

# Proceedings of the Environmental Carcinogen Use Reduction Symposium

February 6, 2007  
Toronto, Ontario



Canadian Cancer Society  
Société canadienne  
du cancer



cancer care ontario | action cancer ontario



Canadian  
Strategy for  
Cancer Control

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## Acknowledgments

Cancer Care Ontario and the Canadian Cancer Society would like to thank all of the participants for attending the Environmental Carcinogen Use Reduction Symposium. A list of participants is included in Appendix B.

Funding for the event was provided by the Canadian Cancer Society, Canadian Strategy for Cancer Control, and Cancer Care Ontario.

Efforts of the following people are acknowledged:

- 1) Symposium Planning Committee:
  - Jordan Beischlag (Canadian Cancer Society)
  - Dorothy Goldin Rosenberg (Ontario Institute for Studies in Education)
  - Ruth Grier (Toronto Cancer Prevention Coalition)
  - Deb Keen (Cancer Care Ontario)
  - Andy King (United Steelworkers of America)
  - Christine Lyons (Cancer Care Ontario)
  - Patti Payne (Canadian Cancer Society)
  - Rowena Pinto (Canadian Cancer Society)
  - Carol Timmings (Toronto Public Health)
  - Rich Whate (Toronto Public Health)
- 2) Symposium Volunteers:
  - Sharon Bain (Toronto Public Health)
  - Geeta Dhall (Toronto Public Health)
  - Kim Dinh (Toronto Public Health)
  - H el ene Gagn e (Cancer Care Ontario)
  - Jill Goddard (Toronto Public Health)
- 3) Conference and Event Planners:
  - Rachel Gillooly and Associates
- 4) Proceedings Report:
  - Michelle Halligan (Cancer Care Ontario)

## Introduction

On February 6, 2007, 85 individuals representing provincial, national, and international organizations and government departments with an interest in the prevention and control of environmental carcinogens met to discuss key priorities and recommendations for the reduction of environmental carcinogen use in Ontario. This meeting was organized by Cancer Care Ontario and the Canadian Cancer Society, Ontario Division, with additional support from the Canadian Strategy on Cancer Control.

The overall objectives of the meeting were (see Appendix A for the agenda):

- To learn more about environmental carcinogen reduction by reviewing current evidence.
- To provide input for the cancer and the environment strategy by working on current recommendations.

The following report is a summary of meeting discussions and outcomes.

## Welcome and Opening Remarks

Carol Timmings, director of Healthy Living of Toronto Public Health, welcomed the participants to the symposium, and introduced a welcome message from the Honourable Minister of the Environment Laurel Broten.

The Honourable Laurel Broten reinforced the importance of the day's discussions, as Ontarians are growing increasingly concerned over carcinogens in the environment. The Ministry of the Environment is committed to improving the health of all Ontarians and the environment, and is actively updating current standards and drafting new standards when it comes to reducing carcinogens. She stressed the value of the current and ongoing research linking environmental contaminants and cancer praising Cancer Care Ontario's leading role in this area.

John McLaughlin, vice president of Preventive Oncology of Cancer Care Ontario, thanked the Canadian Cancer Society and staff from Cancer Care Ontario for organizing and sponsoring the symposium, and introduced Terry Sullivan, president and CEO of Cancer Care Ontario.

There is strong public concern and opinion surrounding cancer and the environment. Terry noted that the public believes the environment is at the top of the list as a cause for cancer. The science behind the link between cancer and the environment has many gaps and unknowns, but researchers are working to solidify these grounds.

Five years ago, the Ontario Ministry of Health and Long Term Care (MOHLTC) met with environmental activists to explore the risks of cancer when it comes to the environment. The MOHLTC and Cancer Care Ontario reviewed the known risks and focused their efforts on surveillance, research and public action.

Preventing cancer is a big focus for Cancer Care Ontario. Targets and objectives for cancer prevention and detection were released in 2003 through *Targeting Cancer: An Action for Cancer*

*Prevention and Detection–Cancer 2020*. Cancer 2020 laid out initiatives of what is known and unknown about cancer and the environment.

In 2005, Cancer Care Ontario and the Canadian Cancer Society, Ontario Division, released *Insight on Cancer: Environmental Exposures and Cancer*, which considered the candidate exposures and reviewed published and official reports relating to selected environmental exposures and the risk of cancer. Public awareness and right to know emerged as important factors, as did the need to integrate different sectors of society. Cancer agencies are able to support research, surveillance, and knowledge exchange, but different agencies such as the Ministry of Labour implement regulations on exposures.

Terry stressed science is needed for the causal link between cancer and the environment, but more importantly a juried public consensus is needed for action to be taken. Decisions on what kinds of actions are required need to come about before public policies can be implemented.

Carol introduced Peter Goodhand, CEO of the Canadian Cancer Society, Ontario Division.

Peter outlined the Canadian Cancer Society's PARIS strategy (prevention, advocacy, research, information, and support), and their core values being: integrity, caring, progressive, and courageous. The Society is strongly committed to cancer prevention, and is an active partner in *Targeting Cancer: An Action for Cancer Prevention and Detection - Cancer 2020*. It is also a member of the Canadian Strategy of Cancer Control. Partnerships with these two groups have led to increased weight behind supported initiatives and impacts in government progress. In December 2006, the Society made recommendations to the federal government for application of the precautionary principle and information disclosure for the five-year review of the Canadian Environmental Protection Act. Vulnerable populations need to be addressed and protected, and toxic substances need to be better managed.

Advocacy by the Society is mainly focused at the municipal level. Implementation of local bylaws regarding the ornamental use of pesticides is a large priority, as is community "right to know" legislation so the public can make informed decisions. At the federal level, the Society is active in the Canadian Strategy for Cancer Control's National Committee on Environmental and Occupational Exposures.

The Society has budgeted over 6 million dollars to research on environmental and occupational hazards as well as fine-tuned etiology projects. In addition, the *Cancer Information Service* is a vehicle in which information is disseminated to the public, a medium in which a universal message surrounding environmental cancers could be communicated. Most importantly, the Society provides support for people living with cancer. The human impact, the devastation and loss, gives a sense of urgency to the issue of cancer and the environment. Waiting for public policy isn't the answer, increasing efforts for action is.

**Post-meeting note:**

- *Targeting Cancer: An Action for Cancer Prevention and Detection–Cancer 2020* is available online at (background report)

<http://www.cancercare.on.ca/documents/Cancer2020BackgroundReportMay2003.pdf> or (summary report) [http://www.cancercare.on.ca/documents/Cancer2020CCS-1513Report\\_summary.pdf](http://www.cancercare.on.ca/documents/Cancer2020CCS-1513Report_summary.pdf)

- *Insight on Cancer: Environmental Exposures and Cancer* is available online at <http://www.cancercare.on.ca/documents/InsightOnCancer-Environmental05.pdf>.

## **Environmental Carcinogens: Concern & Evidence**

After a brief introduction by Carol, Kristan Aronson, director of the Institute of Population and Public Health at Queen's University, gave an epidemiological context to environmental carcinogens. After providing a short background on relevant discussion terms and pointing to the International Agency for Research on Cancer (IARC) as a reference on how to classify known and suspected carcinogens, she reiterated the need for inclusion of public consensus into carcinogen classification and regulations as public values and opinions differ across geographic space. A quick review of challenges and barriers to environmental epidemiological studies were discussed which pointed to the precautionary principle as the best practice, and should be implemented in all cases because it is the best means of prevention. The presentation was concluded by outlining the greatest way to prevent exposure to carcinogens is to reduce their use by elimination and/or substitution.

For more details, refer to the presentation slides in Appendix C.

### ***Post-meeting note:***

- IARC has grouped carcinogens into four categories, depending on their risk to humans. Group 1 is for agents that are carcinogenic to humans. Group 2 is for agents that are probably (Group 2A) and possibly (Group 2B) carcinogenic to humans. Agents in Group 3 are those that are not classifiable as carcinogenic to humans. Group 4 are agents that are probably not carcinogenic to humans. For more information about these groups and IARC's methodology for classification, visit the IARC Web site at <http://www-cie.iarc.fr/monoeval/grlist.html>.

## **Experience of Other Jurisdictions: University of Pittsburgh Cancer Institute's Center of Environmental Oncology**

Carol introduced Devra Lee Davis, director of the Center for Environmental Oncology of the University of Pittsburgh Cancer Institute. The presentation began in the context of the 1970s. At that time, cancer diagnosis and treatment was the focus of all efforts. By learning from the past, Devra suggested future change will be spurred by primary prevention efforts to find causes of cancer. Key areas for improvement were identified including surveillance (tracking toxics release, radiation, and pharmaceuticals) and exposures information registries (biomarkers, environmental and occupational patient histories). Devra outlined the successes of a cross-disciplinary approach to fighting environmental cancer within her own organization. The presentation was wrapped up by stressing the public's right to know. It was emphasized that we need to act on facts instead of waiting for certainty.

For more details, refer to the presentation slides in Appendix C.

**Post-meeting note:**

- For more information about the University of Pittsburgh Cancer Institute please visit their web site at <http://www.upci.upmc.edu/>.

**Experience of Other Jurisdictions: Toxics Use Reduction & the Massachusetts Experiment**

Carol then introduced Ken Geiser, co-director of the Lowell Center for Sustainable Production at the University of Massachusetts Lowell. Ken presented an example of toxics use reduction (TUR) as implemented in the state of Massachusetts. Several chemicals' policies were outlined from international areas, but a clear deficiency emerged within North America where chemicals' policies are nearly non-existent. After discussing the enactment of the Toxics Use Reduction Act (TURA) in the late 1980s, Ken gave the results found (decrease in toxics use, waste, emissions; economic benefits outweighed costs) and lessons learned (planning and management are keys to success) surrounding the program. The presentation came to a close following a brief discussion on new initiatives including studies researching alternatives for high priority chemicals in a four tier classification system (most concern, of concern, unknown concern, and no concern).

For more details, refer to the presentation slides in Appendix C.

**Post-meeting note:**

- For more information about the Massachusetts Toxics Use Reduction Program and reporting measures, visit the Toxics Use Reduction Institute's Web site at <http://www.turi.org/turadata>.

**Question and Answer Panel with Presenters**

Throughout the morning's presentations, participants were asked to write questions for the presenters to answer. After Ken's presentation, Carol facilitated the question and answer period.

*Q: Devra -- How can we break our habit of asking the government to lead?*

- Better inform the public
- Government should levy a fee on all known products containing carcinogens, use these funds for cancer prevention activities

*Q: Ken -- What was the political climate in late 1980s Massachusetts which allowed passage of the TURA?*

- 1982 began right to know campaign
- Public knew about carcinogens but no action was being taken
- Firms had to inventory chemicals onsite for the first time
- TUR campaign was publicly backed, state very democratic
- Public ballot caused enactment

Q: Ken -- Can you give some examples of the economic impact of the TURA?

- Focused on chemicals and materials not exposure and waste
- Fee-based program (set fee, an additional fee for every additional chemical)
- No state appropriation
- Forces firms to be more efficient (decreases excess)
- Awards given to those with highest reductions

Q: Ken -- Is the 4-tier system of chemical categorization based on hazards or risks?

- Based on hazards
- When it comes to mixtures of chemicals -- problematic, need to consider combined effect

Q: Ken -- In the TUR program, how can you be sure firms are reporting honestly/reliably?

- Ask for annual reporting
- Hiding "fake" numbers over consecutive years is difficult
- Often performed by juniors in company (less deception)

Q: Devra -- How can we begin a university based multidisciplinary environmental oncology agency here?

- Funding via private foundations and university
- Need a leader in oncology
- Core team with many outside partners -- collaboration

Q: Kristan -- How can one engage the public with evidence and research?

- Advocacy groups and the internet
- Shorten time between new knowledge and dissemination to public
- Train health professionals/front-line workers
- Empower public

Q: Ken -- What about firms in Massachusetts that had facilities in multiple states? Did they all comply with TURA?

- Some extended them (Texas Instruments), some didn't extend them to other states
- Devra commented on an online materials exchange, waste becomes recycled (a downstream approach)

Q: Ken -- Was the \$14M cost-savings from TURA averaged?

- Was an aggregate number
- Some firms lost, some firms made a large amount

Q: Devra -- What would be needed to start a database of cancer patients and exposures?

- Valuable resource
- Start with death certificates
- Record environmental exposures, occupation history, nutritional history, personal history, medical history, geographical location history
- Privacy issues will emerge



Q: Ken -- What was the existing infrastructure of Massachusetts when TURA was implemented?

- Existing laws were based on waste, releases, and exposure
- We were charting use, no one had authority over it
- Recruited staff from various agencies already working in related areas
- Implemented fee
- Didn't tie into waste reduction program of state
- Massachusetts a larger chemical USER than PRODUCER

Q: Ken -- How can we change government opinions on TUR?

- Difficult with rigid bureaucratic structure
- Massachusetts had right to know before TURA, people more aware
- "Integration Luncheons" throw in at end of the day that working together is better

## Federal Context

Carol introduced Larry Stoffman, chair of the National Committee on Environmental & Occupational Exposures of the Canadian Strategy for Cancer Control. Larry outlined the national and federal commitments within cancer and the environment. Four top priorities emerged: Surveillance (collection of occupational and environmental histories, monitoring universal exposure limits); Information Disclosure; Community Action (aiding municipal pollution bylaws); and Government Intervention (federal legislation, Canadian Environmental Protection Act). In addition to these priorities, Larry commented on six initiatives to be met within five years. The initiatives include: CAREX<sup>1</sup> (increased exposure surveillance, research, and worker registry); Community networks (Non-Governmental Organizations, government, and community working together); Annual meetings (report findings, recommendations); Patient history (occupational and environmental histories); TUR; and Policy Development.

For more details, refer to the presentation slides in Appendix C.

## Proposed Recommendations from Cancer 2020: Cancer and the Environment Stakeholder Group

Carol introduced Deb Keen, director of the Prevention Unit of Cancer Care Ontario, and chair of Cancer 2020: Cancer and the Environment Stakeholder Group. Deb spoke about the targets laid out by Cancer 2020 and *Insight on Cancer* as a balancing act between research and action. It was made clear that the evidence and associations known involving cancer and the environment need to be taken to the next step – action. Deb introduced the review of policies focused on Carcinogen Use Reduction within Ontario commissioned by the group, and concluded by

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<sup>1</sup> CAREX is an information system developed by the Finnish Institute for Occupational Health. CAREX estimates the number of workers exposed to 139 carcinogens as ranked by the International Agency for Research on Cancer (IARC): Group 1: known, Group 2A: probable and Group 2B: suspected carcinogens, and some Group 3 exposures (not classifiable, according to IARC, as to carcinogenicity to humans). CAREX combines occupation and industry data (from the Canadian census) with exposure estimates from Finland and the U.S. to estimate numbers of Ontario workers exposed to carcinogens above a pre-determined threshold (substance-specific), by given industries.

introducing Ronald Macfarlane, supervisor of Environmental Health Assessment and Policy of Toronto Public Health, and chair of Cancer and the Environment Stakeholder Group's Scientific Case Working Group.

Ronald continued the discussion about the gaps analysis of policies focusing on Carcinogen Use Reduction within Ontario. The major trend which emerged from the analysis was that Ontario follows an inefficient chemical by chemical method when it comes to reduction and elimination of environmental carcinogens. The discussion was ended by establishing the proposed recommendations upon which participants would later give input.

For more details, refer to the presentation slides in Appendix C.

### **Small Group Discussions**

Participants were assigned to one of six groups, and asked to provide input on the proposed recommendations as follows:

#### *General*

- 1.1 That a comprehensive provincial environmental toxic use reduction strategy involving government, key stakeholders and municipalities be developed, with a particular focus on carcinogen use reduction
- 1.2 That a greater vulnerability of children and pregnant women to environmental threats be recognized and child-protective measures adopted
- 1.3 That cumulative effects from multiple pollutants and aggregate exposures to carcinogens considered

#### *Surveillance*

- 2.1 That Ontario report annually on trends of environmental carcinogens in air water and soil
- 2.2 That Ontario develop an environmental carcinogen surveillance strategy to supplement the biomonitoring study being undertaken by Statistics Canada

#### *Policies & Programs*

- 3.1 That manufacturers and importers be required to demonstrate, to the responsible Minister, before a substance is permitted for import, manufacture or use, that its value outweighs the environmental and health risk it poses
- 3.2 That comparative assessments and chemical substitution be adopted as the means to achieve carcinogen use reduction in Ontario
- 3.3 That the list of substances in Canada's National Pollutant Release Inventory (NPRI) be amended to include chemicals that have been either classified by the International Agency on Cancer as a Class 1 or 2A carcinogen or listed in the US National Toxicology Program Report on Carcinogens as being a known, or reasonably anticipated to be a human carcinogen
- 3.4 That the reporting thresholds for carcinogens in the NPRI be lowered to change 50 kg or less as appropriate
- 3.5 That reduction goals and caps on the release of environmental carcinogens be established and enforced

3.6 That the label on consumer products sold in Ontario (including pesticides), clearly indicate the presence of carcinogens, and that an easily recognizable symbol be developed and applied to products containing carcinogens

3.7 That the development and implementation of community-based environmental carcinogen reduction public policies and community education programs be funded and supported

The groups met for approximately 60 minutes with a group facilitator. Suggestions, input, and ideas were recorded and can be found in Appendix E.

### **Next Steps, Closing Remarks, and Adjournment**

John thanked all of the participants for their ideas and input on cancer and the environment. The Stakeholder Group's next task will be to review the input, and thereafter revise and set the context for the recommendations. John sent a special thanks to Toronto Public Health for facilitating the meeting.

John summarized the key messages/lessons from each presenter of the day as follows: Terry stated the application of existing knowledge is how public policy can be achieved; Kristan used specific Ontario populations as examples of epidemiological environment studies; Devra made it clear that agencies should act locally, but integrate a global vision; Ken gave a great legislation success story concerning Toxics Use Reduction; and finally, Larry ensured the group that national priorities are strong and sustainable.

A short group discussion followed surrounding Cancer Care Ontario's role in integrating this important issue. John responded by pointing to the need for a clear, universal vision from national, provincial, regional, and community groups. Partnerships between different sectors and groups are central to the success of any strategy, and increasingly important in carcinogen use reduction. Cancer Care Ontario's main domain is cancer prevention – not the environment, and nor does the MOHLTC see the environment as their main domain. By keeping this effort collaborative between several different groups the possibilities are limitless. Recommendations which are clear, and can articulate goals and benefits to the prevention of cancer are needed to create the necessary pressure, public support, and urgency in mandating toxics use reduction in Ontario.

John thanked everyone for attending and the symposium was adjourned.

#### ***Post-meeting notes:***

- Further inquires, recommendations, and/or ideas can be forwarded to Deb Keen directly via email [deb.keen@cancercare.on.ca](mailto:deb.keen@cancercare.on.ca)

**Appendix A: Original Meeting Program**  
**Environmental Carcinogen Use Reduction Symposium Agenda**  
**February 6, 2007**

<b>Time</b>	<b>Item</b>	<b>Speaker</b>
7:30 a.m.	Registration Desk Opens/Continental Breakfast	
8:15 a.m.	Welcome	Carol Timmings, Director, Healthy Living, Public Health, Toronto Public Health
8:30 a.m.	Opening Remarks	Terry Sullivan, PhD President and CEO, Cancer Care Ontario  &  Peter Goodhand, Chief Executive Officer, Canadian Cancer Society, Ontario Division
9:00 a.m.	Environmental Carcinogens: Concern & Evidence	Kristan Aronson, PhD Director, Institute of Population and Public Health, Queen's University, Kingston, Ontario
9:35 a.m.	Experience of Other Jurisdictions: University of Pittsburgh Cancer Institute's Center of Environmental Oncology	Devra Lee Davis, PhD, MHP Director, Center for Environmental Oncology, University of Pittsburgh Cancer Institute
10:10 a.m.	<i>Break</i>	
10:30 a.m.	Experience of Other Jurisdictions: Toxics Use Reduction Institute & the Massachusetts Experiment	Ken Geiser, PhD Co-Director, Lowell Center for Sustainable Production, University of Massachusetts Lowell
11:05 a.m.	Q&A Panel with Presenters	
11:45 p.m.	<i>Lunch</i>	

<b>Time</b>	<b>Item</b>	<b>Speaker</b>
12:45 p.m.	<b>Federal Context</b>	<b>Larry Stoffman, Chair, National Committee on Environmental &amp; Occupational Exposures, Canadian Strategy for Cancer Control</b>
1:05 p.m.	<b>Proposed Recommendations from Cancer 2020: Cancer and the Environment Stakeholder Group</b>	<b>Deb Keen, Director, Prevention Unit, Cancer Care Ontario &amp; Chair, Cancer 2020: Cancer and the Environment Stakeholder Group</b>  <b>&amp;</b> <b>Ronald Macfarlane, Supervisor, Environmental Health Assessment and Policy, Toronto Public Health &amp; Chair, Cancer and the Environment Stakeholder Group's Scientific Case Working Group</b>
1:35 p.m.	<b>Small Group Discussions</b>	<b>Nancy Dubois, Health Promotion and Planning Consultant, DU B FIT Consulting</b>
2:45 p.m.	<b>Break</b>	
3:00 p.m.	<b>Next Steps &amp; Wrap-up</b>	<b>Nancy Dubois, Health Promotion and Planning Consultant, DU B FIT Consulting</b>  <b>&amp;</b> <b>John McLaughlin, PhD Vice President, Preventive Oncology, Cancer Care Ontario</b>
3:30 p.m.	<b>Adjournment</b>	

## Appendix B: List of Participants

### **Alan Abelsohn**

Member  
Ontario College of Family Physicians

### **Kristan Aronson**

Director  
Institute of Population and Public Health,  
Queen's University

### **Louise Aubin**

Chair  
Environmental Health Work Group, Ontario  
Public Health Association

### **Jordan Beischlag**

Senior Coordinator, Public Issues  
Canadian Cancer Society

### **Dave Bennett**

Consultant

### **David Bideshi**

Chief, National WHMIS Office  
Health Canada

### **Nancy Bradshaw**

Community Outreach Coordinator  
Environmental Health Clinic, Women's College  
Hospital

### **Gillian Bromfield**

Senior Health Policy Analyst  
Canadian Cancer Society, National Office

### **Jim Brophy**

Executive Director  
Occupational Health Clinics for Ontario Workers

### **Mae Burrows**

Executive Director  
Labour Environmental Alliance Society

### **Bjorn Christensen**

Director, Health Protection & Promotion  
Niagara Region Public Health

### **Lina Cino**

Toxics Campaigner  
Toronto Environmental Alliance

### **Devra Lee Davis**

Director  
Center for Environmental Alliance Society

### **Nick DeCarlo**

National Representative  
Canadian Auto Workers

### **Minnie De Jong**

Manager, Human Toxicology and Air Standards  
Section  
Ministry of the Environment

### **Vinita Dubey**

Associate Medical Officer of Health  
Toronto Public Health

### **John Eyles**

Professor  
McMaster University

### **Brooke Filsinger**

Junior Research Associate  
Cancer Care Ontario

### **Krista Friesen**

Senior Project Manager  
Pollution Probe

### **Hélène Gagné**

Manager, Prevention Unit  
Division of Preventive Oncology, Cancer Care  
Ontario

### **Ed Gardner**

Manager, Environmental Health Division  
Sudbury and District Health Unit

### **Ken Geiser**

Director  
Lowell Center for Sustainable Production

### **Michael Gilbertson**

Biologist

### **Dorothy Goldin Rosenberg**

Environmental Health Educator  
Women's Healthy Environments Network,  
Toronto Cancer Prevention Coalition

### **Peter Goodhand**

CEO  
Canadian Cancer Society, Ontario Division

### **Chris Greensmith**

Medical Officer of Health  
County of Lambton

### **Ruth Grier**

Member  
Provincial Cancer Prevention and Screening  
Council

**Allan Grill**

Medical Consultant  
Toronto Public Health

**Robert Hall**

Director  
City of Hamilton Public Health

**Deborah Hellyer**

Board of Directors  
Ontario Medical Association

**Janine Hopkins**

Vice-President, Public Affairs  
Cancer Care Ontario

**Roland Hosein**

Vice-President, Environmental Health & Safety  
General Electric Canada

**Alex Hukowich**

Acting Medical Officer of Health  
Perth District Health Unit

**Garry Humphreys**

Medical Officer of Health  
Peterborough County-City Health Unit

**William Hunter**

Manager, Health Protection & Promotion  
Niagara Region Public Health

**Kim Jarvi**

Senior Economist  
Registered Nurses' Association of Ontario

**Deb Keen**

Director, Prevention Unit  
Cancer Care Ontario

**Rajesh Khetarpal**

Senior Policy Advisor, Stakeholder Relations  
Office of the Honorable Jim Watson, Ministry of  
Health Promotion

**Andrew King**

National Health, Safety and Environmental  
Coordinator  
United Steelworkers of America

**Christine Koserski**

Senior Coordinator, Media Relations  
Canadian Cancer Society, Ontario Division

**Karim Kurji**

Acting Medical Officer of Health  
The Regional Municipality of York

**Lalaine Lacuesta**

Junior Policy Analyst  
Canadian Cancer Society, National Cancer  
Institute of Canada

**Hayden Lansdell**

Senior Advisor  
Safe Environment Programme, Health Canada

**Colin Lee**

Associate Medical Officer of Health  
Simcoe Muskoka District Health Unit

**Sylvia Leonard**

Vice-President, Cancer Control Policy and  
Programs  
Canadian Cancer Society, Ontario Division

**Caroline Lidstone-Jones**

Director, Aboriginal Cancer Care Unit  
Division of Preventive Oncology, Cancer Care  
Ontario

**Bill Limerick**

Director, Environmental Health & Health  
Protection  
Northwestern Health Unit

**Heather Logan**

Director, Cancer Control Policy  
Canadian Cancer Society

**Lynda Lukasik**

Policy and Decision Analyst  
Environmental Commissioner of Ontario

**Hazel Lynn**

Medical Officer of Health  
Grey Bruce Health Unit

**Ronald Macfarlane**

Supervisor, Environmental Health Assessment &  
Policy  
Toronto Public Health

**Loraine Marrett**

Senior Scientist and Director, Surveillance Unit  
Division of Preventive Oncology, Cancer Care  
Ontario

**John Mayes**

Acting Director, Standards Development Branch  
Ministry of the Environment

**John McLaughlin**

Vice-President, Preventive Oncology  
Cancer Care Ontario

**Carol Mee**  
Supervisor, Environmental Health Assessment &  
Policy  
Toronto Public Health

**Sarah Miller**  
Researcher  
Canadian Environmental Law Association

**Katrina Miller**  
Co-Executive Director  
Toronto Environmental Alliance

**Safoura Moazami**  
Health Promotion Consultant  
Toronto Public Health

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Research Associate  
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**Fiona Nelson**  
Chair  
Toronto Cancer Prevention Coalition

**Allan Northan**  
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Unit Leader, Carcinogens  
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Ontario Campaign for Action on Tobacco

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Epidemiologist  
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**Rowena Pinto**  
Director, Prevention and Public Issues  
Canadian Cancer Society, Ontario Division

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**Otto Sanchez**  
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Huron County Health Unit

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**Howard Shapiro**  
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Toronto Public Health

**Peggy Sloan**  
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Cancer Care Ontario

**Rick Smith**  
Executive Director  
Environmental Defence

**Larry Stoffman**  
Chair, National Environmental & Occupational  
Exposures Committee  
Canadian Strategy for Cancer Control

**Terry Sullivan**  
President and CEO  
Cancer Care Ontario

**Monir Taha**  
Associate Medical Officer of Health  
Halton Region Health Department

**Carol Timmings**  
Director, Healthy Living, Chronic Disease  
Prevention  
Toronto Public Health

**Connie Uetrecht**  
Interim Executive Director  
Ontario Public Health Association

**Ann Marie Vecchi**  
Cancer Information Specialist  
Cancer Information Service, Canadian Cancer  
Society

**Megan Ward**  
Associate Medical Officer of Health  
Region of Peel



**Erica Weir**  
Associate Medical Officer of Health  
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**Anne Woodsworth**  
Associate Researcher  
Canadian Environmental Law Association

**John Wellner**  
Director, Health Policy  
Ontario Medical Association

**Michael Wosnick**  
Executive Director  
National Cancer Institute of Canada

## Appendix C: Presentation Slides

### *Environmental Carcinogens: Concern and Evidence*

Kristan Aronson  
Professor  
Director, Queen's Institute of Population and Public Health  
Queen's University, Kingston, Ontario

Toronto, Feb 6, 2007

### *Thanks to all of you*

Many here and throughout Canada have endeavoured for many years to reduce or eliminate carcinogens, prevent cancer: including Canadian Labour Congress, Advocacy Groups, Canadian Strategy for Cancer Control, Public Health Units, NGOs etc.

### Outline

- Definitions; extent of the cancer problem
- Types of evidence
- Evaluation of the evidence
- Challenges
- Cancer – Environment Associations
- Research/Action are complementary
- PP/PP: Precautionary principle and primary prevention
- Looking forward

### *What is a carcinogen?*

- A carcinogen is any substance or agent that (because of the way it affects DNA) can cause cancer
- Carcinogens may be *chemical substances*; *physical agents*, such as asbestos dust; or *biological agents*, such as viruses and bacteria

### *Environment: definitions*

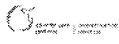
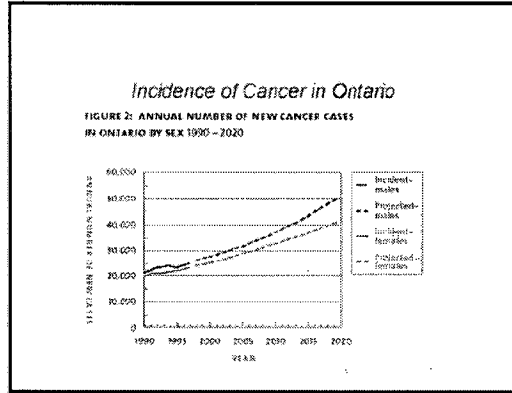
- Generally: anything not genetically controlled (smoking, diet, physical activity, occupational exposures, pollutants, etc.)
- Specifically: air, soil (also contaminants in food), water exposures: PCBs, PAHs, benzene, UV radiation, etc.

### *Cancer is a local and global issue*

- Cancer incidence is on the rise worldwide
- Canadians today face a 1 in 3 chance of contracting cancer, up from 1 in 30 in the 1930s
- World Health Organization estimates that up to 80% of cancers are caused by environmental or occupational factors, including exposure to hazardous chemicals

**Cancer in Ontario**

- Every day, about 150 new cancer cases are diagnosed and every day 67 people die of cancer in Ontario
- About 40% of Ontarians will develop cancer at some point in their lives and close to half will die of it
- The number of new cancer cases will increase by two-thirds by 2020
- Over half of cancer cases can be prevented
- In Ontario less than 1% of cancer spending is directed to prevention and screening

**Evidence: Primary strategies for discovering carcinogens**

- Epidemiology
- Animal experimentation (toxicology)
- Other biological effects
  - Mutagenesis
  - Genotoxicity
  - Etc.

**Evidence for cause of cancer: Types of epidemiologic studies**

- International variation
- Migrant studies
- Time trends
- Observational studies (cohort, case-control)
- Prevention trials

**Chemicals**

- Chemical substances constitute the largest group of carcinogens
- New chemical substances are being developed every year, often without prior testing on their potential toxic effects

**Level of epidemiologic evidence for causal relationships**

**Sufficient evidence** - based on peer-reviewed reports of expert groups or authoritative reviews

**Limited evidence** - several epidemiologic studies, including at least one case-control or cohort study, showed fairly consistent associations and evidence of exposure-risk relationships after control for potential confounders

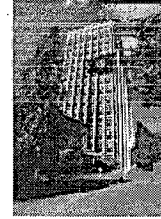
**Inadequate evidence** - epidemiologic studies limited in number and quality, inconsistent results, little or no evidence of exposure-risk relationships

*Summary of Real and Potential Contribution of Environmental Epidemiology*

- The legacy of environmental/occupational cancer research is rich
- Well-targeted studies still present excellent opportunities for cancer etiology research
- Internationalization is good: more knowledge
- Sample sizes must be large enough
- High quality exposure assessment is essential
- Conduct intervention research
- Need lobbying to prevent crippling effects of privacy laws
- Need to combat indifference of universities and funders
- Take action coincident with doing research

*Assessing the scientific evidence*

International Agency for Research on Cancer (IARC) evaluates evidence and publishes lists of known and suspected carcinogens



*IARC Evaluations*

- **Substances chosen on basis of two criteria:**
  - Humans exposed
  - Suspicion of cancer risk
- **Working groups**
  - Composition
  - Functioning
- **Evaluations**
  - Dimensions (human Ca, animal Ca, other)
  - Overall (1, 2A, 2B, 3, 4)
  - Limitations (target organ, quantification, validity)

*IARC Evaluations*

<i>Dimensions and Groups</i>	
<b>Types of evidence</b>	<b>Group</b>
Human	} 1 Carcinogenic to humans
Animal	
Other	} → 2B Possibly carcinogenic to humans
- mutagenicity	
- genotoxicity	
- metabolism	
- etc.	3 Not classifiable
	4 Not carcinogenic to humans

*Some challenges in cancer epidemiology*

- Exposure assessment
- Exposure assessment
- Exposure assessment

Source: Siemiatycki 2005

*More challenges in cancer epidemiology*

- Sample size
- Confounding
- Effect modification (including gene-environment interactions)

*More challenges*

- **Personpower to conduct challenging research**
- **Access to human subjects/data/ethics**
- **Lack of awareness of importance of the issue**

*Number of IARC occupational "carcinogens" by type and group*

Substance or mixture	Group 1	Group 2A	Group 2B
Physical agents (radiation)	2	1	1
Respirable dusts & fibers	5	0	7
Metals & metal compounds	5	0	5
Fuels & by-products of wood & fossil fuels	5	2	10
Monomers	1	5	8
Intermediates in plastics & rubber manufacturing	1	2	8
Aromatic amine dyes	3	3	13

*Siemiatycki et al, Environ 11th Persp, 2004, <http://www.dhponline.org>*

*Number of IARC occupational "carcinogens" by type and group*

Substance or mixture	Group 1	Group 2A	Group 2B
Pesticides	2	3	17
Polycyclic aromatic hydrocarbons	0	3	9
Chlorinated hydrocarbons	0	4	7
Intermediates in the production of dyes	0	1	7
Azo dyes	0	0	10
Nitro compounds	0	0	10
Others	3	6	10

*Siemiatycki et al, Environ 11th Persp, 2004, <http://www.dhponline.org>*

*Childhood cancer*

Sufficient evidence

- a given radiation dose appears to double the excess lifetime risk of fatal cancer for children compared to adults
- leukemia - prenatal x-ray pelvimetry (rel. high-dose)
- thyroid cancer - ↑ incidence < 5 yr after Chernobyl incident

Limited evidence

- leukemia - parental and/or childhood pesticide exposure, paternal smoking, childhood ionizing radiation (x-rays), nuclear testing fallout, EMF, paternal occupational exposure to solvents, paints and motor vehicle repair/related activities
- lymphomas - parental and/or childhood pesticide exposure, paternal smoking, parental occupational exposure to solvents and other petroleum products

*Source: Don Wigle, Ottawa*

*Childhood cancer (limited evidence, cont'd)*

- brain - parental and/or childhood pesticide exposure, paternal smoking, paternal occupational exposure to paints
- Wilm's tumour, Ewing's sarcoma - parental occupational pesticide exposure
- neuroblastoma - parental occupational lead or pesticide exposure

*Source: Don Wigle, Ottawa*

*Childhood cancer: inadequate evidence*

- leukemia - lead, arsenic, indoor/outdoor air pollution (e.g. benzene), radon, RF radiation, chlorination disinfection by-products, paternal radiation exposure (ionizing, EMF)
- brain - radon, EMF, RF radiation, drinking water nitrate/nitrite, paternal exposure to EMF

*The Evidence:  
Cancer Associations with Environment*

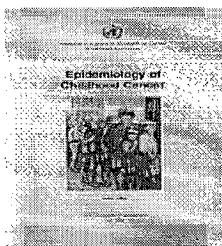
Air pollution (PAHs, particulates etc)  
Asbestos  
Water chlorination by-products  
Some pesticides and fertilizers (nitrates)  
Benzene  
Radon  
Ionizing Radiation  
UV radiation

*Evidence for specific sites:  
Non-Hodgkin's lymphoma*

- Organic solvents (benzene, TCE, PCE)
- PCBs and dioxins
- Pesticides
- Ionizing radiation
- Hair Dyes

*Evidence: Childhood Cancer*

Childhood cancer rare  
Range: 1 in 400 to 1 in  
700  
Causes ~75% unknown  
More prone to effects



*Childhood cancer sites:  
Sufficient evidence of link to environmental exposures*

- Skin cancer and melanoma
- Childhood leukemia
- Childhood brain cancer
- Thyroid carcinoma
- Stomach (*H. pylori* in contaminated drinking water)
- Lung cancer

Source: Children's Task Group of Ont College of Family Physicians,  
2005

*Adult cancer: childhood exposures*

**Sufficient evidence**

- melanoma - intense sun exposure

**Limited evidence**

- thyroid - nuclear test radioactive fallout
- lung - environmental tobacco smoke
- stomach - *H. pylori* (waterborne infection)

**Inadequate evidence**

- testicular - hormonally-active contaminants

*Iceberg phenomenon*

As chemical exposures increase at a faster rate than the detection of toxic effects, the true magnitude of the toxic threat will always be underestimated by "currently available knowledge."

**Some scientific barriers to getting a consensus on the evidence**

- Lack of consensus around epidemiologic evidence
- Too few studies or studies too small
  - Unexplained inconsistencies between well-conducted studies
  - Unknown biologic mechanism
  - Different perspectives of multidisciplinary expert groups

*Summary of Real and Potential Contribution of Cancer-Environmental Epidemiology*

- The legacy of environmental/occupational cancer research is rich
- Well-targeted studies still present excellent opportunities for cancer etiology research
- Internationalization is good: more knowledge
- Need high quality studies
- Need intervention research to determine most effective prevention strategies
- Need lobbying to prevent crippling effects of privacy laws
- Need to combat indifference
- Take action coincident with doing research

*Message from the evidence*

Majority of cancer is "environmental", not genetic, and therefore avoidable.

Major causes of cancer:

Cancer cause	% cancers worldwide
Tobacco	30
Diet	30-50
Viruses	10-15
Genes	1-10
Chemicals in workplace	2-8
Environment	2-5
Radiation	2-5

*Population attributable risk percent*

Definition: Percentage of the diseased persons in the population whose disease would have been prevented had the exposure been absent

Range of estimates: 2% - 10% for occupation/environment

Reliability of estimates: Mediocre

*Population attributable risk percent: Clapp, Howe and Lefevre 2005 report*

- Since cancer is multifactorial, the notion of applying estimates of risk attributable to single exposures should be avoided.
- Most of cancer is unexplained by current knowledge; therefore, it is speculative to attribute cancer to specific causes in the face of so much cancer of unknown cause (recall the iceberg).
- However, given what we already know, we must act to reduce cancer risk by eliminating/reducing carcinogens.

• Source: Environmental and Occupational Causes of Cancer, 2005

*Percentage of cancer unexplained and possibly linked to environment*

Depends on cancer site  
 Could be up to 80% according to WHO


- Needs:
- Do not introduce more substances without more extensive long-term testing
  - More research to identify unknown hazards
  - Action to reduce/eliminate exposures

*Causal link: Does X cause cancer?*  
Process:  
Assess evidence  
May still be some uncertainty  
Employ precautionary principle and prevent exposure

**Why is Carcinogen Reduction a matter of Public Health?**  
*Health as a human right.*  
*Basic values and principles to be invoked: equity and solidarity, participation and accountability, the right to know, sustainable development and the precautionary principle*  
*Use these values and principles to guide improvements in reporting and in policy to develop and maintain healthy environments for us and our children.*


*Climate Change Analogy*  
**February 1, 2007**  
**"Climate Change Science Moves from Proof to Prevention"**  
Source: Scientific American.com  
  
We have choices: mitigation adaptation or suffering. Likely, we will do some of each. The question is: what will be the balance?

**Carcinogens: Move from Proof to Prevention**  
Continue research: need evidence for more action  
But stop arguing about science  
Do not dwell on uncertainty  
Take action now!



**The Evidence: Population Attributable Fractions**  
**Urban air pollution:**  
Trachea, bronchus and lung cancer: 3-9%  
**Occupational carcinogens:**  
Trachea, bronchus and lung cancer: 4-13%  
Leukemia: 1-3%  
Other malignant neoplasms: 1-3%  
Source: WHO, 2000 and 2006

**Most effective prevention strategy: Reduce carcinogen use**  
➤ Eliminate or replace with less harmful substances



Source: Gwerdlow 1990



Some successes

Source: Ivanov and Straif, WHO and IARC, 2006

*There's much to be done...*

- Carcinogen elimination or substitution
- Establish pollution by-laws that prohibit discharges of carcinogenic substances into sewage systems
- Develop consumer labelling campaigns that compel the disclosure of carcinogenic ingredients in chemical products
- Etc

*Looking forward: From Proof to Prevention*

- Advocate for more research
- Lessons from other jurisdictions
- Most effective prevention strategies
- Develop specific recommendations to begin process of enshrining in law/policy carcinogen reduction
- Action to reduce/eliminate exposures

## Environmental Carcinogen Use Reduction Symposium

- Good intentions are not enough: lessons learned from U.S. environmental policy

Toronto, Canada, February 6, 2008

Devra Davis, Director, Center for Environmental Oncology  
University of Pittsburgh Cancer Institute  
[www.environmentaloncology.org](http://www.environmentaloncology.org)  
[www.whensmokeatalkwater.com](http://www.whensmokeatalkwater.com)



If you want the future to differ from the past, study the past



Spinoza

## A New Perspective on the Health of Canadians (Lalonde Report) (1973-1974)

- Health results from the combined activities of humans
- Efforts to promote health involve all sectors
- Modest funding supports primary prevention of disease
- Cancer policy is not the province of research institutions, but engages all sectors

## Salute to Ruth Grier

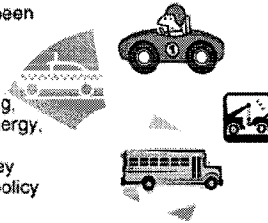
- The International Joint Commission on the Great Lakes (IJC) biennial reports
- Ontario Task Force on the Primary Prevention of Cancer (1995)
- call for the precautionary principle.  
*"lack of full scientific certainty shall not be sufficient reason for postponing preventive or remedial measures."*

## Doll & Peto "misunderestimate", 1980 <5% of cancer is environ/occupat

- Analyzed cancer deaths in persons under age 65 up to 1977
- 80% of all cancer occurs in persons over age 65
- Excluded incidence, African Americans
- Unable to evaluate impacts of exponential industrial growth of

Cancer policy extends well beyond the province of cancer research institutions

- Treatment and diagnosis have been principle foci of research
- Decisions about transport, housing, urban design, energy, need to be understood as key parts of cancer policy



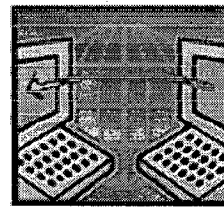
### Democracy rests on an informed public

- Freely consenting to be governed
- Implying a right to know
- A duty to warn
- Uninformed consent imposes risks onto the future

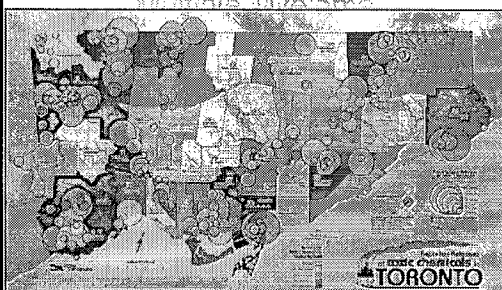


### To control and reduce cancer: information needed

- Surveillance
  - Patterns and trends in cancer incidence by type and age group
- Exposures and concentrations of known and suspected carcinogens



### Reported Toxic Releases Toronto



[www.torontoenvironment.org/toxics](http://www.torontoenvironment.org/toxics)

### Laws only work when they are enforceable

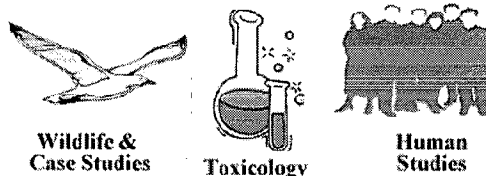
- Toxic Substances Control Act, 1976
- Resource Conservation and Recovery Act, 1976
- Superfund, law
- Mandatory reporting for toxics, Toxic Release Inventory
- Proposition 65



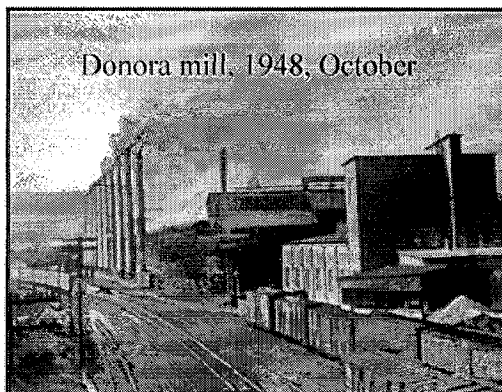
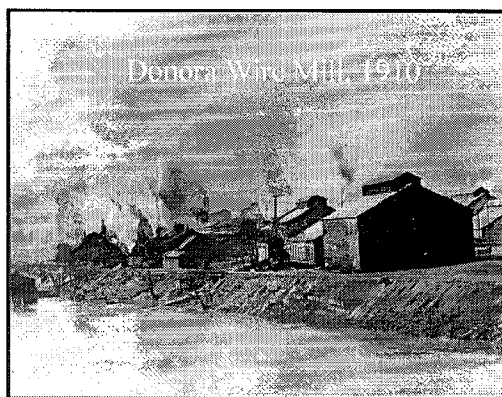
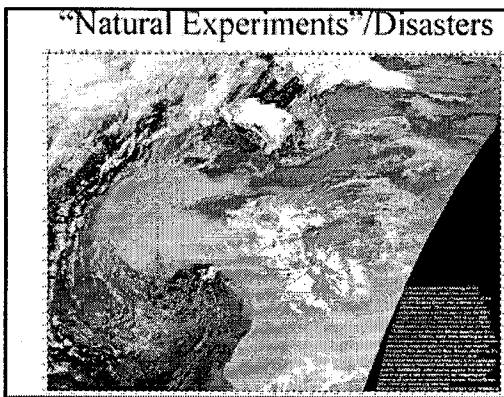
### Beware unfunded mandates

- Voluntary programs get mixed reviews and work best with an engaged citizenry
- Should not add responsibilities to government agencies without adding funding

### Available Evidence for Understanding Environmental Causes of Disease




Human studies cannot always be conducted. Models and measurements of exposure along with toxicology & case studies fill knowledge gaps.



**Reasons why "environment" is a cause of cancer**

Fewer than 1 in 10 cases of breast cancer arises in women born with genetic defects

National Cancer Institute




**Reasons why "environment" is a cause of cancer**

- Cancer risk of adopted children mirrors that of their adopted (NOT their biologic) parents (Sorenson et al., 1988)
- Fewer than half of identical twins get the same cancer
- Migrants' cancer risk changes to that of their new country
- Workers have higher rates


### Center for Environmental Oncology Mission Statement

- Provide a state-of-the-art, medical center-based, cross-disciplinary approach to identify controllable or avoidable causes of cancer linked with the environment
- Create and assess interventions that inform, educate and change individual and institutional behaviors




### What is Environmental Oncology?

- Clinical oncology detects and treats disease
- Environmental oncology seeks to identify causes of disease in order to prevent & predict cancer
  - Measures & develops biomarkers of exposure, susceptibility and early onset disease



### Jobs with increased risk of breast cancer

- Solvent workers
- Chemists
- Nurses/Dentists and Physicians
- Painters
- Hair Dressers



### Chemical Carcinogens in "Experimental Animals"

Chemical Name/Process	CAS NO	ACGIH
Carbon Tetrachloride	56-23-5	A3
Perchloroethylene	127-18-4	A3
Acetalddehyde	75-07-0	A3
Para-Dichlorobenzene	106-46-7	A3
Vinyl Acetate	108-05-4	A3

\*Compiled from American Conference of Governmental Industrial Hygienists (ACGIH): A2, Suspected Human Carcinogen and A3, Animal Carcinogen  
 Reference: <http://www.nceh.nih.gov/branches/ehp/ehp.html>

### "Suspected" Human Carcinogens

Chemical Name/Process	CAS NO	ACGIH
1,3-Butadiene	106-99-0	A2
Benzene	71-43-2	A2
Beryllium and Certain	7440-41-7	A2
Ethylene Oxide	75-21-8	A2
Formaldehyde	50-00-0	A2
Methylene Chloride	75-09-2	A2

\*Compiled from American Conference of Governmental Industrial Hygienists (ACGIH): A2, Suspected Human Carcinogen and A3, Animal Carcinogen  
 Reference: <http://www.nceh.nih.gov/branches/ehp/ehp.html>

### Examples of environmental human carcinogens

- Acrylonitrile
- Aflatoxin
- 4-Amino biphenyl
- Arsenic
- Benzene
- Benzidine
- Beryllium
- B-Naphthylamine
- Bis(chloro)methylether
- Chromium compounds
- Coal tar (aromatic hydrocarbons)
- Cyclophosphamide
- Diethylstilbestrol (hormone analog)
- Leather and wood dust
- Mustard gas
- Neoprene
- Nickel compounds
- Nitrosamines
- Radiations (ionizing and ultraviolet)
- Tobacco smoke
- Vinyl chloride

08/28/2005

Potential Workplace Carcinogens:  
 the NIOSH List

Acetaldehyde	2-Acetylaminofluorene	Acrylamide	Acrylonitrile	Asdm
4-Aminodiphenyl ether	Arsenic	Asbestos and homologs	o-Arsofline	Arsenic and inorganic arsenic compounds
Arsenic	Asbestos	Asphalt fumes	Benzene	Barbitone
Benzidine-based dyes	Beryllium	Butadiene	tert-Butyl chromate class, chromium hexavalent	Cadmium salt and fume
Coal tar pitch volatiles, tars, soil tar products	Coke oven emissions	Coal tar pitch volatiles (COP)	Dichlorobiphenyls	Dichlorobenzene
1,2-Dibromo-3-chloropropane (DBCP)	Dieldrin	Diesel exhaust	Digitoxin ether (DGE) class, glycidyl ethers	4-Dimethylaminobenzene
Diethylstilbestrol	Diethylstilbestrol	Diethylstilbestrol	Diethylstilbestrol	Diethylstilbestrol
Diethylstilbestrol	Diethylstilbestrol	Diethylstilbestrol	Diethylstilbestrol	Diethylstilbestrol
Diethylstilbestrol	Diethylstilbestrol	Diethylstilbestrol	Diethylstilbestrol	Diethylstilbestrol
Diethylstilbestrol	Diethylstilbestrol	Diethylstilbestrol	Diethylstilbestrol	Diethylstilbestrol

Chloroacetaldehyde	Chlorodiphenyl ether (42% chlorine) class, polychlorinated biphenyls	Chlorodiphenyl ether (94% chlorine) class, polychlorinated biphenyls	Chloroform	Chloromethyl methyl ether
1-Chloro-2-naphthol	o-Chlorophenol	Chromic acid, hexavalent [Cr(VI)]	Chromium chloride, class, chromium hexavalent	Chrysene
Coal tar pitch volatiles, tars, soil tar products	Coke oven emissions	DDT (dichlorodiphenyl trichloroethane)	D-2-ethylhexyl phthalate (DEHP)	2,4-Diaminobiphenyl
1,2-Dibromo-3-chloropropane (DBCP)	Dichlorobiphenyls	Dichlorobiphenyls	Dichlorobenzene	Dichloromethyl ether
1,1-Dichloroethane	Dieldrin	Diesel exhaust	Digitoxin ether (DGE) class, glycidyl ethers	4-Dimethylaminobenzene

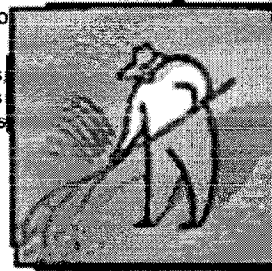
Dimethyl sulfoxide	1,1-Dimethylhydrazine (DMH2), class, hydrazines	Dimethyl sulfate	Dibromodioxane	Dioxane
Environmental tobacco smoke	Ethylchlorohydrin	Ethyl acetate	Ethylene dibromide	Ethylene dichloride
Ethylene oxide	Ethylamine	Ethylene dibromide	Formaldehyde	Gallium arsenide
Gasoline	Hexachlorocyclopentadiene	Hexachlorocyclopentadiene	Hexachlorocyclopentadiene (HCP)	Hexamethyl phosphoramide (HMPPA)
Hydrazine	Hexone	Methylaldehyde	Hexachlorocyclopentadiene	Methyl bromide, class, methyl chlorides

Methylamine	Methyl iodide, class, methyl bromides	Methyl hydrazine, class, hydrazines	4-Methylmorpholine (NMO)	Nitrobenzene
4-Methylmorpholine (NMO)	o-Naphthylamine	p-Naphthylamine	Nickel, metal, soluble, insoluble, and inorganic, class, nickel, inorganic	Nickel carbonyl
Formaldehyde	4-Nitrodiphenyl ether	p-Nitrochlorobenzene	2-Nitropropane	2-Nitropropane
N-Nitrosodiphenylamine	Pentachloroethane, class, chloroethanes	p-Phenyl-2-naphthylamine, class, p-naphthylamine	Phenyl glycidyl ether, class, glycidyl ethers	Phenylhydrazine, class, hydrazines
Propylene Sulfone	p-Propylamine	Propylene sulfide	Propylene sulfide	Propylene oxide

Asbestos	Asbestos, amphibole	Asbestos, amphibole	Asbestos, amphibole	Asbestos, amphibole
Silica, crystalline	Silica, crystalline	Silica, crystalline	Silica, crystalline	Silica, crystalline
Silica, crystalline	Silica, crystalline	Silica, crystalline	Silica, crystalline	Silica, crystalline
Titanium dioxide	o-Toluidine	o-Toluidine	Toluene	Toluene
p-Toluidine	p-Toluidine	1,1,2-Trichloroethane, class, chloroethanes	Trichloroethylene	1,2,3-Trichloropropane
Uranium, insoluble compounds	Uranium, insoluble compounds	Uranium, insoluble compounds	Uranium, insoluble compounds	Uranium, insoluble compounds

Farmers: Sentinels for  
 Avoidable Cancer?

- Occupational group exposed to toxic chemicals:
  - 2 million farmers
  - 3 million farmers and their families
- Low overall mortality rate



### Chemicals associated with increasing cancers in farmers

- Phenoxy herbicides, especially 2,4-D
- Chlorpyrifos
- Methyl bromide
- Alachlor
- Atrazine
- PCBs
- DDT

Source: Agricultural Health Study (AHS) [www.aghealth.gov](http://www.aghealth.gov)

09-28-2005

### Farmers

- Compared to the general public, farmers have lower risks for:
  - ischemic heart disease
  - all causes of cancer combined
  - Cancers of the lung, esophagus, bladder, colon, liver, and kidney
- Low prevalence of smoking
- Low percentage of body fat
- High measure of physical fitness

### Farmer's Diet

- Large amounts of fruits and vegetables
- Small amounts of processed foods
- High in fiber

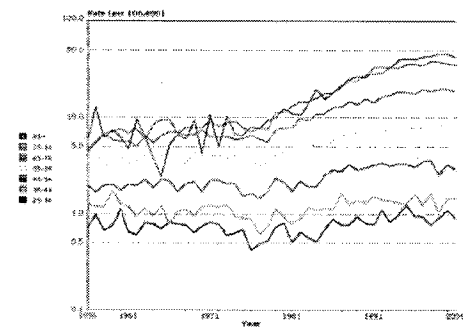
Farmers also reside in low air pollution areas

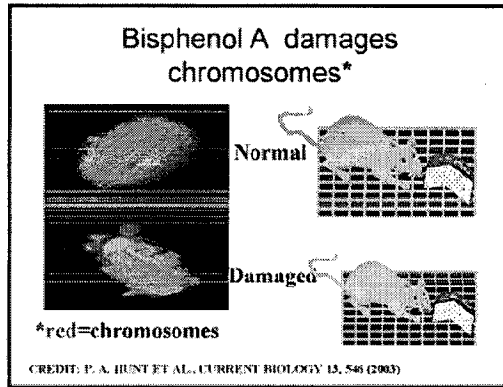
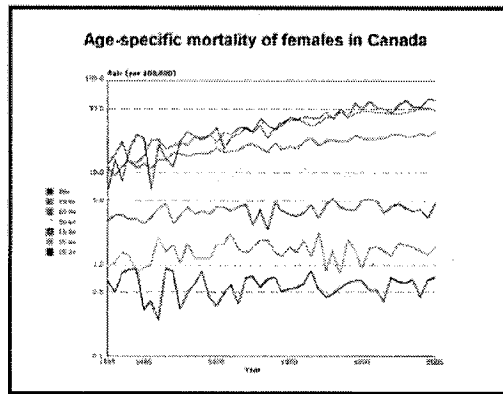
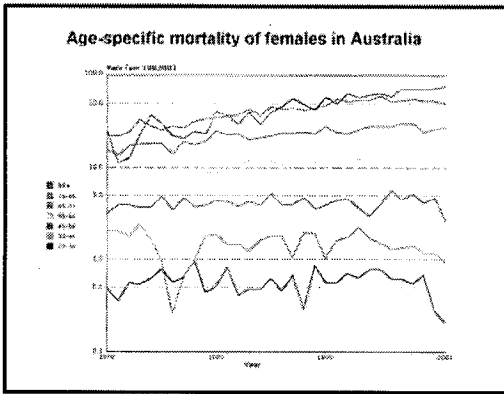
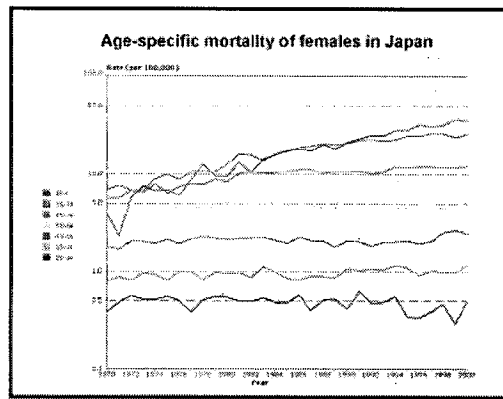
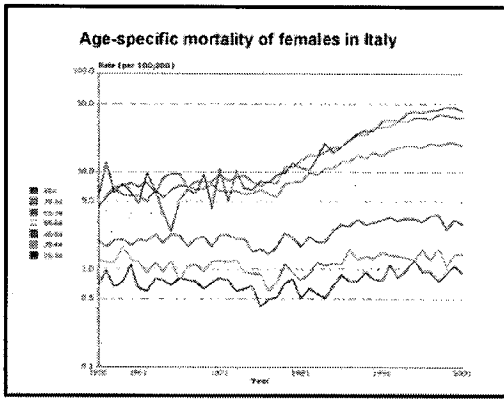
### However...

- Farmers have higher-than-general population risks for certain cancers:
  - Non-Hodgkins Lymphoma
  - Skin melanomas
  - Multiple myeloma
  - Leukemia
  - Lip, stomach, prostate, brain
  - Breast cancer
  - Prostate

### Non-Hodgkins Lymphoma

Age-specific mortality of females in Italy







### Breast Cancer and Traffic Pollution

- Exposure to carcinogens in traffic emissions may increase the risk of developing breast cancer in women who are lifetime nonsmokers
- Among women in Erie and Niagara counties of New York State between 1998 and 2001, those with higher exposures to polycyclic aromatic hydrocarbons (PAHs) from traffic around the time of first menstruation were at increased risk of premenopausal breast cancer.
- For postmenopausal women, higher exposure to PAHs at the time of first birth was associated with increased risk.
- Neither association was found in women with a history of smoking.

Presented by: Susan E. G. Milne, M.D., M.Sc., Ph.D., University of Toronto, Ontario, Canada

### Studying Humans Is Difficult

- People seldom know what they have been exposed to, especially early in life
- Both good and bad xenoestrogens exist
- Studying current levels or recent residues in cancer patients can be misleading — disease development affects storage of toxic compounds

### Criteria for inferring causation in public health research

- Dose-Response
- Timing makes sense... Removal of exposure ends/reduces effect
- Consistent findings
- Biological Plausibility
- Animal/experimental supporting evidence

### Problems of Power in Epi Studies

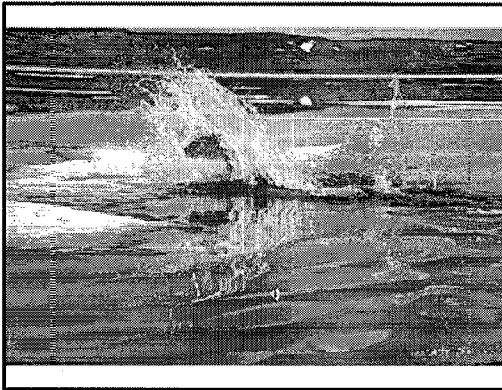
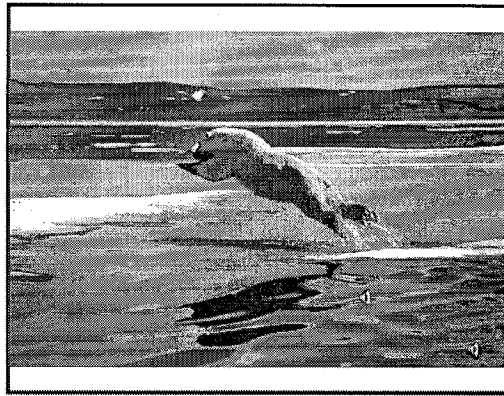
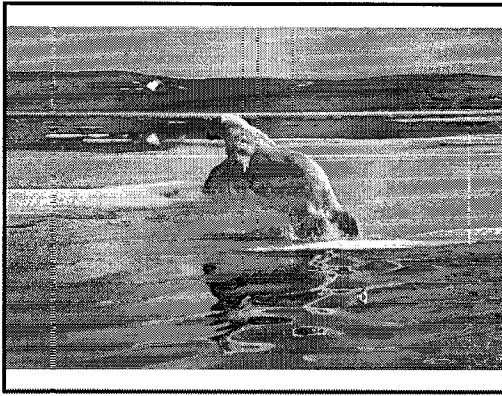
- Easier to find big risks in large populations than in smaller ones
- Harder to find differences between groups for common diseases like breast cancer
- The absence of evidence is not evidence of an absence of an effect
- Statistical significance is not the same as public health importance

### Experimental Studies Are Critical

- Can't always conduct human research
- Modeling in animals and cells is a surrogate for human impacts
- Need for sophisticated modeling and for better use of biomonitoring

### Lessons from Wildlife

- Pay attention to the polar bears
- The deer of the Bitterroot Valley, Montana
- Alligators of Lake Apopka
- Fish hermaphrodites



**UNDER  
CONSTRUCTION**

**We must act on facts, and on  
the most accurate  
interpretation of them, using  
the best scientific information.**

**This does not mean we must  
wait for certainty**

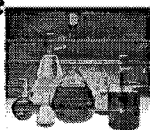
**San Francisco, Precautionary  
Principle Legislation, 2003**

- Public has a right to know
- Government has a duty to assess publicly the full environmental and economic costs of alternative policies
  - Safe purchasing/shopping
  - Assessing alternatives openly
  - Evaluating policies and outcomes regularly based on developing science



## Massachusetts Toxics Use Reduction Program Update

Environmental Carcinogen  
Use Reduction Symposium  
Toronto  
February 6, 2007



### Toxic Chemicals As a Problem

1. Lack of information on chemicals in commerce
2. Slow, inefficient chemical by chemical risk assessment/management processes
3. Lack of integrated, modernized, and forward-looking approach to chemicals management.
4. Increasing public concern about chemicals in commerce (PBTs, carcinogens, etc.)
5. Lack of incentives to stimulate development of safer substitutes

### New International Chemicals Policies

- Denmark: Danish Chemicals Policy
- Sweden: A Sustainable Chemicals Policy
- Netherlands: Strategy on the Management of Substances
- Germany: Product Chain Chemicals Policy
- European Union: REACH
- International: Stockholm Convention (POPs)
- Rotterdam Convention (PIC)
- Strategic Approach to International Chemicals Management (SAICM)

### Massachusetts Toxics Use Reduction (TURA) Program

- 1989—Massachusetts was the first state to enact a Toxics Use Reduction Law
- Goals of the Massachusetts Law
  - Achieve 50% reduction in byproduct (waste) by 1998
  - Establish toxics use reduction as the preferred means of compliance
  - Promote the competitive advantage of Massachusetts Industry
  - Reduce the production and use of toxic chemicals
- The program has focused on some 190 chemicals and involved over 1000 firms

### Techniques of Toxics Use Reduction (TUR)

- DIRECT
  - Chemical Input Substitution
  - Product Redesign
- INDIRECT
  - Process Modification
  - Operations and Maintenance Improvements
  - In-Process Recycling

### Examples of Toxics Use Reduction

- Solvent substitution in washing and degreasing
- Cyanide replacement in electroplating baths
- Hydrocarbon-based inks replaced with water-based inks
- Dry-process coatings replacing wet-process coatings
- Installing energy- and water-conserving pumps and motors
- Installing automated pressure and temperature controls to reduce leaks and spills

### Industry Responsibilities under Massachusetts TURA

- Any firm manufacturing, processing or using any of 1200 toxic chemicals over a given threshold must:
  - report annually to the State on the amount of use and waste generated
  - prepare and biannually update a plan to reduce or eliminate the chemicals
  - pay an annual fee

### Massachusetts TURA Program Structure

- TURA Administrative Council
- Department of Environmental Protection
  - Collects data and fees and provides enforcement
- Office of Technical Assistance
  - Provides on-site, confidential technical assistance
- Toxics Use Reduction Institute
  - Provides research, testing, training and public education

### Annual TURA Reporting

- Annual reports by about 650 facilities
- Each facility reports on:
  - total toxic chemical use
  - total toxic byproduct (waste) generated
  - total toxic chemicals generated in or as products
  - economic activity index

### TURA Data on the Internet

- Data is installed on the Internet at [www.turi.org/turadata](http://www.turi.org/turadata)
- Data is displayed year by year
  - by chemical
  - by facility

### Bi-Annual TURA Facility Planning

- First plans due in 1994
- Plans updated every two years
- Plans are kept on-site, but must be available for state inspection
- All plans must be certified by a licensed TUR Planner
- "Plan Summaries" are released to the public every other year

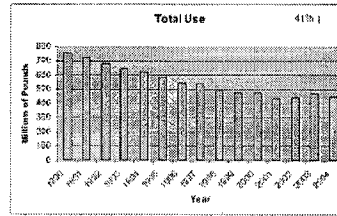
### Toxics Use Reduction Planners

- A licensed Toxics Use Reduction Planner must certify each facility Toxics Use Reduction Plan
- Number trained by the Institute: 1100
  - Number taking the State Exam: 750
  - Total number currently in practice: 320

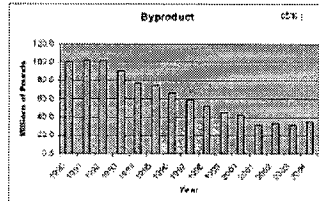
### Results of the TURA Program

- Significant reduction in toxic chemical use, waste and emissions
- Firms improved efficiencies and saved money

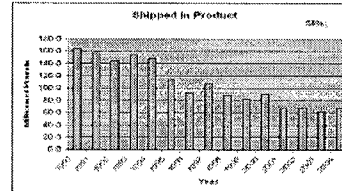
### Trends in Toxic Chemical Use, 1990-2004



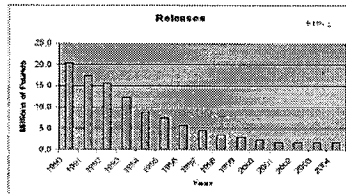
### Trends in Toxic Byproduct (Wastes), 1990-2004



### Trends in Toxic Chemicals Shipped in Products, 1990-2004



### Trends in On-Site Releases of Toxic Chemicals, 1990-2004



### TURA Impacts on Carcinogens

- 2000 Analysis for 41 Carcinogens
  - 18% reduction in use
  - 44% reduction in byproduct (waste)
  - 65% reduction in release
- Current Analysis (2005 data)

	Use	Byproduct	Release
Formaldehyde	-57%	-24%	-62%
DEHP (Phthalate)	-61%	-100%	-93%
Perchloroethylene	-73%	-89%	-88%

### TURA Program Evaluation

- Full Program Evaluation Completed
- Involved a Telephone Survey of 434 out of 645 TUR Filers
- Included an In-depth investigation of 25 TUR Filers
- Included a Benefit-Cost Analysis

### Evaluating the TURA Program

- Planning
  - 70% of firms identified TUR options in their plans
- Implementation
  - 81 % of the firms that identified TUR options in their plans reported implementing at least some of them
  - 87% of firms reported cost savings
  - 66% of firms reported health and safety benefits
  - Materials accounting was rated the most valuable component of TUR planning

### Costs and Benefits of the TURA Program

- Economic benefits exceeded costs

From 1990 - 1997:

- Reported Costs = \$77 million
- Monetized Benefits = \$91 million

\*\*\*Benefits do not include:

- human health and ecological benefits
- benefits to non-TURA firms
- other non-monetized benefits



### Toxics Use Reduction Institute

- Established in the TURA Act to provide research, training, technical support and public awareness
- Maintained as a University center at the University of Massachusetts Lowell
- 14 FTE Employees
- Budget of \$1.2 million per year from State appropriations
- Affiliated with the Lowell Center for Sustainable Production



### Programs at TURI

- Conducts Technical and Policy Research
- Maintains Surface Solutions Laboratory
  - Focuses on surface cleaning and coatings
- Toxics Use Reduction Planner Training Program
  - 48 hr. course trained over 1000 planners
- Maintains on-line technical support services
  - Greenlist, P2Gems, Chemical Fact Sheets, TURA Data
- Sponsors the Toxics Use Reduction Network (TURN) Grants Program
  - Offers stipends to over 70 community-based groups



### New Directions at TURI Promoting Safer Alternatives

- Invested in Research in Green Chemistry and Occupational Health Studies of Nanotechnologies
- Developed Alternative Assessment Tool (P2OASYS)
- Developed Alternatives Assessment Framework
- Conducting an Alternatives Assessment on 5 High Priority Toxic Chemicals (2006)



#### New Directions at TURI

### TURI Five Chemicals Study

- Legislative mandate to study alternatives to five high, priority chemicals
  - lead perchloroethylene
  - formaldehyde di (2-ethylhexyl) phthalate
  - hexavalent chromium
- Step 1: Identify uses
- Step 2: Identify alternatives
- Step 3: Prioritize alternatives
- Step 4: Evaluate alternatives
  - performance, cost, health, and environment

### Alternatives to Carcinogens

- Formaldehyde
  - Dry sterilants and UV light in sanitary storage
  - Alternative resins in plywood
  - Glycol ethers in specimen preservation
- Hexavalent Chromium
  - Conversion coatings for zinc passivation
  - Thermal and vapor sprays for surface coatings
- Perchloroethylene
  - hydrocarbons, siloxanes, glycol ethers and wet cleaning
  - HCFCs and aqueous cleaning in degreasing

### New Directions for TURA

#### 2006 Amendments to TURA

- raises fees and lowers thresholds for higher hazard chemicals (1000 lbs/yr)
- lowers fees for low hazard chemicals
- encourages resource conservation planning and EMGs for TUR leaders (1 yr planning/2 updates)
- requires establishment of priority user segments (including smallest firms) for targeted services and performance standards

### New Directions in the United States

- No new Federal Initiatives
- Several new State Initiatives
  - Mercury phase out laws
  - Brominated flame retardant laws
  - Chemical in packing laws
- New State Chemicals Policy Initiatives
  - Washington, Maine, Massachusetts, California

### New Directions for Massachusetts

#### • Proposed "Safer Alternatives Bill"

- Establish a tiered categorization list for all chemicals—4 tiers
- TURI prepares Safer Alternative Assessment Reports (SAAR) on each priority toxic substance
- Based on the SAAR, EOEA prepares a Chemical Action Plan (CAP)
- Firms must prepare and implement Substitution Plans (SP) to meet CAP requirements
- State provides business and employee assistance

### Lessons from Massachusetts-1

- Economic and environmental quality can be improved by reducing toxic chemical use
- Focus needs to be on facility planning and chemicals management
- Goals need to be clear and ambitious
- Good metrics are needed to measure progress and enhance accountability

## Lessons from Massachusetts-2

- Innovation is spurred by programs that carefully balance mandatory and voluntary instruments ("sticks" and "carrots")
- Smaller firms need reasonably funded technical assistance programs
- Both research and technical assistance are needed to promote the adoption of safer chemical and technology alternatives



## Primary Prevention: Occupational & Environmental Cancer

Federal Overview  
 Larry Stoffman, Chair NCEOE

## Historical Context

Phase 1 – Budget for Cancer - \$700K/yr  
 2002-05 Strategic Framework for a Canadian Strategy for  
 Cancer Control  
 Phase 2 – Budget for Cancer - \$2.9M for 06/07 FY  
 Budget 05 Funding towards cancer control within healthy living  
 and chronic disease framework (\$59.5M over 5 yrs)  
 Phase 3 – Budget for Cancer - \$82M/yr  
 Budget 06 Provides \$260M over 5 yrs towards CSCC  
 implementation

## Recent Events (1)

- Budget 2006 provides funding for the CSCC
  - Officers revise proposed CSCC budget to address  
 Federal Budget '06 priorities for "screening,  
 prevention and research"

## Key Deliverables

- High Level 5 Year Plan
  - Key Result Areas
  - Objectives
  - Project Review and Approval Criteria

## CSCC 5 Year Budget Allocations (as of July 2006)

• Seven priorities for action			
– Surveillance and Analysis	\$79.5M	30%	
– Primary Prevention	\$10.2M		13%
– Rebalance the Focus (health care)	\$28.1M	6%	11%
– Health Human Resources	\$10.1M	5%	
– Standards	\$12.4M	5%	
– Clinical Practice Guidelines	\$13.8M	6%	
– Research	\$8.8M	3%	
• Three additional action areas			
– Governing Board Operations	\$43.8M	17%	
– Quality and Performance	\$8.8M	4%	
– Knowledge Transfer Platform	\$7.8M	3%	
• TOTAL	\$260M	100%	

## National Committee on Environmental & Occupational Exposures (NCEOE)

- National Symposium on Cancer Prevention
  - March 2003
  - Environmental & Occupational Exposures  
 identified as a priority
- NCEOE formed – September 2003
  - First Task: Oversee conduct of a Best Practice  
 Review and then develop recommendations for  
 action



### **Community Action**

1. Municipalities should develop and implement primary prevention activities:
    - A. Community exposure profiles
    - B. Community pollution prevention bylaws should be encouraged, and BP examples disseminated.
- Status: 5 yr budget Workplan TBD 07. (see below)  
TUR legislation proposal Ontario ? BC?

### **Government Intervention**

1. Federal legislation should require disclosure of all Class 1 and 2A & selected 2B carcinogens (listed in Table 7) through labeling on all consumer products, including pesticides.
- Status:  
Discussions with Health Canada ongoing

### **Government Intervention**

2. CEPA 1999 should be updated and require pollution prevention programs for federally regulated sites using or producing classified 1 and 2A carcinogens.
- Status: Presentation Parliamentary Committee

### **5 Year Plan: Initiatives**

1. Carcinogen Exposure (CAREX) Unit
2. Community Networks
3. National Symposia
4. Patient History
5. Toxic Use Reduction Strategy
6. Policy Development

### **1. CAREX Unit**

- This unit will increase E/O surveillance and research capacity:
- > National Workplace Exposure Database
  - > Clearing house of environmental carcinogen exposure data
  - > National resource for monitoring; policy setting; research.

### **2. Community Networks**

- > Contact with existing networks established by NGOs
- > Assist these NGOs in their ongoing community education
- > Funding based on annual grants through a competitive process; multi year activities

### 3. National Symposia

Annual symposia:

- > report findings regarding environmental and occupational carcinogen exposures
- > develop monographs for dissemination
- > policy recommendations.
- > "summit" format with key stakeholders and decision makers invited.

### 4. Patient History

- > Develop O/E history templates for community health practitioners and family physicians.
- > Establish curricula in medical community;
- > Assist in implementing pilot projects

### 5. Toxic Use Reduction Strategy

- > Feasibility Study re: Toxic Use Reduction Centre.
- > Partner with existing initiatives
- > Support development of municipal projects
- > Grants for other initiatives identified

### 6. Policy Development

- > Policy review and review of activity results
- > Ongoing development of federal and provincial policy and legislative recommendations

## Opportunities to Improve the Control of Environmental Carcinogens in Ontario

Deb Keen, Cancer Care Ontario  
Ronald Macfarlane, Toronto Public Health  
Presented at the  
Environmental Carcinogen Use Reduction Symposium  
6 February 2007, Toronto

## Background

### Cancer 2020 targets

- Reduced exposures to THMs in drinking water
- Reduced exposures to particles
- 0% of Ontarians exposed carcinogens above 1 in 1 million benchmark

## Background

### Insight on Cancer

- Difficult to establish cause
- Most evidence comes from occupational exposures
- Environmental exposures inadequately studied

## Background

### Insight on Cancer

- Evidence supports association
  - Air pollution
  - Arsenic
  - Asbestos
  - Water disinfection by-products
  - Extremely-low-frequency electromagnetic fields
  - Solar radiation
  - Radon

## Background

### Principles

- Precautionary principle
- Weight-of-evidence
- Pollution prevention
- Just transition
- Right-to-know

## Methodology

### Environmental Carcinogens Stakeholder Group

- Defined environmental carcinogen
- Identified toxic use reduction as the framework
- Reviewed literature on selected approaches

## Methodology

### Environmental Carcinogen

- A carcinogen found in the environment to which the public can be expected to be exposed as the result of human activity
  1. The substance is known or likely to be in the Ontario environment
  2. The substance is classified by the International Agency for Research on Cancer (IARC) as a group 1 (known) or group 2A (probable) or the substance is identified in the U.S. National Toxicology Program Report on Carcinogens as known or reasonably anticipated to be human carcinogen
  3. The substance is not a biological agent or used solely as a pharmaceutical

## Methodology

### Toxic Use Reduction

- Consistent with a pollution prevention approach
- Can include elements such as
  - Right-to-know
  - Purchasing policies
  - Prohibition of certain substances
  - Substitution requirements
  - Pollution prevention planning

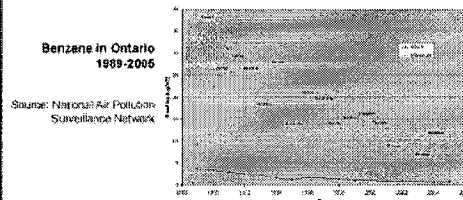
## Methodology

### Review

- Federal, provincial, municipal laws and regulations
- International approaches
  - Europe (Denmark, Sweden, REACH)
  - US (California, Massachusetts, New Jersey)

## Findings and Conclusions

Some success in reducing exposures to carcinogens



## Findings and Conclusions

### Example of Toxic Use Reduction in Ontario Husky Injection Molding Systems

- Husky's commitment to environmental responsibility has made it a worldwide role model
  - Husky has earned the Financial Post Gold Environmental Leadership Award, the National Occupational Health and Safety Award for Excellence, and the Ethics in Action Award for ongoing social responsibility.
  - In 2000, Husky diverted 95 percent of its waste, realizing \$348,000 savings in disposal costs and generating \$804,000 in revenue through innovative reuse of materials
- [www.hrsdc.gc.ca](http://www.hrsdc.gc.ca)

## Findings and Conclusion

### Example of Toxic Use Reduction in Ontario Interface Flooring Canada ( Bellville Ontario)

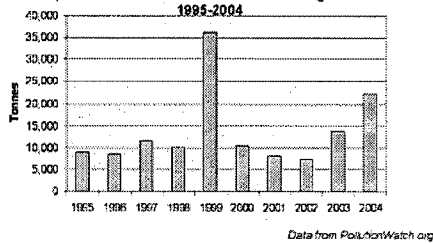
- Envirosense (design, construction, furnishings, operation and management of buildings, environmental engineering and indoor air quality)
- Ecosense (industrial ecology, sustainability and the Interface Environmental Policy)

[www.greenontario.org](http://www.greenontario.org)

## Findings and Conclusions

NPRI data do not indicate progress overall

Total Reported Releases & Transfers of Carcinogens in Ontario



## Findings and Conclusions

### In Ontario and Canada

- No overarching framework to reduce releases and exposures to environmental carcinogens
- Carcinogens are controlled on a “chemical by chemical” basis
- Pollution prevention encouraged through voluntary approach

## Findings and Conclusions

### Opportunities

- Toxic use reduction and pollution prevention
- Comparative assessment and substitution

## Recommendations

### 1.0 General

- 1.1 Comprehensive provincial environmental toxic use reduction strategy involving government, key stakeholders and municipalities be developed, with a particular focus on carcinogen use reduction
- 1.2 Greater vulnerability of children and pregnant women to environmental threats be recognized and child-protective measures be adopted
- 1.3 Cumulative effects from multiple pollutants and aggregate exposures to carcinogens be considered

## Recommendations

### 2.0 Surveillance

- 2.1 That Ontario report annually on trends of environmental carcinogens in air, water and soil
- 2.2 That Ontario develop an environmental carcinogen surveillance strategy to supplement the biomonitoring study being undertaken by Statistics Canada

## Recommendations

### 3.0 Policies and Programs

- 3.1 Manufacturers and importers demonstrate, to the responsible Minister, before a substance is permitted for import, manufacture or use, that its value outweighs the environmental and health risk it poses
- 3.2 Comparative assessments and chemical substitution be adopted as the means to achieve carcinogen use reduction in Ontario

### **Recommendations**

#### **3.0 Policies and Programs**

- 3.3 That Canada's National Pollutant Release Inventory (NPRI) be expanded to include chemicals that have been either classified by the International Agency on Cancer as a Class 1 or 2A carcinogen or listed in the U.S. National Toxicology Program Report on Carcinogens as being a known, or reasonably anticipated to be a human carcinogen

### **Recommendations**

#### **3.0 Policies and Programs**

- 3.4 That the reporting thresholds for carcinogens in the NPRI be lowered to change 50 Kg or less as appropriate
- 3.5 That reduction goals and caps on the release of environmental carcinogens be established and enforced

### **Recommendations**

#### **3.0 Policies and Programs**

- 3.6 The label on consumer products sold in Ontario (including pesticides), clearly indicate the presence of carcinogens, and that an easily recognizable symbol be developed and applied to products containing carcinogens
- 3.7 The development and implementation of community-based environmental carcinogen reduction public policies and community education programs be funded and supported

Thank you!



## Appendix D: Speaker Biographies

**Kristan Aronson, MSc, PhD**, is a Professor in the Department of Community Health and Epidemiology and Division of Cancer Care and Epidemiology, Queen's Cancer Research Institute and School of Environmental Studies and Director, Queen's Institute of Population and Public Health Queen's University, Kingston, Ontario.

Kristan completed her undergraduate and Master's degrees at McGill University. After additional training in Heidelberg and at the University of Edinburgh, she obtained a PhD in epidemiology and biostatistics at the University of Toronto, followed by a postdoctoral award at the International Agency for Research in Cancer in Lyon, France. Upon obtaining a Research Scholar Award in 1991, Dr. Aronson became a professor at the University of Toronto and began conducting research on the determinants of cancer. At Queen's University since 1995, Kristan's research program examines the relative contribution of environmental and genetic factors in the etiology of cancer through multi-disciplinary studies. She is involved in strategic population health issues through national advisory boards including the Canadian Strategy for Cancer Control and the CIHR Institute of Population and Public Health.

**Devra Lee Davis, PhD, MPH**, was designated a National Book Award Finalist for *When Smoke Ran Like Water* (2002, Basic Books). Davis directs the world's first Center on Environmental Oncology at the University of Pittsburgh Cancer Institute. The multi-disciplinary center will include experts in medicine, basic research, engineering and public policy, who will develop cutting-edge studies to identify the causes of cancer and propose policies to reduce the risks of the disease. Honored for her research and public policy work by various national and international groups, Davis is a Professor at the University of Pittsburgh Graduate School of Public Health's Department of Epidemiology, Visiting Professor at Carnegie Mellon University's Heinz School, Honorary Professor, London's School of Hygiene and Tropical Medicine, and Expert Advisor to the World Health Organization.

President Clinton appointed the Honorable Dr. Davis to the newly established Chemical Safety and Hazard Investigation Board, (1994-99) an independent executive branch agency that investigates, prevents, and mitigates chemical accidents. As the former Senior Advisor to the Assistant Secretary for Health in the Department of Health and Human Services, she has counseled leading officials in the U.S., United Nations, World Health Organization and World Bank. She also was a Distinguished Visiting Professor at The Yeshiva University and Stern College for 1996-97 and Scholar in Residence and Executive Director of the Board on Environmental Studies and Toxicology at the U.S. National Research Council, of the National Academy of Science, 1983-93.

Dr. Davis holds a BS in physiological psychology and a MA in sociology from the University of Pittsburgh. She completed a Ph.D. in science studies at the University of Chicago, as a Danforth Foundation Graduate Fellow and a MPH in epidemiology at the Johns Hopkins University, as a Senior National Cancer Institute Post-Doctoral Fellow in epidemiology. She has also authored more than 170 publications, in books and journals ranging from *Scientific American* to the *Journal of the American Medical Association* and the *Lancet*, and the *Annals of the New York Academy of Sciences*, and has also written for the *New York Times*, the *Los Angeles Times*, and other mass media outlets.

A member of both the American Colleges of Toxicology and of Epidemiology, Dr. Davis is also Visiting Professor in the Department of Environmental and Occupational Medicine at Mt. Sinai Medical Center in New York City. In addition, she is a Visiting Scientist of the Strang Cornell Cancer Prevention Center of the Rockefeller University and Scientific Advisor to the Women's Environment and Development Organization. She also founded the International Breast Cancer Prevention Collaborative Research Group, an organization dedicated to exploring the causes of

breast cancer. She currently serves on the Board of the Climate Institute, and the Coalition of Organizations on the Environment and Jewish Life, and the Earthfire Institute.

Dr. Davis' research has been widely acknowledged by different communities. The Lemelson Center for Invention and Innovation of the Smithsonian Institution honored her as an innovator on the environment and invited her to give a distinguished lecture in 1998. The Intergovernmental Panel on Climate Change of the United Nations Climate Convention tapped her to serve as a Lead Author on their assessment of climate mitigation policies and she co-chaired an Expert Workshop on assessing the public health and other impacts of climate policies sponsored by the OECD, IPCC, EPA, and Resources for the Future. She received the Woman of Distinction Award from the Conservative Judaism's Women's League and was recognized by the Noreen T. Holland Foundation for leadership in advancing the understanding of potential environmental causes of breast cancer." She was also honored by the Betty Ford Comprehensive Cancer Center and the American Cancer Society with the Breast Cancer Awareness Award, and was commended by the Director of the National Cancer Institute for Outstanding Service.

**Kenneth Geiser, PhD.** is an internationally recognized specialist on pollution prevention, clean production and industrial chemicals policy. He is a professor of work environment at UMass Lowell, co-director of the University's Lowell Center for Sustainable Production and a special assistant to the Provost for research. He is an author of the Commonwealth's landmark 1989 environmental legislation, the Massachusetts Toxics Use Reduction Act, and served from 1990 to 2003 as the founding director of the Massachusetts Toxics Use Reduction Institute, located at UMass Lowell. He is a policy advisor to the U.S. Environmental Protection Agency and has served the U.N. in a similar capacity. In addition, he has served on the boards of several national non-profit environmental organizations.

Geiser's publications include the 2001 book *Materials Matter: Towards a Sustainable Materials Policy* and numerous articles on pollution prevention, toxic chemical policy and sustainable development. He holds graduate and doctoral degrees from the Massachusetts Institute of Technology.

**Peter Goodhand** is the Chief Executive Officer of the Canadian Cancer Society, Ontario Division. With approximately 75,000 volunteers, more than 350 staff and revenue over \$80 million, the Division is a major force in cancer control in the province.

Mr. Goodhand is committed to volunteerism and is experienced in change management and strategic leadership. He led Ontario Division through the development of a Strategic Plan which focuses on the delivery of the Canadian Cancer Society mission and becoming the organization of choice for those who want to volunteer and donate in the fight against Cancer. Mr. Goodhand sits on the Ontario Campaign for Action on Tobacco-Executive, Minister of Health Promotion's Smoke-Free Ontario Campaign Committee, Ministry of Health Promotion's Advisory Committee on Healthy Eating and Active Living, Princess Margaret Hospital's Advisory Committee on Oncology and is chair of the board of the Health Technology Exchange.

**Deb Keen** is currently the Director of the Prevention Unit at Cancer Care Ontario. She is Chair of the Cancer 2020 Cancer and the Environment Stakeholder Group and a member of the Primary Prevention Action Group for the Canadian Strategy for Cancer Control. She has 18 years of experience in health promotion and public health including local public policy development and is presently leading the development of a Chronic Disease Prevention System with the Ontario Chronic Disease Prevention Alliance. Before coming to Cancer Care Ontario, she managed chronic disease prevention programs with the Region of Peel, including the development of the Regional Smoke-Free Bylaw. She holds a Bachelor of Science in Nursing and a Masters in Public Administration from the University of Western Ontario.

**Ronald Macfarlane** is currently Supervisor, Environmental Health Assessment and Policy with Toronto Public Health. He has twenty-five years of experience in environmental health policy, including the setting of environmental standards. Before joining the staff of the City of Toronto, he worked with the Standards Development Branch of the Ontario Ministry of the Environment. He has also worked as an international consultant environmental health for Consumers International, Pesticide Action Network, and the United Nations. He holds a Masters of Library Science from the University of Toronto and a MSc in Environmental and Development Education from South Bank University, London, England.

### **Larry Stoffman**

Current position and responsibilities:

- Governor, (Labour) Hazardous Materials Information Review Commission (Health Canada)
- Chairperson, National Environmental & Occupational Exposures Committee, Canadian Strategy for Cancer Control (CSCC), (Health Canada)
- Canadian Labour Congress Representative, Federal WHMIS Current Issues Committee (CIC) (Health Canada)
- UFCW Representative, Canadian Labour Congress, National Health & Safety Committee
- Director, Occupational Health & Safety, UFCW 1518
- Board, Labour Environmental Alliance Society

Prior positions and responsibilities:

International Labour Representative (Canada), U.N. (ECOSOC) General Harmonized System: (GHS) Chemical Hazard Communication Research Associate, Simon Fraser University, Worker Resource Centre.

**Terrence Sullivan, PhD**, is President and Chief Executive Officer, Cancer Care Ontario. Since July, 2001 Terry has been with Cancer Care Ontario. Terry was founding President of the Institute for Work & Health (IWH). Terry has played senior roles in the Ontario Ministries of Health, Intergovernmental Affairs and Cabinet Office. He served as Assistant Deputy Minister, Constitutional Affairs and Federal Provincial Relations during the Charlottetown negotiations and he served two successive First Ministers of Ontario as Executive Director of the Premier's Council on Health Strategy, including a period as Deputy Minister. A behavioural scientist with research and practice interests in prevention and health system performance, Terry is the author/editor/co-editor of six recent books and numerous papers. He holds faculty appointments in the Departments of Health Policy Management and Evaluation and Public Health Sciences at the University of Toronto. He currently serves on boards including: the National Cancer Institute of Canada, the Institute for Clinical Evaluative Sciences, the Ontario Hospital Association, and the Ontario Institute for Cancer Research and the Canadian Association of Provincial Cancer Agencies.

**Carol Timmings** is Healthy Living Director in the area of Chronic Disease Prevention with the City of Toronto, Public Health Division. She has lead program responsibilities encompassing tobacco control, nutrition and physical activity promotion, heart health, cancer prevention and early detection and related health planning and evaluation. She also holds lead responsibilities for workplace health promotion.

Throughout her 24 years in the field of public health, Carol's management experiences have spanned a number of portfolios in the areas of family and child health, seniors' health, environmental health and chronic disease prevention. Prior to her career in Public Health, Carol's nursing experience was focused in the clinical areas of paediatric and adult cardiology.

Carol's involvement in Professional Associations and advisory boards includes executive involvement in positions on the Ontario Public Health Association Board, the Association of Local Public Health Agencies of Ontario (alPHa), Board of Directors for Active Healthy Kids Canada,

and President of the Provincial Executive Committee of ANDSOOHA - Public Nursing Management in Ontario. Carol holds a Bachelor of Nursing Science Degree and a Masters of Education Degree in Policy & Administration both from Queen's University, Kingston, Ontario.

## Appendix E: Small Group Exercise–Recommendations

The following recommendations were commented on by six groups during the small group discussions. Each category (general, surveillance, policies and programs) had several recommendations in which input was provided as follows:

**\*Disclaimer: The following ideas, opinions, and notes are verbatim from conference worksheets and may not reflect those of Cancer Care Ontario\***

### General

<i>1.1 That a comprehensive provincial environmental toxic use reduction strategy involving government key stakeholders and municipalities be developed with a particular focus on carcinogen use reduction</i>		
<b>Suggested Changes</b>	<b>Next Steps</b>	<b>Who's Involved and Roles</b>
<ul style="list-style-type: none"> <li>• Add requirement for a concise made-in-Ontario health and medical case/statements for the need for a toxic use reduction strategy (describing Ontario exposures such as Ontario Medical Association (OMA) for the smog issue). The cause and effect on some substance could be described</li> <li>• Develop the hook, impact of carcinogens on human health</li> <li>• Current strategy doesn't include Green Taxes and should be considered</li> <li>• Make carcinogen use reduction a key part of the effort, but link to larger effort to educate on toxics use-reduction of use</li> <li>• Focus should be on carcinogens only</li> <li>• Should be a hazard base framework, including toxins with substitution</li> <li>• Shouldn't forget the exposure early in life</li> </ul>	<ul style="list-style-type: none"> <li>• Consider the economic case and health/medical case too in the strategy</li> <li>• Need to describe magnitude of problem in Ontario</li> <li>• Rephrase 1.1 broader; "That a comprehensive provincial environmental toxic use reduction strategy be developed, with a particular focus on carcinogen use reduction"</li> <li>• Develop correct framework for managing the chemicals independent of how many we choose</li> <li>• Framework is what matters, can always add more chemicals/toxins/carcinogens later on</li> <li>• We need to identify priority concerns</li> <li>• Send our recommendations back to the Stakeholder Group to consider, revise strategy</li> <li>• Consider timeframe for action – for fall election?</li> </ul>	<ul style="list-style-type: none"> <li>• Involve Ministry of Environment (MOEn) in planning stages</li> </ul>

<p>(prenatal/children) and future impact</p> <ul style="list-style-type: none"> <li>• Focus on carcinogen reduction is too narrow, other ways to reduce exposure</li> <li>• What is the focus? Carcinogens, toxins, or pollution? Different, but being used interchangeably</li> <li>• Toxic use reduction vs. exposure debate on which is broader</li> <li>• Exposure includes use, exposure reduction is a tool</li> <li>• Need to be more rigorous as opposed to have motherhood statements that don't grab attention and/or make the case for intended audience</li> <li>• Focus on evidence for environmental carcinogens and put measures forward</li> <li>• Consider chemical management policy as public awareness is ripe for such an approach</li> <li>• Need to use international experience to build our case and not reinvent the wheel</li> <li>• Need to broaden wording to include endocrine/reproductive toxins</li> <li>• Can't just be carcinogens when it comes to pre-natal exposures and unique vulnerability of children</li> </ul>	<p>Need clear directions to government, but need enough time to develop sound strategy</p> <ul style="list-style-type: none"> <li>• Develop recommendations to government on the process to be followed to implement the framework and recognize that government ministries lack the capacity to do this alone</li> <li>• Requires a collaborative, multi-stakeholder effort (suggests Environment Commissioner of Ontario to lead)</li> <li>• Translate health issues/impact into directions to government</li> <li>• Short term, view upcoming elections as an opportunity but need to keep eye on long term approach</li> <li>• Campaign to initiate legislation similar to the US Food Quality Protection Act (risk assessment &amp; pesticides as studied by US National Academy of Sciences)</li> <li>• Ingredient disclosure added to framework</li> <li>• Indication of harm, precautions</li> </ul>	
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<i>1.2 That the greater vulnerability of children and pregnant women to environmental threats be recognized and child-protective measures adopted</i>		
<b>Suggested Changes</b>	<b>Next Steps</b>	<b>Who's Involved and Roles</b>
<ul style="list-style-type: none"> <li>Expand outcomes from just cancer to include congenital anomalies, infertility, and other reproductive effects, as well as child health effects (e.g. asthma) so that broader effect of certain chemicals are better understood</li> </ul>	<ul style="list-style-type: none"> <li>Better surveillance of congenital anomalies, infertility so there is more of a lifespan approach, link with cancer</li> </ul>	<ul style="list-style-type: none"> <li>Need to partner with other organizations/groups interested in health effects of chemicals</li> <li>Canadian Congenital Anomalies Surveillance Network</li> </ul>
<i>1.3 That the cumulative effects from multiple pollutants and aggregate exposures to carcinogens be considered</i>		
<b>Suggested Changes</b>	<b>Next Steps</b>	<b>Who's Involved and Roles</b>
<ul style="list-style-type: none"> <li>"considered" far too weak of a term for this crucial area</li> <li>add "be" between carcinogens and considered</li> <li>demand more research and funding for this area</li> <li>the research must include the potential role of cancer causing or contributing infections (especially viral)</li> <li>add something here re: airshed loadings</li> </ul>		

**Surveillance**

<i>2.1 That Ontario report annually on trends of environmental carcinogens in air, water and soil</i>		
<b>Suggested Changes</b>	<b>Next Steps</b>	<b>Who's Involved and Roles</b>
<ul style="list-style-type: none"> <li>What about food as a medium?</li> <li>What about personal care products (hence skin being a route of absorption)?</li> <li>Must be timely (is not more than one-year-old data)</li> <li>Make recommendation more specific</li> </ul>	<ul style="list-style-type: none"> <li>Prioritize carcinogens (use expert group)</li> <li>Incremental approach (start with short list and expand year-by-year, eventually to also capture toxicants on the precautionary principle basis)</li> <li>Expert panels to decide what carcinogens are</li> </ul>	<ul style="list-style-type: none"> <li>Reporting should be done by independent environmental commissioner who reports directly to the legislature (not a minister)</li> <li>A university could be the locus so that arms-length can be maintained</li> <li>Independent arms-length organization?</li> </ul>

<ul style="list-style-type: none"> <li>• Incremental approach, start with high priority carcinogens</li> <li>• Decide what the purpose of collecting the information and reporting is</li> <li>• Needs to be more specific</li> <li>• Just human health or animal indicators as well?</li> <li>• Should there be more emphasis on areas where children are exposed?</li> <li>• Which carcinogens – most harmful or widest exposure?</li> <li>• What types of trends? Local/regional/provincial</li> <li>• Air, soil, and water carcinogens differ in persistence (e.g. air can dissipate quickly)</li> </ul>	<p>priorities and how to measure</p> <ul style="list-style-type: none"> <li>• Decide how information will be used</li> <li>• Piggy-back on existing surveillance systems</li> <li>• Fill in the gaps of existing lists</li> <li>• Develop on going reporting system</li> <li>• Data analysis</li> <li>• Dissemination of info, timely, accessible, noticeable</li> <li>• Ensure data is valid</li> <li>• Develop savvy media strategy</li> </ul>	<ul style="list-style-type: none"> <li>• MOEn</li> <li>• Environment Canada</li> <li>• MOHLTC</li> <li>• MOL</li> <li>• Non-Governmental Organizations (NGOs)</li> <li>• Public</li> <li>• Ontario Agency for Health Promotion and Protection</li> <li>• Consult with experts</li> <li>• Greenpeace</li> <li>• Academics</li> <li>• Drinking Water Surveillance Program</li> <li>• National Pollutant Release Inventory (NPRI)</li> <li>• Ont Reg. 137</li> <li>• Media savvy people</li> </ul>
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*2.2 That Ontario develop an environmental carcinogen surveillance strategy to supplement the biomonitoring study being undertaken by Statistics Canada*

<b>Suggested Changes</b>	<b>Next Steps</b>	<b>Who's Involved and Roles</b>
<ul style="list-style-type: none"> <li>• Ontario biomonitoring study – unclear on meaning</li> <li>• To supplement the Canadian study so that breakdown by region in Ontario, or by age, sex, or other group can be done</li> <li>• A disease/death (health outcome) surveillance system for health outcomes thought to be attributable to environmental carcinogens?</li> <li>• Biomonitoring is definitely needed</li> <li>• A cohort approach would be superior to cross-</li> </ul>	<ul style="list-style-type: none"> <li>• Explore options in biomonitoring studies</li> <li>• e.g. Rapid Risk Factor Surveillance System Biological Assessment and Risk Comparison study that is being piloted in Durham Region</li> <li>• Ontario Cancer Consortium cohort study</li> <li>• Develop a strategy</li> </ul>	<ul style="list-style-type: none"> <li>• Statistics Canada?</li> </ul>



<p>sectional studies</p> <ul style="list-style-type: none"> <li>• Assuming this refers to Canadian Community Measures Study</li> <li>• Not sure whether supplementing this study</li> <li>• So need to explore other options and platforms that might be more appropriate</li> <li>• Statement too vague, how does it differ from 2.1?</li> <li>• What does environmental carcinogen surveillance mean?</li> <li>• Will StatsCan study data be specific enough for use in Ontario?</li> <li>• StatsCan study not timely as due out in 2009</li> <li>• Biomonitoring is expensive</li> <li>• Need to understand the significance of biomonitoring levels (levels of safety)</li> </ul>		
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**Policies & Programs**

<p><i>3.1 That manufacturers and importers be required to demonstrate, to the responsible Minister, before a substance is permitted for import, manufacture or use, that its value outweighs the environmental and health risk it poses</i></p>		
Suggested Changes	Next Steps	Who's Involved and Roles
<ul style="list-style-type: none"> <li>• Concern "its value" is too subjective, WHO defines the values that outweigh environmental and health risks?</li> <li>• "value" has to be clearly defined</li> <li>• the Pest Management Regulatory Agency defines "value" to mean merely that a product does what it says it does</li> <li>• Value should mean that it</li> </ul>	<ul style="list-style-type: none"> <li>• Ontario should make recommendations to federal government</li> </ul>	<ul style="list-style-type: none"> <li>• Provincial and Federal governments</li> </ul>

<p>serves some greater good</p> <ul style="list-style-type: none"> <li>• Should there be a word about "the" precautionary principle (the version quoted by Larry Stoffman in his presentation very good)</li> <li>• Need specific criteria</li> <li>• How do you know if they have met burden of proof</li> <li>• What would the burden of proof be? Animal studies, no alternative</li> <li>• Fast track that chemicals are working so well so that they didn't have to go through years of examination</li> <li>• Use benefit instead of value (value implies economic)</li> <li>• Include existing and new substances</li> <li>• Test criteria are needed</li> </ul>		
<p><i>3.2 That comparative assessments and chemical substitution be adopted as the means to achieve carcinogen use reduction in Ontario</i></p>		
Suggested Changes	Next Steps	Who's Involved and Roles
<ul style="list-style-type: none"> <li>• Confirm details of 'comparative assessments' i.e. Risk vs. Hazard</li> <li>• Liability lies with industry</li> <li>• Comparative assessment should be a hazard assessment</li> <li>• Alternatives that are of positive value should be fast-tracked</li> <li>• Safer-alternatives process possible</li> </ul>	<ul style="list-style-type: none"> <li>• Investigate past successes (Sweden, Denmark, Massachusetts)</li> <li>• Advocate at federal level to add to list</li> <li>• Municipalities move forward</li> <li>• Pilot project, large scale mapping</li> <li>• Establish mandatory program for safe alternative chemical use</li> <li>• Environmental audit assistance so that it's not out-of-pocket</li> <li>• Increase access to information</li> </ul>	<ul style="list-style-type: none"> <li>• MOHLTC</li> <li>• MOEn</li> <li>• MOL</li> <li>• Ministry of Education</li> <li>• Industry, trade, innovation</li> <li>• Universities</li> <li>• Larry Stoffman, National level to advocate</li> <li>• OMA to get involved</li> <li>• Municipalities</li> <li>• Federal government for funding</li> <li>• Occupational Health &amp; Safety committee</li> <li>• Workplace Safety and Insurance Board (WSIB)</li> </ul>

	<ul style="list-style-type: none"> <li>• Workplace Champions award for those that have implemented changes</li> </ul>	
<p><i>3.3 That the list of substances in Canada's National Pollutant Release Inventory (NPRI) be amended to include chemicals that have been either classified by the International Agency on Cancer as a Class 1 or 2a carcinogen or listed in the US National Toxicology Program Report on Carcinogens as being a known, or reasonably anticipated to be a human carcinogen</i></p>		
<b>Suggested Changes</b>	<b>Next Steps</b>	<b>Who's Involved and Roles</b>
<ul style="list-style-type: none"> <li>• Ranked by toxicity or how are they ranked?</li> <li>• Add and clearly identify carcinogens</li> <li>• Needs to be prioritized</li> </ul>	<ul style="list-style-type: none"> <li>• Make list publicly accessible</li> <li>• Put some context to the list</li> <li>• Raise awareness within public about the effects of carcinogens</li> <li>• Enhance list with different age ranges, thresholds for adults (male and female) and children, infants, and pregnant women</li> <li>• Apply list of carcinogens to real life</li> </ul>	<ul style="list-style-type: none"> <li>• Federal government</li> <li>• National Committee on Environment and Occupational Exposure</li> <li>• Pediatricians in OMA</li> <li>• MOHLTC has power to change situations</li> <li>• Provincial government</li> <li>• Champion organizations</li> </ul>
<p><i>3.4 That the reporting thresholds for carcinogens in the NPRI be lowered to change 50 Kg or less as appropriate</i></p>		
<b>Suggested Changes</b>	<b>Next Steps</b>	<b>Who's Involved and Roles</b>
<ul style="list-style-type: none"> <li>• Expand on this slightly "less as appropriate"</li> <li>• Does it mean in this instance that a carcinogen is particularly potent?</li> <li>• 3.3 and 3.4 combined?</li> <li>• Lower thresholds on carcinogens already listed</li> <li>• Lower 10 000 times and 50 Kg is old</li> </ul>	<ul style="list-style-type: none"> <li>• Make public aware by translating it into a language they can understand</li> </ul>	

*3.5 That reduction goals and caps on the release of environmental carcinogens be established and enforced*

<b>Suggested Changes</b>	<b>Next Steps</b>	<b>Who's Involved and Roles</b>
<ul style="list-style-type: none"> <li>• Something should be added to indicate that the aim is to make these national goals that are enforced consistently across ALL provinces and territories</li> <li>• Strengthen NPRI to look at use, products and waste not just emissions</li> <li>• Ontario develop its own goals and caps separate from NPRI</li> <li>• Reduction targets on the release of environmental carcinogens be established, measured comprehensively (use, product, by-products, emissions) and enforced</li> <li>• Systems and management be established to enable achievements of targets</li> <li>• Long term goal of elimination</li> </ul>	<ul style="list-style-type: none"> <li>• Decide what to monitor</li> <li>• Make targets</li> <li>• Establish legislation (e.g. reporting fees for sustainability)</li> <li>• Provide appropriate assistance and expertise</li> </ul>	<ul style="list-style-type: none"> <li>• Industry experts</li> <li>• Academic leaders</li> <li>• Materials/process engineers</li> <li>• NGOs</li> <li>• Environmental groups</li> <li>• Government agencies</li> <li>• MOEn regulates</li> <li>• MOHLTC makes recommendations</li> <li>• CCO creates policies</li> <li>• MOL creates policies</li> </ul>

*3.6 That the label on consumer products sold in Ontario (including pesticides), clearly indicate the presence of carcinogens, and that an easily recognizable symbol be developed and applied to products containing carcinogens*

<b>Suggested Changes</b>	<b>Next Steps</b>	<b>Who's Involved and Roles</b>
<ul style="list-style-type: none"> <li>• Excellent idea</li> <li>• Hope it doesn't get watered down to only Class 1 carcinogens being listed</li> <li>• Recognize more than just products with an immediate health risk</li> <li>• Implement universal labeling</li> <li>• Link with reduction targets</li> </ul>	<ul style="list-style-type: none"> <li>• Gain stakeholder commitment</li> </ul>	<ul style="list-style-type: none"> <li>• Federal government – labeling standards</li> <li>• MOHLTC – education</li> <li>• CCO – leadership</li> <li>• MOEn – compliance</li> <li>• Advocacy groups</li> <li>• Consumer Education/Protection groups</li> <li>• National Environmental &amp; Occupational Exposures</li> </ul>

<p>(3.5)</p> <ul style="list-style-type: none"> <li>Rewards system for Green Industry or non-toxic products</li> <li>Include labels indicating no use of carcinogens in PROCESS of product manufacturing</li> </ul>		<p>Committee - leadership</p> <ul style="list-style-type: none"> <li>MOL – protection, labeling of products</li> <li>Universities/colleges – educate and advocate</li> <li>Emergency response – public awareness</li> </ul>
<p><i>3.7 That the development and implementation of community-based environmental carcinogen reduction public policies and community education programs be funded and supported</i></p>		
Suggested Changes	Next Steps	Who's Involved and Roles
<ul style="list-style-type: none"> <li>Local public health units could play an important role but few have a full set of skills (e.g. in toxicology, environmental engineering science, risk assessment, industrial hygiene)</li> <li>Seen as 2 separate issues                      1) behavioural = carcinogen reduction                      2) knowledge transfer = education via major stakeholder and community</li> <li>Education would be primary steps for knowledge transfer and community acceptance and support</li> <li>Myth that environmental alternative not always more cost effective, need to debunk this</li> </ul>	<ul style="list-style-type: none"> <li>Make specific program responsibilities and funding to local public health units so that they can create their own versions of environmental protection offices</li> <li>Annual report</li> <li>Educate the health professionals and general population</li> <li>Understand target group</li> <li>Implement fee program, self-funded, industry user fee</li> <li>Use lessons we have learned from tobacco here</li> <li>More research to ensure education is applicable to each community</li> <li>Right to Know</li> <li>Community involved in intervention</li> <li>Community working with industry for accountability</li> <li>Use already existing programs and adapt them for a TUR</li> <li>Educate about policy (what you can do and how)</li> </ul>	<ul style="list-style-type: none"> <li>MOHLTC</li> <li>Public health units</li> <li>Educational institutes connected to public health tie into curriculum</li> <li>Needs to be tied into day to day</li> <li>All levels of government for funding and resources tied to setting TUR limits</li> <li>Self responsibility</li> <li>Train the trainers</li> <li>Community collaboration via learning series</li> <li>Focus groups</li> <li>CEOs of companies</li> <li>Public Health visits to daycares to provide info manuals and educate</li> <li>Government has a role in public policy when environment is unsafe for community (e.g. water, mercury, contaminants)</li> </ul>

	<ul style="list-style-type: none"><li>• Jurisdictional issues – knowledge sharing, provincial resource centres, all parties allowed access</li><li>• Online virtual database = central hub all can share</li><li>• Provide community mobilization models</li><li>• Labeling</li><li>• Fund access issue, remote communities policy</li><li>• All settings – home, work, schools</li></ul>	
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