release or human exposure
			phase-in chem	new chem or phase-in chem + SVHC or dang. w/ disp. use								
7.3	√	Boiling Point	√	√	√	√	√	√	√	√	√	
7.4		Relative Density	√	√	√	√	√	√	√	√	√	
7.5	√	Vapor Pressure	√	√	√	√	√	√	√	√	√	
7.6		Surface Tension	√	√	√	√	√					
7.7	√	Water Solubility	√	√	√	√	√	√	√	√	√	√
7.8	√	Partition Coefficient (n-octanol/water)	√	√	√	√	√	√	√	√	√	
7.9		Flash Point	√	√	√	√	√					
7.10		Flammability	√	√	√	√	√					
7.11		Explosive Properties	√	√	√	√	√					
7.12		Self-ignition Temperature	√	√	√	√	√					
7.13		Oxidizing Properties	√	√	√	√	√					
7.14		Granulometry	√	√	√	√	√					
7.15		Stability in Organic Solvents / Identification of Breakdown Products				√	√					
7.16		Dissociation Constant				√	√					
7.17		Viscosity				√	√					
–		Infra-red, Ultra-violet, Mass or Nuclear Magnetic Resonance Spectrum							√			

Source: Environmental Defense, based on:

HPV/SIDS: Identification of SIDS elements called for under U.S. HPV and OECD SIDS Programs: See: (1) EPA's formal announcement of the U.S. HPV Challenge Program, *Federal Register*, 26 December 2000, Vol. 65, No. 248, pp. 81694-5, available at www.epa.gov/chemrtk/pubs/update/ts42213.pdf. (2) EPA's program guidance document, "Determining the Adequacy of Existing Data," Appendix A, available at www.epa.gov/chemrtk/pubs/general/datadfin.htm. Note that the list of the SIDS elements omits those applicable to inorganic substances, as they are not included among HPV chemicals identified by EPA under the HPV Challenge Program.

REACH: Final text of REACH, published in the European Union's *Official Journal*, Volume 49, 30 December 2006, Annexes VII-X, available at http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_396/l_39620061230en00010849.pdf.

CEPA New Chemicals: New Substances Notification Regulations (Chemicals and Polymers), published in Canada Gazette, 21 September 2005, available at http://canadagazette.gc.ca/partII/2005/20050921/html/sor247-e.html; see Sections 7 and 8 and Schedules 5 and 6 for NDSL (Non-Domestic Substances List) and non-NDSL chemicals.

TSCA New High-Volume Chemicals: The criteria EPA uses to define substantial production, exposure and release are specified in its Exposure-based Policy, available at www.epa.gov/oppt/newchems/pubs/expbased.htm, and the testing elements of the data sets are available at www.epa.gov/oppt/newchems/pubs/expbasedtesting.htm.

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TABLE 4 NOTES

[a] Requirements listed in the following sets of columns are ***cumulative***, i.e., they carry over requirements applicable at lower tiers as well as new requirements at that tier: REACH Annexes VII, VIII, IX and X; and CEPA Sch. 5, NSNR §7(2), NSNR §7(3).

Explanation of terms/abbreviations: "HPV" = high production volume; "SIDS" = Screening Information Data Set; "phase-in chem" = a chemical already on the market, to which REACH's requirements will apply on a phased scheduled based on tonnage or certain properties; "t/yr" = metric tons per year per producer or importer; "SVHC" = substance of very high concern; "dang. w/ disp. use" = substance classified as dangerous, with a dispersive use; "Sch." = Schedule; "NDSL" = Non-Domestic Substances List; "Non-NDSL" = substance *not* on the NDSL; "NSNR" = New Substances Notification Regulations; "(C&P)" = chemicals and polymers; "kg/yr" = kilograms per year per producer or importer; "sign. env. release or human exposure" = significant environmental release or human exposure.

[b] Requirement is for "information sufficient to assess skin irritation, which may be based on in vitro or in vivo skin irritation or skin corrosion studies or alternative methods.

[c] To be conducted only if negative results found in Annex VII 8.4.1 and Annex VIII 8.4.2.

[d] To be conducted if positive results found in any of the other genotoxicity studies in Annexes VII and VIII.

[e] Data for one route of exposure is required, selected as the most significant route.

[f] Data required for an additional route of exposure, selected as the next most significant route, unless the chemical boils below 0˚C and was already tested by the inhalation route.

[g] To be proposed by the sponsor if frequency and duration of human exposure and nature of potential effect indicate a longer-term study is appropriate, or there is evidence of accumulation of the substance or its metabolites.

[h] Further studies shall be proposed or may be required if shorter-term studies do not detect an expected effect, there is a more specific expected serious effect, the route of exposure used in shorter-term studies was inappropriate or there is particular concern about exposure.

[i] May be proposed by the sponsor or required if frequency and duration of human exposure and nature of potential effect indicate a longer-term study is appropriate.

[j] Shall be proposed by the sponsor or may be required where there is evidence of toxicity of particular concern or of a specific type (e.g., neurotoxicity), or particular concerning over exposure.

[k] This element may be required for chemicals anticipated to be produced at or above HPV levels (1 million pounds/year, or 455 metric tons/year), for which high worker exposure or exposure to consumers or the general population is expected.

[l] To be performed initially on one species, with the decision as to whether to perform on a second species at this tonnage level or the next highest based on the results of the first test and other available information.

[m] To be performed initially on one species, with the decision as to whether to perform on a second species based on the results of the first test and other available information.

[n] May be proposed or required if the substance has wide dispersive use or frequent or long-term exposure is expected, and the substance is classified as a category 3 mutagen or there is evidence of induction of hyperplasia and/or preneoplastic lesions; if the substance is already classified as a category 1 or 2 mutagen, it is presumed to be a genotoxic carcinogen, so testing would not be required.

[o] Data from a test on any one of the three organisms is required.

[p] A chronic test shall be considered if the substance is poorly water soluble.

[q] May be required if the substance is expected to be chronically toxic.

[r] A chronic test shall be considered if the substance is poorly water soluble or the safety assessment indicates the need to further investigate aquatic toxicity.

[s] These longer-term studies shall be considered if the chemical safety assessment indicates concern for effects on aquatic organisms. If a decision is made to conduct such tests, only one of the tests specified in 9.1.6.1, 9.1.6.2 and 9.1.6.3 need be provided.

[t] These studies shall be considered if the chemical safety assessment indicates concern for effects on aquatic organisms. Which tests to conduct depends on the results of the chemical safety assessment.

[u] Further testing shall be proposed or may be required if the chemical safety assessment indicates the need to further investigate environmental fate and behavior. Which tests to conduct depends on the results of the chemical safety assessment.

[v] In particular for substances with a high potential for soil adsorption or that are very persistent, long-term testing shall be considered instead of short-term.

[w] Further testing shall be proposed or may be required if the chemical safety assessment indicates the need to further investigate effects on terrestrial organisms. Which tests to conduct depends on the results of the chemical safety assessment.

[x] Further testing shall be proposed or may be required if the chemical safety assessment indicates the need to further investigate effects on sediment organisms. Which tests to conduct depends on the results of the chemical safety assessment.

[y] Any proposal or requirement to test for these endpoints should first carefully consider the large mammalian database that is usually available at this tonnage level.

[z] To be provided upon request for the relevant compartments for which studies were performed that used the method(s).

APPENDIX 2

Biographies of Panelists

BIOGRAPHIES OF PANELISTS

Richard A. Denison, Ph.D.

Dr. Denison is a Senior Scientist in Environmental Defense Fund's Washington, DC office. With nearly 25 years of experience in the environmental arena, he specializes in chemicals policy, hazard and risk assessment and management for industrial chemicals, and responsible development of nanotechnology. Dr. Denison has managed EDF's participation in and oversight of the U.S. High Production Volume (HPV) Chemical Challenge Program, initiated by EDF, the US Environmental Protection Agency and the American Chemistry Council to provide basic hazard data on the 2,200 chemicals produced in the US in the largest quantities. He also represents EDF on the Chemicals Committee of the Organization for Economic Cooperation and Development (OECD). Dr. Denison served on the Science Advisory Panel for California's Green Chemistry Initiative. He was also a member of the National Pollution Prevention and Toxics Advisory Committee (NPPTAC), which advised EPA's toxics office. Dr. Denison is the author of a major report, titled Not That Innocent, that provides a comparative assessment of existing and emerging industrial chemicals policies in the US, Canada and Europe. Dr. Denison earned a Ph.D. in Molecular Biophysics and Biochemistry from Yale University in 1982. He joined EDF in 1987, after several years as an analyst and assistant project director at the Office of Technology Assessment, United States Congress.

Elinor Fanning, Ph.D.

Dr. Elinor Fanning is the Assistant Director for Research of the Center for Occupational and Environmental Health at UCLA. She holds a Ph.D. in Environmental Health Science from UC Berkeley. Her expertise and interests lie in toxicological mechanisms, air pollution science, environmental health policy, and regulation of pesticides and other toxic chemicals. Dr. Fanning was previously an associate toxicologist at the California Office of Environmental Health Hazard Assessment, and the technical liaison for the Scientific Review Panel of California's toxic air contaminant program. In her current position in the UCLA COEH, Dr. Fanning works with the Southern California Particle Center on air pollution research and the UCLA-Fogarty program for research and training in occupational and environmental health in Mexico, and is a founding member of UCLA's new Law and Environmental Health Sustainable Technology Policy Program. Dr. Fanning joined part of the meeting via the webcast.

Michael L. Fischman, M.D., M.P.H.

Dr. Fischman is a consulting physician in occupational and environmental medicine and toxicology from the Bay Area. He has been the World-Wide Medical Director of Intel Corporation for over 20 years. He is a Clinical Professor of Medicine at the University of California San Francisco, where he is an Attending Physician in and Associate Medical Director of the Occupational & Environmental Medicine Multidisciplinary Clinic and serves as the Assistant Chief of the Division of Occupational & Environmental Medicine. He received his medical degree at the University of Michigan and his master's degree in public health, in environmental health sciences, from the University of California, Berkeley. He did his residency training in internal medicine and in occupational medicine at the University of California, San Francisco and is board-certified in both fields. Dr. Fischman is co-author of a textbook, Chemical Hazards of The Workplace, and author or co-author of a number of book chapters. He is a fellow in the American College of Occupational and Environmental Medicine.

Dale Johnson, Ph.D.

Dr. Johnson is an Adjunct Professor in Molecular Toxicology at University of California, Berkeley, where he teaches predictive toxicology primarily through computational methodology and participates in the Green Chemistry Initiative. He is also President & CEO of Emiliem, Inc., a privately held biopharmaceutical company developing cancer therapeutics and molecular diagnostics for cancer and safety. He has over 30 years of experience in biotechnology and pharmaceutical research and development activities where he has led and managed groups ranging from small units in start-up companies to multi-national units in large corporations where he has been involved in multiple risk/benefit analyses and worker safety protective measures. Most recently, he served as Vice President, Drug Assessment & Development at Chiron Corporation and previously as Vice President, Preclinical Development. He received his Ph.D. degree in Toxicology from the University of Michigan where he was an AFPE Fellow. Prior to his Ph.D. work, he received B.S. and Pharm.D. degrees from the University of Michigan and completed a clinical pharmacy residency. He is a Diplomate of the American Board of Toxicology and co-editor of the journal *The Chemistry of Metabolic and Toxicological Processes, Current Opinion in Drug Discovery & Development.*

Abby Li, Ph.D.

Dr. Li is a Senior Managing Scientist at Exponent Health Science. Dr. Li has extensive experience addressing toxicology, risk assessment, and other regulatory science issues related to human and environmental exposure for a wide range of chemicals, including pesticides,

industrial chemicals, medical devices, and pharmaceuticals. She also has registration and re-registration management experience for pesticides, dealing with a wide range of risk assessment issues internationally. Her particular strengths include identifying and understanding key scientific issues that affect regulatory risk assessment decisions (*i.e.*, application of uncertainty and FQPA factors), and selecting the appropriate application of toxicology data for quantitative risk assessment approaches (*i.e.*, benchmark dose, CxT analyses, cumulative risk assessment). She has extensive experience in product stewardship, and design, project management, and analysis of toxicology studies. She has served on several international and national expert panels, including those sponsored by the National Academy of Science, the Organization of Economic Cooperation and Development (OECD), and the International Life Science Institute. Dr. Li served for 6 years as a full member of the Environmental Health Committee, a committee of EPA's Science Advisory Board. She is recognized as an expert in neurotoxicology in the U.S. and internationally. She served on the United States Expert Team to develop international guidelines for neurotoxicology and developmental neurotoxicology for the OECD. She chaired the American Industrial Health Council's Neurotoxicology Subcommittee, frequently making public presentations to EPA scientific panels on scientific issues related to neurotoxicology. Dr. Li was the chair of the American Chemistry Council's Neurotoxicology Technical Panel, and she led an expert panel of industrial, government, and academic neuroscientists overseeing long-range research projects to advance the field of neurotoxicology.

Meg Schwarzman, M.D., M.P.H.

Dr. Schwarzman is a Research Scientist at the Center for Occupational and Environmental Health at UC Berkeley. She received her medical degree from the University of Massachusetts Medical School in 2000 and completed specialty training in Family Medicine at San Francisco General Hospital, University of California, San Francisco in 2003. Dr. Schwarzman obtained her MPH in Environmental Health Sciences at the UC Berkeley School of Public Health in 2007. Her current research focuses on green chemistry and chemicals policy, including the intersection between European Union regulations and policy development in California; the production, use and disposal of chemicals and products and their implications for human health and the environment; and clinical practice and instruction in family medicine and reproductive health. Dr. Schwarzman offers guest lectures in UC Berkeley environmental health courses and frequently presents her research findings on green chemistry to non-governmental organizations, industry and businesses groups, professional associations and state and local government agencies.

Patrick Wilson, Ph.D., M.P.H.

Dr. Wilson is a Senior Regional Toxicologist with the U.S. Environmental Protection Agency's Pacific Southwest - Region IX Office in San Francisco, California. He holds a Ph.D. in Toxicology, with a minor in Pathology from UCLA. His Masters in Public Health degree is also from UCLA and was earned from the School of Public Health's Department of Environmental Health Sciences. Since 1995, Dr. Wilson has enjoyed oversight responsibility for all facets of toxicology and risk analysis for regional facilities and sites compliant with the Resource Conservation and Recovery Act (RCRA). As a member of the federal government's Regional Incident Coordination Team (RICT), Dr. Wilson has provided toxicological support for cleanups of Department of Defense releases of weapons-grade plutonium, and chemical weapon cleanup activities in the South Pacific. Patrick also served as the technical lead in support of the TRW case, which resulted in the largest combined civil and criminal monetary penalties for a hazardous waste violation in the history of EPA. Patrick has been awarded three Bronze Medals for exemplary federal service, and remains a U.S. EPA commissioned enforcement officer. He has also given courses in toxicology, risk analysis, and the biological sciences at U.C. Berkeley, Golden Gate University School of Law, and UCLA. Dr. Wilson's research focus involves mechanistic investigations of the molecular pharmacokinetics of chemical carcinogens. On a personal level, Dr. Wilson has been awarded as a Southern California Certificate of Merit Pianist.

Tracey J. Woodruff, Ph.D., M.P.H.

Dr. Woodruff is an Associate Professor in the Department of Obstetrics, Gynecology, and Reproductive Sciences and Pediatrics at the University of California, San Francisco and the Director of the Program on Reproductive Health and the Environment. She has done extensive research and policy development on environmental health issues, with a particular emphasis on early-life development. Her research areas include perinatal health effects from air pollution, developing the first national characterization of air toxics across the US, children's health risks, and environmental health indicators. She has authored numerous scientific publications. She recently departed from the US EPA, where she was a senior scientist and policy advisor in the Office of Policy, Economics, and Innovation. While at US EPA she was the principle author of two EPA reports on children's environmental health indicators. She also has worked on critical science policy issues at EPA, including participation in risk assessment review and development, and general policy development. She is a coauthor of the 2005 USEPA guidance addressing childhood susceptibility to carcinogens for use in risk assessment. She is an Associate Editor of Environmental Health Perspectives. Dr. Woodruff received her Ph.D. and M.P.H. in the

environmental health sciences from the University of California, Berkeley. She completed a Pew Postdoctoral Fellowship at the University of California, San Francisco, Institute for Health Policy Studies.

APPENDIX 3

OVERVIEW PRESENTATION GIVEN BY OEHHA

Toxics Information Clearinghouse

A Preliminary Discussion of Hazard Traits, Endpoints, and Other Relevant Data

Office of Environmental Health Hazard Assessment
Sacramento, California
January 29, 2009

What is the Clearinghouse?

- Established by SB 509 (Simitian, Chapter 560, Statutes of 2008), which specifies that the Clearinghouse:

  "…shall provide a decentralized, Web-based system for the collection, maintenance, and distribution of specific chemical hazard trait and environmental and toxicological end-point data."

  "The department [DTSC] shall make the clearinghouse accessible to the public through a single Internet Web portal and, shall, to the maximum extent possible, operate the clearinghouse at the least possible cost to the state."

OEHHA's Legislative Mandates: SB 509

On or before January 1, 2011, OEHHA shall:

"evaluate and specify the hazard traits and environmental and toxicological end-points and any other relevant data that are to be included in the clearinghouse."

- Evaluation conducted in consultation with DTSC and all appropriate state agencies
- Required to hold one or more public workshops and provide an opportunity for all interested parties to comment
- May seek information from other states, the federal government, and other nations

AB 1879 in relation to SB 509

Section 25252 mandates that DTSC, in consultation with OEHHA and all appropriate state agencies: *"adopt regulations 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…"*

- The identification and prioritization process shall include at least the following considerations:
  - Volume of chemical in commerce in California
  - Potential for exposure to the chemical in a consumer product
  - Potential effects on sensitive subpopulations, including infants and children
- The criteria developed to evaluate chemicals and their alternatives "*shall include, but not be limited to, the traits, characteristics and endpoints that are included in the clearinghouse data...*"

Discussion Questions

- What characteristics of a chemical should be considered a "hazard trait"? What hazard traits should be included in the Clearinghouse?
- What toxicological endpoints should be included in the Clearinghouse?
- What environmental endpoints should be included in the Clearinghouse?

Discussion Questions (cont.)

- What traits/endpoints/other relevant data would be useful in identifying chemicals of concern in the absence of a full toxicological database?
- What traits/endpoints/other relevant data would be useful in evaluating exposure potential?
- What traits/endpoints/other relevant data would be useful in evaluating potential effects on sensitive subpopulations, including infants and children?

Goals for Today's Meeting

- Begin discussion about Clearinghouse hazard traits, endpoints and other relevant data
- Explore how to address chemicals lacking adequate data
- Identify follow up questions and next steps

APPENDIX 4

EXAMPLE HAZARD TRAITS

EXAMPLE HAZARD TRAITS

- Carcinogenicity
- Reproductive toxicity
- Developmental toxicity
- Genotoxicity
- Neurotoxicity
- Immunotoxicity
- Respiratory effects (including asthma)
- Cardiovascular effects
- Effects on other organs (*e.g.*, liver)
- Endocrine disruption
- Perturbation of other hormone systems
- Ecotoxicity
- Sensory irritation
- Sensitization
- Persistence
- Bioaccumulation
- Corrosivity
- Flammability
- Reactivity
- Structural alerts
- Other physical chemical properties indicative of a hazard

APPENDIX 5

COMMENTS SUBMITTED BY GREEN CHEMISTRY ALLIANCE

Green Chemistry Alliance

Committed to Product Sustainability in the Global Economy

OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT
Received
MAR 19 2009
Sacramento

Alliance of Automobile Manufacturers
American Chemistry Council
American Electronics Association
American Forest & Paper Association
California Chamber of Commerce
California League of Food Processors
California Manufacturers & Technology Association
California Paint Council
California Restaurant Association
California Retailers Association
Can Manufacturers Institute
Chemical Industry Council of California
Citizens for Fire Safety Institute
Consumer Specialty Products Association
Grocery Manufacturers Association
Industrial Environmental Association
Metal Finishers Association
National Paint and Coatings Association
Personal Care Products Council
Plumbing Manufacturers Association
Soap & Detergent Association
Toy Industry Association
Western Plant Health Association
Western States Petroleum Association

March 17, 2009

Maziar Movassaghi
Acting Director
Department of Toxic Substances Control
1001 I Street
Sacramento, CA 95814

Joan Denton
Director
Office of Environmental Health Hazard Assessment
1001 I Street
Sacramento, CA 95814

Dear Directors Movassaghi and Denton:

The Green Chemistry Alliance (GCA) has appreciated the opportunity to participate in California's Green Chemistry Initiative, and submits this letter regarding the implementation of SB 509, which creates a Toxics Information Clearinghouse (TIC).

The Clearinghouse is being established to collect, maintain, and distribute specific chemical traits, and toxicological and environmental information. It will be very helpful to the State and to stakeholders in pursuing the objectives of the Green Chemistry Initiative. The Office of Environmental Health Hazard Assessment (OEHHA) is charged with evaluating and specifying the specific chemical hazard traits and environmental and toxicological endpoints and any other relevant data to be included in the TIC by January 1, 2011. The Department of Toxic Substances Control (DTSC), in the purview of SB509, is responsible for establishing by January 1, 2012, the TIC for collection, maintenance, and distribution of various traits/endpoints and other relevant data to be included.

The Green Chemistry Alliance believes there is great value in publicly available databases of reliable scientific information on chemicals. The planned California database can get started quickly by providing a user-friendly portal providing direct links to a large set of reliable information on chemicals that already is available on the Internet. It is critical for the State to ensure that information provided through the Clearinghouse be reliable for use by the State and by stakeholders. There is a significant amount of "junk science" on the Internet and California will have to vet the sources that will be presented to ensure the quality of the information.

In establishing the Clearinghouse, the type of information provided should not just be restricted to hazard characteristics, but should also include available

sources of use and exposure information. Once it is well developed, the Clearinghouse should be a useful tool in informing priority chemical identification and alternatives analysis as well as meeting the needs of a variety of stakeholders.

The Green Chemistry Alliance supports the American Chemistry Council's comments on this topic, attached. In particular, it references the many currently available sources of reliable information on chemicals that, if integrated into the Clearinghouse, will provide a quick startup for the program.

If you have any questions or comments, please feel free to contact us. We look forward to our continued work together on this important public policy initiative.

Sincerely,

Caroline Silveira

Caroline Silveira
On Behalf of the Green Chemistry Alliance

cc: Linda Adams, California EPA
Jeff Wong, DTSC
Rick Brausch, DTSC
Don Owen, DTSC
Peggy Harris, DTSC

January 29, 2009

To: Director Maureen Gorsen
California Department of Toxics Substances Control

From: Mike Walls, Managing Director
American Chemistry Council
703-741-5167 / mike_walls@americanchemistry.com

Tim Shestek, Director
American Chemistry Council
916-448-2581 / tim_shestek@americanchemistry.com

Re: Information on Chemicals for Clearinghouse

The American Chemistry Council (ACC) appreciates the opportunity to provide the attached information to assist the department in implementation of SB 509 (Simitian), legislation that establishes a Toxics Information Clearinghouse for the collection, maintenance, and distribution of specific chemical hazard traits and environmental and toxicological end-point data.

If you have any questions or comments, please feel free to contact us. We look forward to our continued work together on this important public policy initiative.

INFORMATION ON CHEMICALS FOR CLEARINGHOUSE

The State of California has enacted SB 509, which requires the Department of Toxic Substances Control (DTSC) to establish a Toxics Information Clearinghouse for the collection, maintenance, and distribution of specific chemical hazard traits and environmental and toxicological end-point data. The Office of Environmental Health Hazard Assessment is required to evaluate and specify the hazard traits and environmental and toxicological end-points and any other relevant data that are to be included in the clearinghouse by January 1, 2011.

The U.S. chemical industry believes there is considerable value in publicly-available, electronically searchable databases of information on chemicals. The American Chemistry Council (ACC), for example, helped establish the High Production Volume (HPV) Challenge Program in cooperation with US EPA and the Environmental Defense Fund. Through this program, industry has provided information consistent with the internationally agreed to Screening Information Data Set, covering environmental fate and several toxicity endpoints. When complete, the US EPA's High Production Volume Information System (HPVIS) will contain information on approximately 3,000 commercial chemicals that represent 95% of the chemicals in U.S. commerce by volume. **See http://www.epa.gov/hpv/index.htm** for more information on the HPV program. ACC has also produced and posted a short video with helpful hints on how to search for chemical information. See **http://www.americanchemistry.com/s_acc/sec_policyissues.asp?CID=316&DID=1142** .

The California online database would benefit by including direct links to the abundant information on chemicals already available on the Internet. A summary of major sources is attached to this document. These sources provide an important means by which DTSC can achieve the mandate contained in SB 509 to minimize the cost of establishing the Clearinghouse and avoiding any duplication of effort.

In establishing the Toxics Information Clearinghouse, the DTSC has an important opportunity to provide information not just on hazard characteristics, but also on use and exposure information. Chemical safety is a function of both hazard and exposure, and the Clearinghouse would be even more valuable if it addresses both elements.

It should however be clear that not all chemicals require identical information on hazard traits, environmental and toxicological end-points. An acutely toxic chemical, for example, likely does not require chronic toxicity data if chronic effects are unlikely to develop based on information about its use and exposure. Use and exposure patterns should direct what information is reasonably expected to be available for a chemical product. Chemicals with widespread or dispersive uses, or chemicals likely to be released in their use pattern, should be expected to have more hazard and use information than those with occupational exposures (which are generally controlled by process and personnel protective measures). **In short, DTSC should take care not to create an unfair perception of a given chemical simply because data on every end-point is not available.**

Information available in the online Toxic Information Clearinghouse should help provide an understanding of the nature, magnitude and probability of a potential adverse health or environmental effect. The set of data/ information on a chemical in the Clearinghouse should provide relevant study data and information to assist users in understanding potential risks, not just hazards.

Standard Information Parameters. The following table summarizes the general information that the Clearinghouse should seek to provide on covered chemicals.

Substance Identity	Phys / Chem Properties	Toxicity / Ecotoxicity
CAS Number(s)	Melting Point	Toxicity data and information relevant to understanding potential risk to human health (including info. on relevant route of exposure e.g. oral, dermal, inhalation)
Name(s)	Boiling Point	Ecotoxicity data and information relevant to understanding potential risks to the environment e.g., fish, daphnia or algae)
CAS Descriptor (Only inorganic)	Relative Density	
Structural Formula	Vapor Pressure	**Environmental Fate**
Composition being assessed	Partition Coefficient	Biodegradability
Use Pattern (categories / types)	Water Solubility	
Sources of Exposure	Ignition temperature	
	Physical state	

Communication Data and Information to Promote Understanding of Toxicity Assessment in Relation to Use and Exposure Patterns. Because risk is a function of both toxicity and exposure, it is desirable to portray toxicity information linked to anticipated use and exposure patterns. The Clearinghouse should make every effort to assure that communications explain that not every substance needs to have an extensive, expensive, animal-intensive, toxicity testing and exposure dataset in order to be adequately characterized. Chemicals differ in physical/chemical characteristics and in many other ways that influence toxicity and risk.

In particular, certain substances such as pesticides and pharmaceuticals are designed or developed to have biological effects, while commodity chemicals and pesticide inert ingredients, with some exceptions, generally do not possess this same kind of biological activity. Since risk is a function of both inherent toxicity and exposure, production processes and use patterns that influence exposure will ultimately influence potential risks to human health. These principles – that the processes appropriate for evaluating potential risk from commodity chemicals need to consider both use and exposure and toxicity – are the reason that the OECD's SIDS program, the US EPA HPV and PMN programs and EU's REACH have production/use/exposure "triggers" for toxicity study data requirements.

Any single mandated battery of tests beyond the screening tier (for example, beyond the base set in the US HPV dataset) would not permit flexibility to set rational testing priorities based on anticipated toxicity and exposure potentials. Many testing and evaluation programs currently rely on tiered approaches.

For example, the FDA bases its tiered approach for obtaining data on direct food additives and color additives on the principle that the degree of effort expended to reduce uncertainty about the safety of a direct food additive or color additive should relate in a logical way to the likelihood

that use of the substance poses a health risk to the public. Similarly, EPA's approach to evaluating the toxicity study data requirements for assessing potential human health hazards from exposures to inert pesticide ingredients, antimicrobial pesticides, and biopesticides is flexible and tiered such that the required data are deemed by EPA to be commensurate with the potential exposure and risks associated with that use patterns (EPA 2002).[1]

Although there may be differences among different tiered testing frameworks, in general, the tiered testing approach involves sequential testing, in which data are evaluated and decision criteria are applied to determine whether to proceed or not to proceed with further testing, and to determine which specific type of test should be conducted. Some features of tiered testing strategies that confer advantages over non-stratified batteries of toxicity tests include: (1) more efficient use of resources, animals and time to identify chemicals that are of highest concern for public and environmental health; (2) more flexibility to allow tailoring of testing for specific toxicities, populations, or other risk assessment and risk management needs; (3) readily interpretable testing results because tests are pre-sorted into levels according to sensitivity and selectivity; (4) timely evaluation and identification of chemicals that may pose unacceptable risks; and (5) rapidly available results for chemicals that present low potential for serious toxicity.

It has clearly been shown that a hazard based "data gap" is not necessarily a "data need" with respect to characterizing potential risks. A "data gap" indicates information that is lacking, and can refer to data, analyses or presentation; not every "data gap", however, is a "data need." "Data needs" are those specific "data gaps" requiring additional work before the potential risks can be adequately characterized. Devoting resources to toxicity "data gaps" irrespective of whether the specific information is actually needed (that is, data or information which is viewed as necessary to characterize risks with an adequate degree of scientific certainty), would be scientifically unjustifiable, require unnecessary animal testing and unwarranted costs.

For these reasons, the Clearinghouse should develop approaches that will provide an accurate and fair presentation of data and information relevant to assessing potential risk of different types of chemicals. Furthermore, the Clearinghouse must refrain from characterizing any fields as "data gaps" or "data needs" since this is not the purpose of the Clearinghouse.

Data Sources

It is important to establish that data from *in vivo* animal studies are not necessarily required to provide appropriate information on chemicals. DTSC should make clear that alternative information sources from authoritative programs in the US (EPA, FDA, etc.), OECD and REACH are entirely appropriate to include in the Clearinghouse. These sources may include:

- (Quantitative) Structure Activity Relationships. Theoretical models that can be used to predict the physicochemical and toxicological properties of molecules based on the chemical structure (applicable if structure is in domain). Under the US HPV and European REACH programs the category approach has been accepted.
- Read-across and Category Approaches. In Read-across, endpoint information for one chemical is used to make a prediction of the endpoint for another chemical, which is considered to be "similar." With the Category Approach, chemicals are grouped together based on structural or other critical similarities, and therefore physicochemical, fate and

[1] US EPA (2002) Guidance document on methodology for determining the data needed and the types of assessments necessary to make FFDCA 408 safety determinations for lower toxicity pesticide chemicals. http://www.epa.gov/oppfead1/cb/csb_page/updates/lowertox.pdf

toxicological properties are likely to be similar or follow a regular pattern, and these can be interpolated from one substance to another within the category. (For further information see US EPA and OECD HPV programs).

- No relevant exposure information. In some cases, testing is either not scientifically relevant or possible (e.g. ph, vapor, solubility). The Clearinghouse should be robust enough to recognize those situations.
- In vitro methods. Non-animal testing data - validated in accordance with national and internationally accepted principles (e.g. ICCVAM, ECVAM, and OECD).
- Expert judgment. On the basis of existing data further testing is deemed to be not necessary.
- Epidemiological Studies. Data available from human studies (case control studies, cohort studies and other relevant epidemiological studies).
- Available Literature and databases. On the basis of expert judgment whether data and source is valid. Prerequisite for the use of existing information / data is to evaluate their scientific quality. In line with OECD guidance, evaluation of existing data should take into consideration three aspects - adequacy, reliability and relevance of the available information.

Data Quality

In general, the Clearinghouse should rely on data carried out pursuant to Good Laboratory Practices (GLP). In cases where non-GLP data is available, it should be able to be included in the Clearinghouse subject to appropriate explanation and context.

SOURCES OF PUBLIC INFORMATION ON CHEMICALS

There is a common misconception that there isn't a lot of information available on chemicals and their effects on people and the environment. But an abundance of information on chemicals is easily available to the public, researchers, government regulators, and industry via the internet. Learn more at the following sources.

National Library of Medicine. For nearly 40 years, the National Library of Medicine's (NLM) Toxicology and Environmental Health Information Program (TEHIP) has been a significant leader in organizing and providing public access to an extensive storehouse of toxicological information through its online databases. With the advent of the Internet, TEHIP has expanded its role to also serve as a pre-eminent portal to toxicological information worldwide. Its primary databases reside within the web-based TOXNET system, and include the scientifically peer-reviewed Hazardous Substances Data Bank (HSDB), the U.S. Environmental Protection Agency's Integrated Risk Information System (IRIS) and Toxics Release Inventory, the National Cancer Institute's Chemical Carcinogenesis Research Information System (CCRIS) and the TOXLINE file of over 3 million bibliographic references.

TEHIP's ChemIDplus is an extensive chemical dictionary that extends beyond simple nomenclature to offer displays of molecular structures and links from particular chemicals to other databases containing more information. Specialty files in occupational safety and health, and household products have recently been added to TEHIP's suite of resources. Additional databases in risk assessment, drugs, toxicology education, and global resources, are under development. "Special Topics" pages lead users to structured summaries and links in areas such as arsenic, chemical warfare agents, biological warfare, and West Nile Virus. A database on alternatives to the use of live animals, a three-module toxicology tutor, and a glossary of terms in toxicology are among TEHIP's other information aids, as well an increasing commitment to serving consumers, as witnessed by the animated ToxTown program. Outside the sphere of TEHIP, NLM offers additional databases, such as PubMed, of significant value to toxicology researchers.

The database is available at the National Library of Medicine's "Environmental Health & Toxicology" web page at **http://sis.nlm.nih.gov/enviro.html**. A 100 page user manual is available online called "TOXNET and Beyond: Using the National Library of Medicine's Environmental Health and Toxicology Portal" at **http://sis.nlm.nih.gov/enviro/toxnetmanual112008.pdf**.

ATSDR. The Agency for Toxic Substances and Disease Registry (ATSDR) produces *Toxicological Profiles* for hazardous substances found on the National Priorities List (NPL) of contaminated sites. ATSDR also prepares toxicological profiles for the Department of Defense (DOD) and the Department of Energy (DOE) on substances related to federal sites. The *Toxicological Profiles* summarize in detail existing hazard and exposure information on chemicals, and are written for technical audiences.

The ATSDR ToxFAQs™ is a series of summaries about hazardous substances for general audiences. Information for this series is excerpted from the ATSDR *Toxicological Profiles* and Public Health Statements. Each fact sheet serves as a quick and easy to understand guide. Answers are provided to the most frequently asked questions (FAQs) about exposure to hazardous substances found around hazardous waste sites and the effects of exposure on human health.

- **ATSDR, Toxicological Profiles and ToxFAQs: http://www.atsdr.cdc.gov**

High Production Volume Chemicals. Under the "HPV Challenge" program American Chemistry Council members are making screening information and test data publicly available on high production volume (HPV) chemicals. HPV chemicals represent more than 95 percent of the U.S. market for commercial chemicals by volume. Information provided includes 17 endpoints internationally agreed as sufficient to initially assess chemical hazards including physical/chemical properties, environmental fate, ecotoxicity, and hazards to human health. This program has already made more data publicly available - and faster - than any chemical regulatory program in history. For more information and to view the data, visit the HPV Challenge web sites at:

- **US HPV Chemical Challenge Program: http://www.epa.gov/hpv/pubs/hpvrstp.htm**
- **Environmental Protection Agency (EPA)'s HPV Information System: http://www.epa.gov/hpvis/index.html**

EPA is in the process of sorting and prioritizing the data in the High Production Volume Information System (HPVIS) through use of an algorithm established by a federal advisory committee (the National Pollution Prevention and Toxics Advisory Committee - NPPTAC). The results of EPA's prioritization, any decisions on further data or risk management needs, and assessment of those chemicals will be publicly available.

In 2007, the EPA began development and post interim screening-level hazard characterizations for chemicals that were part of the HPV Challenge Program. In 2008, EPA updated the interim screening-level hazard characterizations and combined them with use and exposure data under the 2006 Inventory Update Reporting (IUR) Rule to develop and post Risk-Based Prioritizations (RBPs). The RBPs identify potential risks, note scientific issues and uncertainties, and indicate the initial priority being assigned by the Agency for potential future appropriate action. In 2008, as part of the Agency's commitment under the Chemical Assessment and Management Program (ChAMP), EPA began developing initial evaluations of moderate production volume (MPV) chemicals – those chemicals with production between 25,000 pounds and one million pounds per year.

ACC has also produced and posted a short video with helpful hints on how to search for chemical information. See **http://www.americanchemistry.com/s_acc/sec_policyissues.asp?CID=316&DID=1142**.

- **HPV Chemical Hazard Characterizations: http://www.epa.gov/hpvis/abouthc.htm**
- **MPV Chemical Hazard-Based Prioritizations: http://www.epa.gov/champ/pubs/abouthbp.htm**
- **Risk-based prioritizations: http://iaspub.epa.gov/oppthpv/hpv_hc_characterization.get_report?doctype=1**
- **HPV Screening Process: http://www.epa.gov/oppt/npptac/pubs/recommendations.htm**

VCCEP. Under the Voluntary Children's Chemical Evaluation Program (VCCEP), EPA evaluates both hazard and exposure information submitted by companies which have volunteered to in this pilot program to determine potential effects on children's health. This information is publicly available at:

- **VCCEP: http://www.epa.gov/chemrtk/vccep/index.htm**

TSCATS. The Toxic Substance Control Act Test Submission database, TSCATS, is a central system for the collection, maintenance, and dissemination of information on unpublished technical reports submitted by industry to EPA under TSCA. Studies on over 8,000 chemicals are categorized into three broad subject areas (health effects, environmental effects, and environmental fate). Searches can be conducted using these subject areas as well as indexing terms.

• **TSCATS: http://www.syrres.com/eSc/tscats_info.htm**

Integrated Risk Information System. EPA and its Office of Research and Development maintain an electronic database called the Integrated Risk Information System (IRIS) and it contains descriptive and quantitative information on human health effects that may result from exposure to various chemicals in the environment. According to EPA's website, IRIS was initially developed for EPA staff in response to a growing demand for consistent information on chemical substances for use in risk assessments, decision-making and regulatory activities. Information in IRIS is intended for those without extensive training in toxicology, but with some knowledge of health sciences. The heart of the IRIS system is its collection of computer files covering individual chemicals.

- **To learn more about IRIS and to view the list of IRIS substances visit: http://www.epa.gov/iris/**

ESIS. The European Chemical Substance Information System (ESIS) is an electronic system that provides information on both new and existing substances in the EU. It includes proposed classification and labeling for 3,300 chemicals, information and data for roughly 2,500 EU HPV chemicals and final risk assessment reports for chemicals with completed assessments. ESIS also allows users to download the data on chemicals submitted in IUCLID.

• **ESIS can be found at: http://ecb.jrc.it/ESIS/**

The European Union REACh program is expected to result in the availability of hazard data on all chemicals in the European market, as well as use-specific chemical risk assessments for chemical on the European market above a specific threshold. Data will be publicly available, and fully searchable, formatted in software known as IULCLID.

Organization for Economic Cooperation and Development. The International Council of Chemical Associations has committed to submit data and assessments for 1,000 global HPV chemicals to the 30 developed nations of the OECD for government assessment. OECD assessments are published as soon as they are completed on the OECD website. The data included in those assessments are also available, via the United Nations Environment Program (UNEP).

• **OECD HPV Database: http://cs3-hq.oecd.org/scripts/hpv/**
• **UNEP HPV Datasets: http://www.chem.unep.ch/irptc/sids/OECDSIDS/sidspub.html**

The EXICHEM database is a pointer system on current, planned and completed activities on existing chemicals in OECD member countries and other relevant bodies. It was created to provide information for the OECD member countries on "who is doing what with which chemicals", (e.g. information gathering, testing, evaluation), in order to assist countries that are identifying opportunities for co-operation.

• **EXICHEM is found at: http://webdomino1.oecd.org/ehs/exichem.nsf**

IPCS. The International Program on Chemical Safety (IPCS - a joint program of UNEP, ILO and WHO) developed INCHEM - a freely available collection of internationally peer-reviewed documents about chemicals and chemical safety. It was initiated in 2003 in response to priorities established by the Intergovernmental Forum on Chemical Safety (IFCS) and provides convenient worldwide full-text electronic access to chemical safety-related documents provided by intergovernmental organizations. All documents referenced by INCHEM contain hazard information and the site can be queried by key-words and free text. INCHEM contains Environmental Health Criteria documents, and cancer assessments by the International Agency for Research on Cancer.

The International Chemical Safety Cards (ICSC) found on the IPCS site summarizes essential information on chemical substances; developed cooperatively by the IPCS and the Commission of the European Union (EC). The International Chemical Safety Cards summarize essential health and safety information on chemical substances in a clear way, and are not only intended to be used at the "shop floor" level by workers, but also by other interested parties in factories, agriculture, construction and other places of work.

Also on the IPCS site are Environmental Health Criteria (EHC) documents. These documents provide critical reviews of the effects of chemicals on human health and the environment. They include technical information on sources of exposure, environmental transport, health effects, and kinetics/metabolism in laboratory animals. There are more than 200 EHC documents posted.

The IPCS site also provides access to Concise International Chemical Assessment Documents (CICADs), which characterize hazard and dose-response to exposures of chemicals. They summarize the information considered critical for risk characterization.

- **IPCS INCHEM: http://www.inchem.org/**
- **INCHEM ICSC: http://www.inchem.org/pages/icsc.html**
- A list of chemicals with EHC documents can be found at **http://www.who.int/ipcs/publications/ehc/ehc_alphabetical/en/index.html**
- The CICADs are posted at **http://www.who.int/ipcs/publications/ehc/ehc_alphabetical/en/index.html**

EDF Scorecard. The Environmental Defense Fund created Scorecard.org, which provides information on more than 11,200 chemicals, including chemicals used in large amounts in the United States and the chemicals regulated under major environmental laws. You can search for information by typing in the chemical's name (or any common synonym) or the chemical's standard identification number (Chemical Abstracts Service or CAS registry number).

- **http://www.scorecard.org/chemical-profiles/**