

SENSOR



Occupational Lung Disease Bulletin

Massachusetts Department of Public Health
Occupational Health Surveillance Program, 250 Washington Street, 6th Floor, Boston, MA 02108
Tel: (617) 624-5632 Fax: (617) 624-5696 www.mass.gov/dph/workrelatedasthma

April 2010

Dear Health Care Provider,
This issue of the Occupational Lung Disease Bulletin provides a summary of a report released last year about chemicals that are manufactured and used in Massachusetts. The report, produced by the Lowell Center for Sustainable Production, uses Toxic Use Reduction data to explore the use of chemicals that have evidence of an association with asthma.

The full report can be downloaded at:
<http://www.turi.org/content/view/full/6640>;

The executive summary is available at:
<http://www.turi.org/content/view/full/6639>.

REMINDER: To receive your Bulletin by e-mail, please send a message to occupational.asthma@state.ma.us

Sincerely,
Elise Pechter MPH, MAT, CIH

Some Chemicals Linked to Asthma Are Used by Massachusetts Companies

The prevalence of asthma in Massachusetts is high, for adults and children. Nearly 150,000 children and 500,000 adults currently have asthma. Increasing attention is being paid to the health, social and economic consequences of asthma and to effective disease management.

The Lowell Center for Sustainable Production (LCSP) at University of Massachusetts Lowell raised more questions about asthma. Are chemicals that are known to cause or exacerbate asthma used in Massachusetts? Are they released into the environment inside factories where workers are exposed? Are they released out their stacks to nearby communities? Are communities differentially exposed to these releases? They identified data collected under the Toxics Use Reduction Act as the source of the answers to these questions, and to additional questions about trends in chemical use over time. This Bulletin focuses on use and releases within workplaces.

Chemicals

LCSP assembled a master list of 335 chemicals and substances capable of causing asthma and/or exacerbating

existing asthma. They used four sources to establish the list: the Collaborative for Health and the Environment Toxicant Disease database,¹ the Association of Occupational and Environmental Clinics Exposure Database,² the Institute of Medicine's 2000 report, *Clearing the Air*, which reviewed exposures in non-occupational indoor environments,³ and last, a comprehensive review of the peer-reviewed literature, published in *Asthma in the Workplace*.⁴ After eliminating duplicates they selected 335 chemicals, which they called "chemicals associated with asthma." They found that 68 (20%) of the chemicals were reportable to the Massachusetts Department of Environmental Protection under the Massachusetts Toxics Use Reduction Act (TURA). Among these 68, 41 had been reported during the period of analysis 1990-2005. TURA requires companies to report if they use substantial quantities—over 10,000 pounds per year of the reportable chemicals.

Findings

Nearly 8 billion pounds of the 41 identified chemicals were used over the study period by companies who filed TURA reports. These chemicals were incorporated into products, processed or otherwise expended. Use of asthma-associated chemicals declined 27%, from 532 million pounds in 1990 to 387 pounds by 2005. But, surprisingly, use of *some* asthma related chemicals increased over the 15 years, including (with amount of increase): Ammonia (103%); Chlorine (1013%); Ethylene oxide (2200%); Hydrazine (732%); Maleic anhydride (3029%); and Toluene diisocyanate (TDI) (62%).

In the manufacturing process, some chemicals are released inside the facilities. These are reported as fugitive air releases. They comprise chemicals not captured by emission control technologies, such as leaks at tanks, pipe fittings, and loading operations, losses through evaporation, etc. Fugitive air releases have declined 82%, even more rapidly than overall use has declined, indicating that companies may be improving in their control of these unwanted releases,

¹ Janssen S, Solomon G, Schettler T. CHE toxicant and disease database. <http://database.healthandenvironment.org/>

² <http://www.aoc.org/tools.htm>

³ <http://www.iom.edu/en/Reports/2003/Clearing-the-Air-Asthma-and-Indoor-Air-Exposures.aspx>

⁴ Malo J-L, Chan-Yeung M. Appendix: Agents causing occupational asthma with key references. In Bernstein LI, Chan-Yeung M, Malo J-L, Bernstein DI (eds). *Asthma in the Workplace*. 3rd Ed. NY:Taylor & Francis, 2006.

REPORT 2009-2010 CASES NOW

Help us protect workers' health and promote safe workplaces! By April 30th, please report all occupational lung disease cases seen for the first time in 2009 or 2010. Thank you.

continued on other side

preventing product loss and protecting workers. The workers within the reporting companies are most directly exposed to fugitive air releases, which may cause or exacerbate asthma, thus adding to the burden of work-related asthma. The table below shows the top ten communities with the highest total cumulative fugitive air releases, and the top five responsible chemicals:

#	Town	Top 5 Responsible Chemicals (descending order of use)	Total Cumulative (lbs) Fugitive Releases
1	FALL RIVER	Ammonia, Acetic Acid, Formaldehyde, Sulfuric Acid, Styrene	816,458
2	NEW BEDFORD	Sulfuric Acid, Zinc & compounds, DEHP, Ammonia, Nickel & compounds	272,036
3	PEABODY	Ammonia, Acetic Acid, Sulfuric Acid, Zinc & compounds, TDI	254,759
4	WORCESTER	Sulfuric Acid, Ammonia, Formaldehyde, Chromium & compounds, Nickel & compounds	236,540
5	LOWELL	Ammonia, Styrene, Sulfuric Acid, DEHP	213,128
6	SALEM	Ammonia, Chromium & compounds, Nickel & compounds, Zinc & compounds, Sulfuric Acid	212,093
7	HAVERTHILL	Acetic Acid, Sulfuric Acid, Ammonia	151,257
8	CANTON	Ammonia, Aluminum, Phenylenediamine, Zinc & compounds, Styrene	112,901
9	GRAFTON	Nitrogen dioxide, Chromium & compounds, Aluminum, Nickel & compounds, Cobalt	108,819
10	LUDLOW	Styrene	104,277

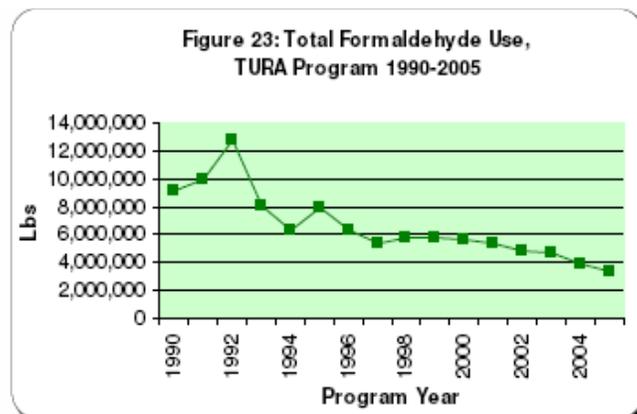
Source: Lowell Center for Sustainable Production report, July 2009.

Chemicals may also be discharged to air outside the facilities through stacks, vents, ducts or pipes. We do not know the impact of these releases, nor whether they affect the residents of any nearby community where the companies are located. Data are emerging about the adverse effects of traffic and railroad transportation emissions on asthma among nearby residents. It is possible that industrial releases may contribute to airborne chemical exposures, affecting already burdened communities.

Chemicals Driving the Trends

The report takes a closer look at the 9 chemicals driving the trends in Massachusetts: styrene, sulfuric acid, zinc, ammonia, diisocyanates, chromium and its compounds, acetic acid, formaldehyde and nitrogen dioxide. The report provides information for each chemical about usual use,

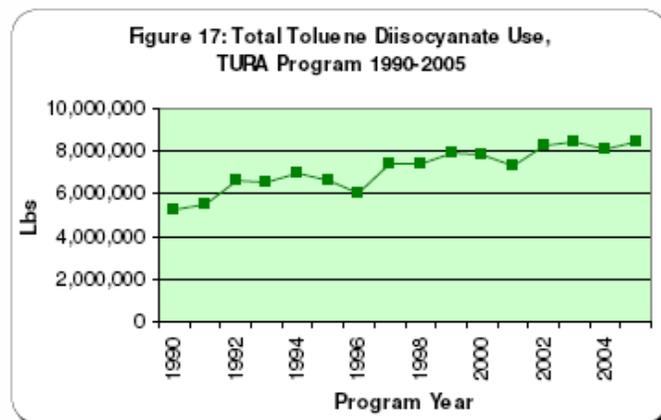
fugitive and point source air emissions and the location of these releases, by community and industry type. The authors also present the strength of the evidence about the potency of each chemical to cause asthma.



Source: Lowell Center for Sustainable Production report, July 2009.

For example, formaldehyde is used to manufacture resins and adhesives, permanent press fabric treatments, tissue preservatives, lawn fertilizers, cosmetics and disinfectants, and was ranked 9th among the asthma-related chemicals. The strength of evidence regarding its capacity to cause asthma is ranked as good/adequate by three of the four sources. Cumulative use totaled over 105 million pounds. Formaldehyde was used in quantities of 10,000 pounds or more in 22 communities. Use has declined by 63% from 1990-2005.

On the other hand, use of toluene diisocyanate (TDI), a known potent asthma causing chemical, increased over the same time period.



Source: Lowell Center for Sustainable Production report, July 2009.

LCSP calls for increased surveillance of workers exposed to TDI and research and technical assistance to identify a safer alternative. In addition, the report notes 100 chemicals that cause and/or exacerbate asthma that should be considered for reporting under the TURA (e.g. benzalkonium chloride, ethyl cyanoacrylate, colophony, ethanolamines). The TURA Science Advisory Board has already implemented a change—they will now consider asthma as a health outcome of concern in designating hazardous chemicals.

Please report work-related asthma cases to SENSOR by phone, fax, or mail!