

# Massachusetts Toxics Use Reduction Program

## Annual Report FY14



Submitted to:  
The Governor of the Commonwealth of Massachusetts  
The Commonwealth of Massachusetts House of Representatives  
The Commonwealth of Massachusetts Senate

Prepared by the Office of Technical Assistance and Technology  
June 2015

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## Introduction

Unanimously passed by the legislature in 1989, the Massachusetts Toxics Use Reduction Act (TURA) was the first comprehensive state pollution prevention law in the United States. TURA was a result of intensive negotiations between industry, environmentalists, and government, and launched a new approach to addressing the problem of toxics in the environment. Instead of developing and enforcing hundreds of chemical and process specific rules on the use and release of toxics substances, the Act set up an innovative combination of regulatory requirements, technical assistance, research and training programs designed to promote the voluntary adoption of cost-effective toxics use reduction techniques.

A cornerstone principle of the law is that the best way to reduce pollution is to address the root cause: the decision to use toxics in the first place. Firms in industrial categories that use large quantities of listed toxics have to report on their use and the wastes generated, and are also required to develop toxics use reduction (TUR) plans that identify and evaluate opportunities to reduce the use of toxics and the generation of toxic byproducts, or wastes. Because these evaluations typically reveal toxics use reduction measures that save the companies money, this approach leads to voluntary reductions in toxic chemical use, resulting in reductions in releases and toxic wastes. It also decreases the risks of major transportation and storage accidents, protects workers from dangerous workplace exposures, and creates safer products for customer use.

### **The Core Strategy of TURA**

Instead of requiring toxics users to stop using a chemical, TURA requires them to examine the method of chemical use and the possibility of alternatives. When toxic users are required to evaluate how chemicals are used and to identify alternatives, they often find ways to improve manufacturing and develop safer products and more efficient operations, which boosts the competitiveness of Massachusetts businesses.

### **TURA Program Components**

TURA is collaboratively implemented by three state entities:

- **MassDEP:** The Massachusetts Department of Environmental Protection (MassDEP) is charged with enforcing the law's annual reporting and biennial planning mandates, and promoting TUR as the preferred way to bring facilities into compliance with environmental regulations. The Department oversees licensing toxics use reduction planners (TURPs), and preparing an annual public report on toxic chemical use in the Commonwealth.
- **OTA:** The Office of Technical Assistance (OTA) provides no-cost, confidential assistance to toxic users to reduce their chemical use or increase the efficiency of energy, water, and materials use. OTA also produces fact sheets, case studies, and guidance on TURA, energy and water conservation, and compliance, and hosts workshops and other educational opportunities. OTA makes on-site visits to businesses, and is available to answer questions over the phone or by email.

- **TURI:** The Toxics Use Reduction Institute (TURI), located at UMass Lowell, is a multi-disciplinary research, education, and policy center. TURI sponsors and conducts research, organizes education and training programs and provides research and technical support to large and small businesses and community organizations. Among other activities, TURI trains TUR planners; convenes business working-groups; conducts policy research and analysis; provides grants to businesses, municipalities, community groups, and researchers; provides laboratory testing; and maintains a specialized library on toxic chemicals and safer alternatives.

The three state agencies work in conjunction with:

- An **Administrative Council**, overseen by the Secretary of Energy and Environmental Affairs, and with seats for representatives from public health, public safety, occupational safety, economic development, and environmental protection, that determines TURA policy and coordinates toxics prevention state-wide;
- An **Advisory Committee** to the Administrative Council, composed of business, labor, advocacy, citizen and other stakeholders, and provides input to the Council; and
- A **Science Advisory Board (SAB)**, with members from a variety of scientific backgrounds, that ensures that the program bases its decision-making on the best available science.

#### **Designations of Higher Hazard Substances in FY14**

The Administrative Council, with input from the Advisory Committee, voted to designate the chemical n-Propyl Bromide (nPB) as a Higher Hazard Substance (HHS). The chemical solvent, mainly used for metal degreasing, adhesives, and dry cleaning, is a suspected carcinogen and causes eye, nose, and throat irritation, as well as headache, dizziness, nausea, and fatigue after acute exposure. The Higher Hazard Substance designation lowers the reporting threshold to 1,000 pounds per year for all uses of the chemical.

During the fiscal year, the Council also began deliberations for possible designation of four other substances as HHS: hydrogen fluoride, cyanide compounds, toluene diisocyanate (TDI) and TDI mixed isomers, and dimethylformamide (DMF). As of the end of FY14, the Council had not yet voted on the designation of these four chemicals, and the designations will be determined in FY15.

Following the designation of Methylene Chloride as a Higher Hazard Substance in FY13, the program agencies successfully launched an outreach campaign for the chemical in FY14. This outreach follows the arc of other successful campaigns for HHS, including TCE and perchloroethylene (perc).

#### **Future Program Directions**

In FY15, the program plan is to focus on completing the Higher Hazard Substance designations discussed above and the development of a proposal for updating the TUR fees that are required of all filers. TURA requires that these fees be adjusted annually to reflect changes in the Producer Price Index, and this change has never been implemented. As a result fees are approximately 67 percent less than they would

have been had this legislative mandate been followed. As it would be a hardship to increase fees by that amount all at once, the program must propose a course of action that fits the needs of filers as well as the need to meet statutory mandates. Preliminary discussions have already identified the need to structure any fee increase so that it does not impose an excessive burden on any business, but in particular on small businesses.

The TURA program will also conduct outreach on any new Higher Hazard Substances that are designated, and will examine toxics use by small quantity users and businesses with less than ten employees and report to the Administrative Council on whether Priority User Segments should be designated. This will include a PrUS analysis for formaldehyde. The program will continue working with a wide range of sectors, including users of previously designated Higher Hazard Substances such as methylene chloride, defense suppliers in the state, smaller businesses such as dry cleaners and auto shops, and environmental purchasing, among other focus areas. TURI will foster research on TUR alternatives and develop new workshops and factsheets, OTA will perform outreach to offer its services to manufacturers and others, and DEP will examine improvements in inspection and enforcement.

A major focus of FY15 will be the celebration of the 25<sup>th</sup> Anniversary of the Toxics Use Reduction Act through a TUR Leadership Tour in which close to a dozen facilities, across the Commonwealth, that have demonstrated successful application of TURA principles will be honored. The Council, the Advisory Committee, and the Science Advisory Board will all have new members, and the program will seek their input and guidance, and report to them in open public meetings.

## Highlights from Fiscal Year 2014

Highlights of TURA program work in FY14 (July 1, 2013 to June 30, 2014) included the following:

- **Site visits.** OTA completed 53 on-site visits to facilities and provided assistance to many more through email, phone calls, workshops, and distributed factsheets.
- **Grants:** TURI provided grants for two university research projects, five community-based projects, and three businesses in the biotechnology, defense, and dry cleaning sectors.
- **Demonstration events:** The TURA program sponsored demonstration events at Raytheon Corporation, showcasing its conversion to ozonated water for cleaning; at KMK Cleaners, showcasing wet cleaning technology; and at ChemGenes, demonstrating a new solvent recovery system.
- **Training:** The TURA program provided a wide variety of training opportunities, including a 7-week TUR planner course; two continuing education conferences; special conferences on the aerospace and defense sector, medical devices, and European Union regulations relevant to Massachusetts businesses; and a series of webinars.
- **TUR planner certification:** MassDEP certified 146 Toxics Use Reduction Planners as having the training and expertise needed to review and approve toxics use reduction plans.
- **Higher Hazard Substance designations:** The Administrative Council voted to designate n-propyl bromide (nPB) as a Higher Hazard Substance (HHS), and began consideration of four other HHS candidates.
- **Case studies and fact sheets:** The TURA program published new case studies on Crane & Company, Inc. and Noor Oriental Rugs, and wrote or updated fact sheets on methylene chloride, hexavalent chromium, and n-propyl bromide.



Demonstration event for new solvent recovery system at ChemGenes

## The Administrative Council and the Advisory Committee

A key component to the success of the TUR program is the structure of the program: three program agencies with a multi-agency governing body, the Administrative Council, and its Advisory Committee. Activities of the Administrative Council and Advisory Committee in FY14 included the following.

- After considering the Advisory Committee and program agencies' recommendations, including reporting from the Science Advisory Board and comments submitted by various private parties, the Council voted to designate nPB as a Higher Hazard Substance. nPB is a suspected carcinogen and causes peripheral and central nervous system toxicity.
- The Advisory Committee developed criteria for prioritizing additional substances for potential Higher Hazard Substance designation, and reviewed the SAB's existing list of More Hazardous Substances to identify priorities for additional TURA program work in FY15.
- The program agencies developed, and the Advisory Committee and Administrative Council provided input on, a detailed implementation plan for outreach to businesses that use methylene chloride.
- Administrative Council members toured a dry cleaner in Walpole that switched from using the solvent perchlorethylene (perc) to professional wet cleaning with support from a TURI grant; this has resulted in reduced labor costs, worker absenteeism and headache complaints, and electricity and water usage.



Administrative Council Members at KMK Cleaners for professional wet cleaning demonstration.

## Science Advisory Board

The SAB provides science-based recommendations on the questions considered by the Advisory Committee and Administrative Council, as well as providing expert scientific review to inform other agency decisions.

In FY14, TURI worked with the Science Advisory Board to examine a number of questions and provide science-based recommendations to the TURA program.

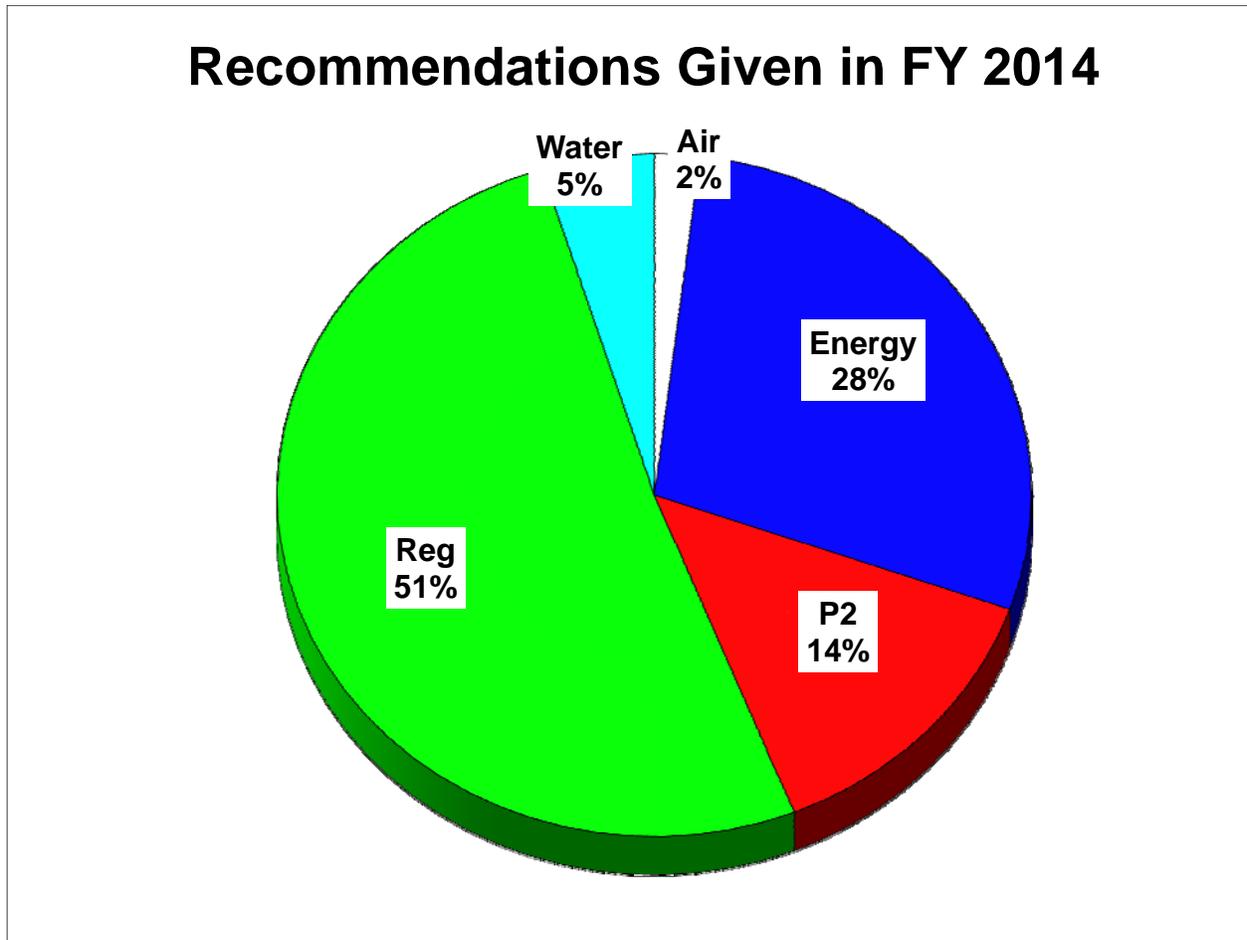
- The SAB categorized n-propyl bromide (nPB or 1-bromopropane) as an SAB More Hazardous Chemical.
- The SAB reviewed current scientific information on ethyl acetate, a chemical categorized by the SAB as a Less Hazardous Chemical. TURI is considering proposing ethyl acetate as a TURA Lower Hazard Substance.
- The SAB continued its examination of the phthalate esters category in order to provide advice to MassDEP. This category is on the TURA list of toxic or hazardous substances, but by MassDEP policy has not been reportable.
- The SAB also initiated a review of the EPCRA Diisocyanates Category. This includes MDI (methylene diphenyl diisocyanate), which is individually categorized as an SAB less hazardous chemical. The SAB will review all the other diisocyanate substances in the EPCRA category to determine whether the entire category should be categorized along with MDI as more hazardous substances.

## The Office of Technical Assistance (OTA)

### Assistance Services

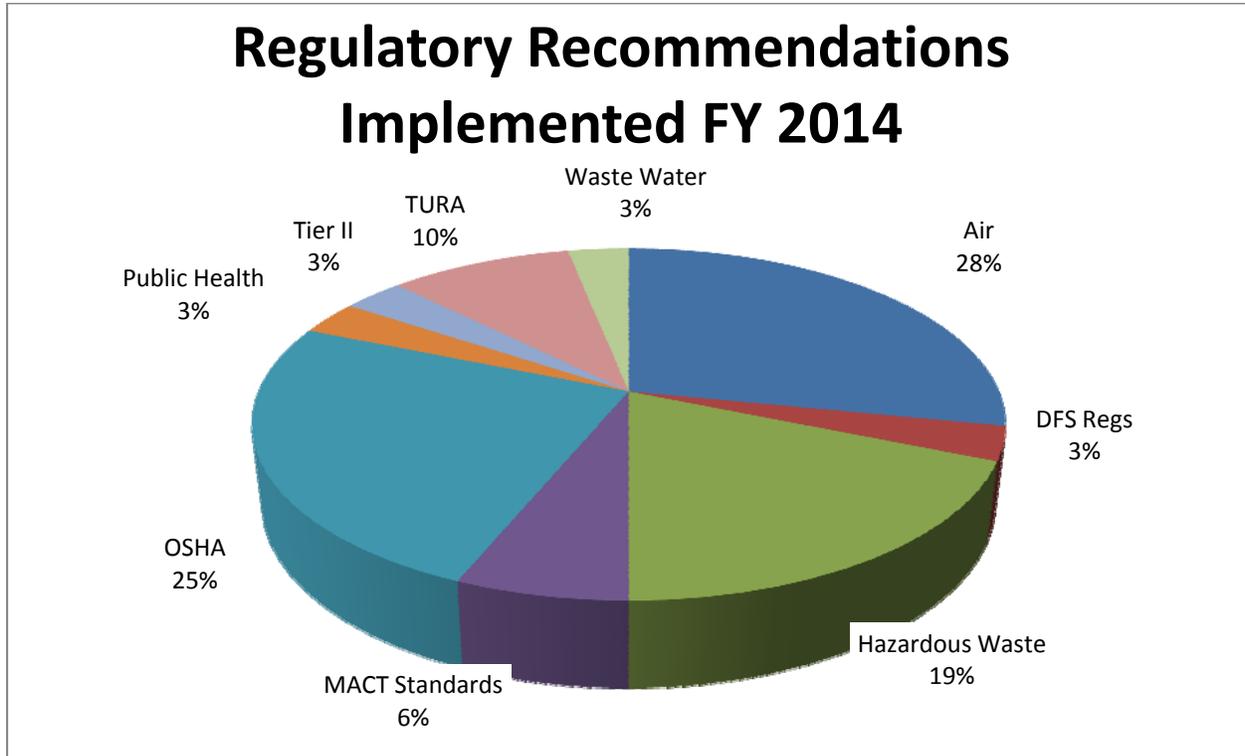
Onsite technical assistance continues to be at the core of OTA's services. During FY14, OTA engineers made 92 visits to 53 facilities in the following industry sectors: transportation equipment, plastics, machinery, furniture, food processing, fabricated metal products, electronics, chemicals automotive repair, and textiles and paper. Seventy-nine percent of the businesses visited have previously received onsite assistance from OTA. 52 percent of the total site visits were referrals from a state or public agency such as MassDEP, U.S. EPA, Massachusetts Office of Business Development, the Department of Occupational Safety, or publically owned treatment works (POTW). 20 percent were a result of OTA outreach activities, and the remainder were company initiated or from other sources.

During FY14, OTA engineers provided more than 290 recommendations to the visited facilities. Of these, 28 percent of the recommendations concerned energy efficiency or clean energy options, 53 percent were related to regulatory compliance, fourteen percent concerned toxics use reduction or pollution prevention, and 5 percent concerned water conservation.



Of the recommendations made to facilities, forty percent were implemented or plan to be implemented by facilities. Out of the 40 percent of regulatory recommendations implemented during this fiscal year,

28 percent involved air issues, 25 percent were OSHA related issues, 19 percent involved hazardous waste management issues, 10 percent were TURA related, 6 percent involved MACT standards, 3 percent were waste water issues, 3 percent were Tier II related and 3 percent were related to public health.



The energy recommendations implemented during FY14 can be broken down into the following categories: 34 percent involved compressed air, 22 percent concerned building envelope improvements, 22 percent were suggestions and guidance for energy efficiency incentives and 11 percent concerned lighting.

The office published two case studies of successful projects by companies that received OTA’s assistance, including the following:

- Crane & Company, Inc., founded in 1801 and located in Dalton, Massachusetts, is the oldest continuously run paper manufacturer in North America. The company incorporated new technology and process changes to conserve energy and save money with the implementation of renewable energy and energy efficiency projects. Crane installed a small hydroelectric power generator and a combined heat and power back-pressure steam turbine generator. Together, the projects save the company nearly \$273,000 annually in reduced energy costs. The new installations have the added benefit of significantly reducing carbon dioxide, sulfur dioxide, and nitrous oxide emissions.
- Noor Oriental Rugs, an importer and restorer of fine oriental rugs in Cambridge, Massachusetts, utilized OTA’s assistance services to find a replacement for a lotus-based rug soap that is not

available in the United States. Noor and OTA researched safer alternative soaps and Noor is now able to report that its process is safer than those that use machine-washing, petroleum-derived soaps and dyes, and industrial disinfectants, deodorizers, and moth-repellents.

### **Assistance to Non-TURA Filers**

#### **Energy and Water Conservation**

In FY14, OTA gave recommendations regarding energy conservation to 59 facilities, 28 percent of the total recommendations given throughout the year, and water conservation recommendations to 10 facilities, 5 percent of the total recommendations given throughout the year.

One facility in Southeastern Massachusetts improved their compressed air distribution, allowing the company to turn off one of their air compressors, saving 32,000 kilowatts hours and \$2,500 annually. The company also enrolled in a local utility company's demand response program, which provides them a payment of approximately \$30,000 a year. The facility also reduced water consumption by 3 million gallons per year, by using a portable meter to measure water flow for processes. The reduction in water consumption saved the company approximately \$21,000 annually.

Another company, located in Central Massachusetts, implemented a lighting upgrade to their facility and saw an annual reduction of 32,000 kilowatts hours, resulting in annual savings of \$2,500.

#### **Outreach and Collaboration**

Throughout FY14, OTA collaborated with outside groups working on toxics use reduction and water and energy conservation projects. Some of these projects include:

**Massachusetts Clean Auto Repair (MassCAR)** – In FY14, EPA provided a grant to OTA to update an existing guidance document that OTA developed for auto body and repair shops, to help them comply with requirements and to implement pollution prevention and other environmental best practices. The previous guidance, *CRASH COURSE*, has been used and adapted by facilities state-wide wishing to be in compliance with relevant requirements and to implement pollution prevention practices. The new guidance, *Sustainability Training for Auto Repair Shops (STARS)* is being developed through a Massachusetts Clean Auto Repair (MassCAR), partnership, in which auto facilities and associations are providing information and comment. STARS will inform facilities of current compliance requirements and about how to implement the latest practices that characterize a shop as “greener” or “more sustainable,” and are also considered good business operation. The guidance will help shops document their implementation of responsible practices so that they can be considered as acting in “good faith”. The grant will continue into FY15, during which OTA will hold workshops to educate the sector about the practices in the guidance.

#### **Sustainable Nanotechnology Organization**

As a result of OTA's issuance of guidance on the “Safe Development of Nanotechnology” in 2010, OTA staff have been invited to speak at various conferences examining nanotechnology policy. OTA staff

have now presented at two annual conferences of the new Sustainable Nanotechnology Organization. An OTA staff presentation was accepted for presentation at the organization's 2014 meeting in Boston, on "Good and Bad Nano," discussing the importance of avoiding either too permissive or too restrictive an approach to classifying nano products or processes, presenting considerations of the value of precaution, and proposing "collaborative evaluation."

## **The Toxics Use Reduction Institute (TURI)**

The Toxics Use Reduction Institute (TURI) at UMass Lowell provides research, training, technical support, laboratory services, and grant opportunities to reduce the use of toxic chemicals while enhancing the economic competitiveness of local businesses. TURI also manages the SAB and conducts policy analyses that form the basis of TURA program decision-making on chemical listing, de-listing and categorization, ensuring the development of sound policies with a strong grounding in science. In addition, TURI collaborates with diverse groups, including communities, businesses, institutions, and government and public entities to develop innovative approaches and share best practices.

### **Education and Training**

Throughout the year, TURI hosts various events, including workshops, conferences, webinars, and training courses to educate on TURA, TUR planning, and toxics. Education and training activities in FY14 included the following.

- **TUR Planners' Training Course.** Every year, the Institute presents a seven-day course to train new Toxics Use Reduction Planners. This year, TURI began a process of reformatting the course from a purely live classroom format to a blended format consisting of online slide lectures and live classroom sessions for group workshop exercises and discussion. The objective is to make the course more efficient; basic informational slide presentations will be available online, where participants can listen on their own schedule and at their own pace, while classroom sessions will be devoted to workshop exercises, group discussion, and team project work. This will shorten the time participants must devote to classroom sessions away from their normal duties, and make it easier for those travelling from a distance. The first three of twelve course modules were prepared in FY14, for use in the Fall 2014 course offering.
- **TUR Planners' Continuing Education Conferences.** TURI offers semi-annual Continuing Education conferences for TUR Planners to ensure that they have the most up-to-date information on chemical hazards, alternatives, and regulations, and to assist them with maintaining their certifications. At the Fall 2013 conference, TURA program staff and experienced TUR planners engaged all participants in a full-day refresher training on planning basics. Topics included planner ethics, plan scope, materials accounting, options evaluation and financial analysis. The Spring 2014 CE Conference also included a 'back to basics' track, as well as sessions on toxics in building materials, TUR case studies, changes in ISO Environmental Management System standards, and toxics policy.
- **Resource Conservation course.** TURA filers may complete Resource Conservation (RC) plans in place of TUR plans after they have completed at least three cycles of TUR planning. Every two years, TURI presents a two-day training for planners wishing to become RC-certified. This year, the RC Planning training featured several outside speakers with direct RC Planning experience, including speakers from Pfizer, Lightolier, Polartec, Save That Stuff, and MA Clean Energy Center.
- **Workshops: EU Regulations, Aerospace/Defense, and Medical Devices.** TURI provided full-day workshops on the Aerospace and Defense sector, and on two important European Union toxics-

related regulations – the regulation on Registration, Evaluation, and Authorization of Chemicals (REACH), and the updated Restriction on Hazardous Substances (RoHS). Both of these regulations have significant impact on Massachusetts industry; REACH affects chemical producers as well as other producers who may incorporate EU-defined Substances of Very High Concern in their products. Since Massachusetts is home to a great many suppliers to the aerospace industry, understanding the requirements of REACH can be important even for small producers whose products are included in the EU aerospace supply chain. RoHS is directed specifically at producers of electrical and electronics products and now includes new categories of electronics – in particular medical instrumentation. For this reason, medical electronics was a special focus of this event, which featured guest speakers from both the UK and North America.

- **Workshops: “Beyond the MSDS.”** The TURI library conducts on-going outreach to researchers and planners, focusing on providing them with tools to better identify hazards of chemicals before adopting these chemicals in industry. Last year, TURI initiated a 2-hour workshop, called “Beyond the MSDS”, to train participants in the use of databases to learn about chemical hazards. This workshop was repeated several times in FY2014 – as an in-person 2-hour class, as a webinar, and as part of several University classes.
- **Webinars.** TURI also introduced a new series of webinars, available to TUR planners as well as to the general public. Five were presented in FY2014, covering the following topics: resources for researching safer chemicals; business benefits of safer metal plating; green janitorial cleaning; update on the European REACH and RoHS regulations; and overview of issues related to solvents.



Mark Rossi, from BizNGO, presenting on California’s Safer Consumer Products regulations at the TUR Planners’ Continuing Education

## Grant Opportunities

TURI provided grants to industry, University of Massachusetts researchers, small businesses, and community organizations to advance toxics use reduction goals in a wide variety of sectors.

## Industry Grants

- **Biotechnology sector:** ChemGenes of Wilmington, MA, was selected as the FY13 Industry Incentive Grant recipient. They installed a new solvent recovery system which reduced the use of ethyl acetate and hexane by 70 to 90 percent. The first demonstration event was held on June 6, 2013, and the project continued into FY14 with a second demonstration on November 5, 2013, attended by approximately twenty people from industry and pollution prevention stakeholders.
- **Aerospace and Defense Sector:** TURI provided an incentive grant to Raytheon Corp. to support converting their janitorial cleaning to an ozonated water system. The Lotus® Pro system uses ozonated water as an alternative to chlorine bleach for surface cleaning and disinfection. A demonstration event was held at Raytheon's Andover manufacturing facility on May 28, 2014, with 32 attendees. Follow-up testing by Raytheon and TURI's Cleaning Lab has provided feedback to the Lotus® Pro manufacturer on efficacy and ozone levels.
- **Dry Cleaners:** In FY13, TURI provided a grant to KMK Cleaners of Walpole to eliminate its use of perchloroethylene and become a dedicated professional wet cleaner. In 2014, TURI sponsored two demonstration events at KMK Cleaners, where the facility showcased its work for other cleaners and other interested stakeholders, including members of the TURA Administrative Council. Due to their conversion from perc to wet cleaning, KMK has seen a 40 percent reduction in electricity costs and greater than 50 percent reduction in water use, and is saving over \$1,500 per month in operating costs. Also in FY14, J&P Cleaners in the Jamaica Plain Neighborhood of Boston opened as a dedicated wet cleaner with grant assistance from TURI and has been a focus of the Jamaica Plain New Economy Transition project to move local small businesses away from carcinogens.

## University Research Grants

By funding University of Massachusetts research, TURI helps to keep Massachusetts companies on the leading edge of technologies that are ahead of compliance trends, and environmentally, occupationally and economically sound. This research also educates the next generation of engineers, scientists and decision makers about toxics, green chemistry and safer materials. Two projects were supported at UMass Lowell in FY14:

- Alternatives to formaldehyde in resins. Assoc. Prof. Ramaswamy Nagarajan in Plastics Engineering tested naturally-occurring sugars to replace formaldehyde, a known irritant and potential cancer hazard, in phenolic resins used in wood adhesives, laminates and coatings, and bonded and coated abrasives.
- Alternatives to lead in electronics. Assoc. Prof. Zhiyong Gu in Chemical Engineering worked to create a new type of lead- and halogen-free nanosolder paste for use in next-generation electronics assembly, with possible applications in manufacturing of computers, cell phones, automobiles, satellites and medical devices such as heart pacemakers.

## Regional, Municipal, Community, and Small Business Grants

Each year, TURI sponsors a competitive community grants program available for community organizations, small businesses, and regional, county, and municipal departments to create and promote healthier communities by raising awareness and educating people about safer alternatives to toxics. The following projects were funded in FY14.

- **Barnstable County** – “Hidden Hazards in the Art Studio Education Outreach Program.” Hidden Hazards in the Art Studio is an educational outreach project highlighting the importance of protecting the health and safety of artists, their family and pets, and the environment, through the use of less toxic alternatives to hazardous art supplies, the prudent use of hazardous materials used in creating vibrant art, and information on the proper storage and disposal of such products. The project was extended to local boards of health, art schools and teaching facilities, veterinary practices, cultural districts, film festivals, and other relevant groups.
- **La Chic Mentoring Plus, Inc.** – “Healthy Girls Model Healthy Products.” The goal of this project was to educate girls, their mothers and their friends and school community about safer alternatives to toxic chemicals in products they commonly use, such as cosmetics, personal care products and textiles. The Healthy Girls Model Healthy Products (HGMHP) activity taught young girls about the potentially toxic effects of certain chemicals and the properties and structures of effective alternatives.
- **Jamaica Plain New Economy Transition** – “Cancer-Free New Economy Jamaica Plain.” This project was designed to promote a transition to a “cancer-free new economy” in the Boston neighborhood of Jamaica Plain, integrating toxics use reduction approaches with sustainable community development. The Jamaica Plain New Economy Transition (JPNET) is a community-based effort to strengthen community resilience and support the transition to a sustainable and equitable economy. The project conducted trainings and outreach to promote toxics use reduction as a fundamental strategy for this effort. As part of this project, participants identified and worked with a dry cleaning facility to develop their interest in converting to wet cleaning.
- **Franklin Regional Council of Governments** – “Green Cleaning for Foodservice.” This project worked to reduce toxic chemical use in food service establishments in western Massachusetts. The project was a collaboration between local health departments from municipalities of all sizes in three counties. The project worked to reduce toxics use in food service by compiling information on certified green cleaning products, practices and benefits and then distributing that information during routine public health inspections of commercial and institutional kitchens.
- **Full Circle Earth** – “Healthy Communities Initiative.” Full Circle Earth used this grant to raise awareness about the negative impact of toxic chemicals found in many common lawn care products. The goal is to educate the public about the need to eliminate the use of pesticides and other harmful land applied chemicals while providing viable alternatives to them. This was done through workshops, community and environmental events in Beverly, Wakefield and Woburn. The workshops demonstrated compost tea brewing and easy-to-use kits were given out to help people achieve healthy lawns and landscapes without the use of pesticides or harmful fertilizers. These workshops explained how to rejuvenate the soils through the introduction of microbes that will strengthen plants to resist pests.

## Sector-Specific Projects

- *Aerospace and Defense.* TURI has continued a successful collaborative initiative with companies and government agencies in the aerospace and defense sector to research safer alternatives to the use of hexavalent chromium in selected applications. Core participants include Raytheon, Lockheed Martin, Northrop Grumman, Bombardier, NASA, U.S. Navy, U.S. Army, and U.S. Air Force. The first phase of research was completed in FY13, providing positive results for the use of non-hexavalent chromium materials for primer coating applications. The second phase of research was completed in FY14, providing positive results for the use of non-hexavalent chromium materials for sealant applications. During FY15, TURI will continue working with these companies and government agencies to research safer alternatives to hexavalent chromium used for structural adhesive coatings.
- *Dry cleaning.* TURI continues to take an integrated approach to helping dry cleaners shift to safer alternatives. (See box, below.) Largely as a result of encouragement and financial support provided by TURI, more than a dozen dry cleaners across Massachusetts have made the switch from perchloroethylene to professional wet cleaning. In FY14, TURI sponsored demonstration events at KMK Cleaners, which had received a conversion grant in a previous year. TURI also provided a grant to J&P Cleaners in Jamaica Plain, and worked closely with the business to facilitate the conversion, including providing information on equipment and arranging training in use of the new equipment.
- *Auto shops.* With funding from an EPA Pollution Prevention grant, TURI continued to conduct outreach to auto shops, working with them to test safer products, including alternative brake cleaners and paint gun wash solutions.

### **FY14 Highlight: TURA's integrated approach to working with the dry cleaning sector**

The TURA Program's integrated approach to promoting safer alternatives in garment cleaning includes the following:

- *Grants and demonstration events.* TURI has now provided grants to a total of nine dry cleaners, enabling them to shift to dedicated professional wet cleaning. Each cleaner that receives a grant from TURI also hosts one or more demonstration events. In FY14, TURI sponsored demonstration events at KMK Cleaners, and worked with J&P Cleaners in Jamaica Plain to complete its conversion to wet cleaning.
- *Environmental Results Program:* In FY13, MassDEP and TURI worked together to update and solidify the guidance for dry cleaners provided through the ERP program. In FY14, cleaners used this new guidance, which provided information on alternative systems and a voluntary, simplified assessment tool to compare environmental impacts, effectiveness, and other attributes. Approximately half of dry cleaners filing an ERP certification stated that they had completed the assessment.
- *Federal policy development:* TURI was invited to provide commentary to the Federal Trade Commission (FTC), and participate in a panel discussion, on the FTC's care label standard. TURI has also provided input to the EPA Design for Environment program.
- *Data analysis.* TURI has collected data on performance, labor needs, energy and water use, and cost savings at each of the demonstration sites. An earlier effort in California collected similar data for a number of California cleaners. TURI's work is the first documentation of such data across multiple facilities on the east coast.
- *Outreach to additional cleaners.* During FY14, OTA staff visited 116 Massachusetts dry cleaners to provide information about hazards of perchloroethylene and n-propyl bromide and to explain TURA program resources available to help them shift to wet cleaning.
- *Wet Cleaners' Work Group:* TURI has facilitated the formation of a wet cleaner's workgroup consisting of all Massachusetts dedicated wet cleaners. The purpose of the group is to share expertise and lessons learned to strengthen their professional knowledge and enhance performance.
- *Work with multiple stakeholders.* The TURA program has worked with the North East Fabricare Association among other stakeholders in developing initiatives for this sector.

### **Research**

TURI is a leader in the innovation and implementation of alternatives assessments as a way of promoting a shift towards safer chemicals in industrial processes and consumer products. This work has focused not only on Massachusetts industry and small business needs, but has also included national and international level collaborations. The Institute also provides science and policy research to support the work of the SAB, and to inform the Institute's recommendations to the TURA Administrative Council. Research conducted in FY14 included:

- *TUR and disease prevention.* In FY13, TURI completed a study of trends in the use of carcinogens as reported by TURA filers. In FY14, TURI built on this work through additional publications and outreach, including an educational presentation to the Comprehensive Cancer Prevention and Control Program steering committee hosted by MassDPH. TURI and OTA also continued to work

with MassDPH on implementation of its existing five-year Asthma Prevention Plan, as well as providing input on the development of the next five-year plan.

- *National and international chemicals policy.* The TURA program is recognized nationally and internationally as a leader in chemicals policy development. Upon request, TURI staff members occasionally provide input on national or international chemicals policy questions. In some cases, these questions have the potential to affect Massachusetts businesses and communities directly. For example, in FY14, TURI staff members provided input, upon request, on the potential impacts on Massachusetts of proposed changes to the federal Toxics Substances Control Act (TSCA). In other cases, other jurisdictions request information on the Massachusetts program in order to learn about options for improving their own chemicals management policies. For example, in FY14, TURI staff provided information on the experiences of the TURA program to other states through the Interstate Chemicals Clearinghouse and the Great Lakes Green Chemistry collaborative; federal agencies and others through conferences organized by the Institute of Medicine and by US EPA; a nationwide collaborative of businesses through the Green Chemistry in Commerce Council; and to members of the legislative and executive branches of the French government. Any travel related to providing assistance to jurisdictions outside Massachusetts is covered by non-TURA funds.
- *Alternatives assessment.* TURI is a leader in the innovation and implementation of alternatives assessments as a way of promoting a shift towards safer chemicals in industrial processes and products. This work has focused not only on Massachusetts industry and small business needs, but has also included national and international level collaborations. Among other activities, TURI worked with other organizations to develop the Commons Principles for Alternatives Assessments, which are referenced by industry, government and NGOs.

### **Laboratory Services**

By providing free testing services to Massachusetts companies looking for safer cleaning alternatives, TURI helps companies reduce the amount of hazardous chemicals used in surface cleaning. The TURI Laboratory tested the performance of safer cleaning solutions for Massachusetts companies and suppliers representing the metal working, biomedical, coating and cleaning chemicals sectors. The TURI Laboratory continued to expand its services to industry and the Commonwealth in the area of janitorial cleaning. A major focus of the lab's assistance work was with the MA Department of Conservation and Recreation, the MA Department of Correction, and the MA Environmental Purchasing Toxics Reduction Task Force and Environmentally Preferable Products (EPP) Procurement Program to help state agencies move to greener janitorial cleaning chemicals and systems. The Lab continued its active research program with Dr. Nancy Goodyear of Clinical Laboratory and Nutritional Sciences investigating safer approaches to disinfection.

### **Library Services**

The TURI Library has responded to information requests from students, faculty, industry, non-governmental organizations, constituents, and other MA agencies. Selected topics include: plastics additives; restricted substances; VOC regulations and retailer's responsibilities; health effects of pool

chemicals; substitutes for acetonitrile in the chemical synthesis of oligonucleotides; non-methanol alternatives for windshield wiper fluid and antifreeze; flame retardants; health effects of fluoridation; insulation choices for building; alternatives to ammonia in refrigeration; health effects of chemicals used in auto body detailing; EHS information on alternative brake cleaning fluids; safety of organic hair care products; Globally Harmonized System of Classification and Labeling of Chemicals (GHS); and health impacts of solar PV installation.

The TURI library's newsletter, Greenlist, continued to provide information on important new publications. Greenlist converted from weekly to bi-weekly distribution starting in January 2014, and now includes special topic issues in order to provide a deeper understanding of selected topics. Recent topics have included Nanotechnology and Green Building.

### **Publications, Presentations, and Educational Materials**

TURI publishes educational materials for a variety of audiences, including Toxics Use Reduction Planners, professionals in industry sectors that use toxic chemicals, and the general public.

In FY14, TURI published new or updated fact sheets on methylene chloride, hexavalent chromium, and n-propyl bromide. Each six-page fact sheet includes detailed information on chemical hazards, use, and alternatives, and presents the most recent information on data submitted on the use of these chemicals by TURA filers. TURI Fact Sheets are used by TUR Planners in their work with Massachusetts businesses, and are distributed in hard copy and electronically to chemical users.

In FY14, TURI published information on the transition from hexavalent to trivalent chromium, and on solvent-free cleaning systems for auto repair shops, in sector-specific trade journals.

TURI staff provided educational presentations in a variety of settings. Topics included an overview of TURA program resources; information on hazards of exposure to nanoparticles and techniques for reducing exposure; options for sharing information on chemicals in products through supply chains; an introduction to alternatives assessment; tools for creating safer products; case studies of safer alternatives to perchloroethylene and hexavalent chromium; approaches to cancer prevention through toxics use reduction; lessons learned from 20 years of toxics use reduction in Massachusetts; research results on alternatives for hexavalent chromium sealants; safer alternatives in building materials; and safer alternatives to perchloroethylene in garment care.

### **Press Coverage**

Press coverage, both print and online, is another important route for public and business education about safer alternatives to toxic chemicals. In FY14, the work of the TURA program was featured in a variety of press outlets, with coverage of topics including declining use of carcinogens in the state and the importance of toxics use reduction for cancer prevention; the Framework for Safer Chemical Alternatives; the importance of TUR in preventing chemical accidents; the importance of sharing information about chemical ingredients through industry supply chains; and UMass Lowell researchers' progress in identifying and testing safer alternatives to toxic chemicals.

## **The Department of Environmental Protection (MassDEP)**

MassDEP administers the regulatory components of the TURA program. Each July 1, large-quantity toxics users submit an annual report to MassDEP on each chemical listed by TURA used in above-threshold amounts during the previous calendar year. These reports supplement the Toxics Release Inventory (TRI) report that must be submitted to the U.S. Environmental Protection Agency and MassDEP on the same date. Every other year, large-quantity toxic users must also develop a TUR plan or plan update, which must be signed by a MassDEP-certified TUR Planner. A summary of the plans must be submitted with the TUR report.

In FY14, MassDEP processed TUR reports from more than 500 filers, checking reports for accuracy and compliance; followed up on report anomalies and conducted inspections; took enforcement actions, as necessary; provided assistance via phone and email; processed fees and fee waivers; qualified and certified TUR Planner applicants; and worked alongside OTA and TURI on all aspects of TURA policy development and program planning.

### **Data**

The most recent data available derives from the 2012 Toxics Use Reduction Information Release, which summarizes the information received from the TUR reports that were submitted by July 1, 2013. MassDEP received:

- 1,683 Form S's were filed, with an accompanying Form R, from the Federal Toxics Release Inventory, also required to be submitted. These forms were received from 477 large-quantity toxic users and:
  - Used a total of 895 million pounds; and
  - Reported 139 individual toxic chemicals.

### **Outreach**

MassDEP updated the following documents in FY14:

- 2013 Toxics Use Reduction Reporting Instructions (updated March 2014)
- Complete List of TURA Chemicals (updated April 2014)
- Toxics Use Reduction Planning and Plan Update Guidance (significantly revised March 2014)
- Resource Conservation Planning Guidance under the Toxics Use Reduction Act (updated March 2014)
- Environmental Management Systems Planning Guidance under the Toxics Use Reduction Act (updated March 2014)
- Directory of Toxics Use Reduction Planners (updated monthly through June 2014)
- Reporting Year 2012 Toxics Use Reduction Information Release (June 2014)

Mass DEP also held four training sessions throughout the year.

## **Enforcement**

During FY14, MassDEP:

- Inspected 76 TURA Filers.
- Screened another 321 facilities to determine if they were subject to TURA.
- Issued enforcement actions, including
  - One Notice of Non-compliance and
  - Three Administrative consent orders with penalties.

## **Fee Revenue**

TURA-regulated facilities must pay annual fees, unless they have obtained a financial hardship waiver. In FY14 there were no fee waiver requests. MassDEP collected:

- \$2,885,400 in annual fees and statutory late fees, and
- \$28,850 in fees from TUR planners who applied for the DEP's certification.

## **TUR Planner Certification**

Toxic Use Reduction Planners (TURPs), who are independent parties who review and approve annual toxics use reduction plans, must be certified by MassDEP. In FY14, MassDEP:

- Certified 11 new TURPS, and
- Recertified 135 TURPS whose two-year certification was due to expire.

Out of these 146 certifications and recertifications:

- 49 certifications were for "Limited Practice" TUR planners, who are only authorized to sign plans for their own company, Of these:
  - 44 were approved for TUR plans only.
  - 2 were approved for TUR and RCP plans.
  - 3 were approved for TUR and EMS plans.
- 97 were for "General Practice" TUR planners, who are allowed to sign the plans for any toxic user, Of these:
  - 47 were approved for TUR plans only.
  - 19 were approved for TUR and RCP plans.
  - 16 were approved for TUR and EMS plans.
  - 15 were approved for TUR, RCP and EMS plans.

At present, there are a total of 198 Certified TUR Planners.

- 128 are approved for TUR Plans Only
  - 69 General Practice
  - 59 Limited Practice

- 23 approved for TUR and RCP Plans
  - 21 General Practice
  - 2 Limited Practice
- 25 approved for TUR and EMS plans
  - 19 General Practice
  - 6 Limited Practice
- 2 Limited Practice TURPS approved just for EMS plans
- 19 approved for TUR, RCP and EMS plans
  - 17 General Practice
  - 2 Limited practice

Six applicants for General Practice TURP certification passed the exam administered by MassDEP in December 2013. The agency reviewed and approved approximately 30 CEU training opportunities submitted by TURPs for continuing education credits, for maintaining TUR, RC, and EMS certifications. MassDEP also reviewed the work experience in application for limited practice TURPs for relevance to TUR.

## **Appendices**

### **Policy Decisions**

The following policy decisions occurred in FY14:

- The Administrative Council voted to designate n-Propyl Bromide (nPB) as a Higher Hazard Substance.

### **Events**

TURI organized a variety of events in FY2014, including the following. (Note: This list does not include the events organized by recipients of the FY2014 TURI community grants.)

#### *September 2013*

- TUR Planner Certification Course, 7 weeks, Sept 12 through Oct 24 (11 students)
- Aerospace & Defense Industry Supply Chain Conference, September 2013 (51 attendees)
- RoHS and REACH Workshop, September 2013 (43 attendees)

#### *October 2013*

- Beyond the MSDS training session at the TURI library, October 201, 2013 (21 attendees)

#### *November 2013*

- Solvent Recovery and Recycling: ChemGenes Corporation, Wilmington
- KMK Cleaners, Walpole, November 2013
- Toxics Use Reduction Planners' Continuing Education Conference (72 attendees)
- Resource Conservation Workshop, November 2013 (37 attendees)

#### *February 2014*

- Beyond the MSDS training session at the TURI library, February 13, 2014 (15 attendees)

#### *April 2014*

- Toxics Use Reduction Planners' Continuing Education Conference (90 attendees)

#### *May 2014.*

- Ozonated Systems for Janitorial Cleaning: Raytheon, Andover (50 attendees)

#### *June 2014*

- Champions of Toxics Use Reduction Recognition Event: Massachusetts Statehouse, Boston. (Approx. 150 attendees.)

### **Webinars:**

- Beyond the MSDS – Resources for Researching Safer Chemicals, February 27, 2014. 76 attendees.
- Business Benefits of Safer Metal Plating, April 11, 2014. 49 Attendees.
- Green Janitorial Cleaning, May 29, 2014. 35 attendees.
- REACH Update, January 30, 2014. 70 attendees.
- Solvents. Webinar presented through the Six Chemical Classes Webinar Series, November 19, 2013. Presented to an audience of about 400 participants. Available at <http://www.sixclasses.org/>.

## Publications

TURI continued to make its work accessible through a variety of publications and presentations. Below are listed both TURA and non-TURA funded publications and presentations by TURI staff and faculty:

### Reports, Book Chapters, and Journal Articles:

- Ellenbecker, M.J., and S. Tsai, "Exposure Assessment and Safety Considerations for Working with Engineered Nanoparticles," in press, *Wiley Interscience*, publication date 2014.
- Goodyear, N., DeMatteo, R., Warden, D., and Marshall, J., "Fabric softeners impact cleaning but not disinfection by a saturated steam vapor system," *Am. J. Inf. Control*, in press, 2014.
- Jacobs, M., Massey, R., Clapp, R. 2013. "The Burden of Cancer from Organic Chemicals." In David Carpenter, ed., *Effects of Persistent and Bioactive Organic Pollutants on Human Health*. Hoboken, New Jersey: John Wiley & Sons.
- Jacobs, M., Tenney, H., Massey, R., Harriman, E. 2013. *Opportunities for Cancer Prevention: Trends in the Use and Release of Carcinogens in Massachusetts*. Lowell: Massachusetts Toxics Use Reduction Institute. Methods and Policy Report No. 29, June 2013, Available at: [www.turi.org/carcinogens2013report](http://www.turi.org/carcinogens2013report).
- Jacobs, M.M., Ellenbecker, M.J., Hoppin, P., Kriebel, D., and Tickner, J., "Precarious Promise: A Case Study of Engineered Carbon Nanotubes," Lowell Center for Sustainable Production, March 2014.
- Massey, R. "Massachusetts Toxics Use Reduction Act: Reducing Toxic Waste and Saving Money." *Physicians for Social Responsibility, Environmental Health Policy Institute* (online policy forum), article series on States' Rights and Federal Chemical Policy Reform. With contributions from Rick Reibstein. October 2013. Available at: <http://www.psr.org/environment-and-health/environmental-health-policy-institute/responses/massachusetts-toxics-use-reduction-act.html>.
- Onasch, J. 2013. "Wet Cleaning Technology Eliminates PCE Use in Dry Cleaning" Included in Chapter 4, "Too much to swallow: PCE contamination of mains water." In European Environment Agency. 2013. *Late lessons from early warnings: science, precaution, innovation*. EEA Report No. 1/2013. Available at <http://www.eea.europa.eu/publications/late-lessons-2>.

### Professional Conference Presentations, Workshops, and Training Presentations (Selected):

- Butow, M., and Ellenbecker, M., "Beyond the MSDS: Finding Information About Chemical Hazards". Hands-on workshop presentation held in the Weed Hall, Presentation to UMass Lowell doctoral students and faculty in the Clinical Lab Sciences Department, March 4, 2014. Approximately 11 in attendance.
- Butow, M., Eliason, P., Myles, M., "TURI Resources: Information, Grants, Testing Services, and More to Improve the Value of TUR Planning", Four separate presentations in various locations in MA, Spring 2014. Approximately 200 DEP Inspectors in attendance.
- Dunn, K., Tsai, S., Woskie, S., Bennett, J., Garcia, A., Ellenbecker, M., "Use of Tracer Gas and Nanoparticle methods to Evaluate a New Nano Containment Hood", presented at the 6th

International Symposium on Nanotechnology, Occupational and Environmental Health (NanOE2013), Nagoya, Japan, October 2013.

- Dunn, K., Tsai, S., Bennett, J.S., Woskie, S.R., Ellenbecker, M., “Using computational fluid dynamics to assess the impact of the user on nanoparticle containment for traditional and nano fume hoods,” American Industrial Hygiene Conference & Expo (AIHCE), San Antonio, TX, June 2014.
- Edwards, S., and Massey, R., “Information Exchange on Chemicals in Products: Guidance for Programme Participants.” Presentation at the UNEP Chemicals in Products Programme meeting in Boston, December 5, 2013.
- Ellenbecker, M., “Controlling exposures to engineered nanoparticles using exposure prevention and minimization,” American Industrial Hygiene Conference & Expo (AIHCE), San Antonio, TX, June 2014.
- Eliason, P., “Alternatives Assessment: More than a simple chemical hazard comparison”, Interstate Chemicals Clearinghouse, October 16, 2013, Framingham, MA (Staples HQ) and Chemicals Commons Principles for Alternatives Assessment, Chemical Commons Community of Practice, October 18, 2013, Framingham, MA (Staples HQ).
- Eliason, P., “The Power of Assessing Alternatives: The Massachusetts Example”, Raytheon All Hands EHS Meeting, October 15, 2013, Andover, MA.
- Eliason, P., “Safe Products, Made Safely: Tools for Businesses”, Great Lakes Green Chemistry, Stevens Point, WI, November 2013.
- Harriman, E., “TURI Case Studies: Perchloroethylene and Hexavalent Chromium Safer Alternatives” Presentation at Institute of Medicine, “Identifying and Reducing Environmental Health Risks of Chemicals in Our Society: Workshop.” Washington, DC. November 7-8, 2013. Summary of presentation available in IOM (Institute of Medicine). 2014. *Identifying and reducing environmental health risks of chemicals in our society: Workshop summary*. Washington, DC: The National Academies Press. Video available at: <http://www.iom.edu/Activities/Environment/EnvironmentalHealthRT/2013-NOV-07/Day%202/Session%205/32-Harriman-Video.aspx>.
- Harriman, E., “How Organizations are Reducing Toxic Chemicals to Protect Public Health.” Toxic Free Talk Radio with Debra Lynn Dadd, March 24, 2014. Available at: [http://reneradioarchives.com/toxic\\_free\\_talk\\_radio/#032514](http://reneradioarchives.com/toxic_free_talk_radio/#032514).
- Jacobs, M., and Massey, R., “Massachusetts Toxics Use Reduction Act (TURA): Reducing the Use of Carcinogens.” Presentation to the Massachusetts Comprehensive Cancer Prevention and Control Program, Westborough, MA (rescheduled as a virtual meeting), October 3, 2013. Audience: Staff members at MassDPH and members of the MCCPCP Steering Committee.
- Massey, R. “United Nations Environment Programme Global Chemicals Outlook: Toward Sound Management of Chemicals.” Featured talk at Rencontres Chimie Santé Environnementale (Chemistry and Environmental Health Meeting), Lyon, France, October 18, 2013. Conference presentation given to an audience of about 150 representatives of regional government, press, non-governmental organizations, academics and others.

- Massey, R. "Massachusetts Toxics Use Reduction Act: Goals, Results, and Lessons Learned." Featured talk at Rencontres Chimie Santé Environnementale (Chemistry and Environmental Health Meeting), Lyon, France, October 18, 2013. Conference presentation given to an audience of about 150 representatives of regional government, press, non-governmental organizations, academics and others.
- Massey, R. "La loi de réduction de produits chimiques toxiques: résultats et leçons." Presentation to staff members of the French Ministry of the Environment and Sustainable Development and Ministry of Labor, Paris, France, October 21, 2013.
- Massey, R. "Vers la gestion rationnelle des produits chimiques: UNEP Global Chemicals Outlook & le programme de réduction de produits chimiques toxiques dans l'état de Massachusetts." Presentation to French Parliament committee on environment; hearing on the development of a French strategy on endocrine disruptors, Paris, France, October 21, 2013.
- Morose, G., "Successful Industry Collaborations for Evaluating the Performance of Safer Chemical Alternatives" GC3 Green Chemistry & Commerce Council, webinar, September 12, 2013.
- Morose, G., "Phase II Research Results for Hex Chrome Free Sealant Alternatives", SAE International Aerospace G9 Sealant Conference, Savannah, Georgia, April 30, 2014.
- Myles, M., "Safer Alternatives for Toxics in Buildings", Presentation at the Boston Architectural College, January 15, 2014. Approximately 20 Master's students in attendance.
- Myles, M., Joseph, G. "Moulder Environmental Accounting Case Study", presented by Professor Joseph at the American Accounting Association 2014 Mid-Atlantic Region meeting, King of Prussia, PA, April 2014.
- Onasch, J., "Toxics Use Reduction in our Communities" Presentation at Massachusetts Health Officers Association Annual Meeting in Hyannis, October 24, 2013.
- Onasch, J., "TURA and Professional Wet Cleaning", Northeast Fabricare Association Fall Fest, November 2013 in New Castle, NH.
- Onasch, J., "Alternatives to Perc in Garment Care" to NEWMOA Hazardous Waste Inspectors Advanced Training, Marlborough, MA, June 10, 2014.
- Onasch, J., "Can Dry Cleaning be Less Toxic?" Toxic Free Talk Radio with Debra Lynn Dadd, May 6, 2014. Available at: <http://debralyndadd.com/toxicfreetalkradio/can-dry-cleaning-be-less-toxic>.
- Tenney, H. "Beyond TRI: Lessons learned from additions to the Toxics Use Reduction Act", TRI Annual Conference, Washington, DC, May 2014.
- Tsai, S., Ellenbecker, M., "Characterization of airborne nanoparticle loss in sampling tubing", presented at the 6th International Symposium on Nanotechnology, Occupational and Environmental Health (NanOEH2013), Nagoya, Japan, October 2013.
- Wilcox, H., "How the TURI Lab Fits in with EPP FAC 59," DCR Training Central Region, West Boylston, January 28, 2014, Approximately 20-30 attendees.

## Fact Sheets

- Toxics Use Reduction Institute, “Massachusetts Chemical Fact Sheet: Methylene Chloride,” February 2014. Available at: [http://www.turi.org/TURI\\_Publications/TURI\\_Chemical\\_Fact\\_Sheets/Methylene\\_Chloride\\_Fact\\_Sheet/Fact\\_Sheet\\_Methylene\\_Chloride.2014](http://www.turi.org/TURI_Publications/TURI_Chemical_Fact_Sheets/Methylene_Chloride_Fact_Sheet/Fact_Sheet_Methylene_Chloride.2014).
- Toxics Use Reduction Institute, “Massachusetts Chemical Fact Sheet: Hexavalent Chromium,” March 2014. Available at: [http://www.turi.org/TURI\\_Publications/TURI\\_Chemical\\_Fact\\_Sheets/Hexavalent\\_Chromium\\_Fact\\_Sheet/Hexavalent\\_Chromium\\_Fact\\_Sheet](http://www.turi.org/TURI_Publications/TURI_Chemical_Fact_Sheets/Hexavalent_Chromium_Fact_Sheet/Hexavalent_Chromium_Fact_Sheet).
- Toxics Use Reduction Institute, “Massachusetts Chemical Fact Sheet: n-propyl bromide,” April 2014. Available at: [http://www.turi.org/TURI\\_Publications/TURI\\_Chemical\\_Fact\\_Sheets/n-Propyl\\_bromide/n-Propyl\\_bromide\\_Fact\\_Sheet](http://www.turi.org/TURI_Publications/TURI_Chemical_Fact_Sheets/n-Propyl_bromide/n-Propyl_bromide_Fact_Sheet).
- Toxics Use Reduction Institute, “Designation of Higher and Lower Hazard Substances in Massachusetts,” March 2014. Available at: [http://www.turi.org/TURI\\_Publications/TURI\\_Chemical\\_Fact\\_Sheets/Higher\\_and\\_Lower\\_Hazard\\_Substances](http://www.turi.org/TURI_Publications/TURI_Chemical_Fact_Sheets/Higher_and_Lower_Hazard_Substances)

#### Case Studies

- Office of Technical Assistance and Technology, “Crane & Company, Inc.: Renewable Energy Case Study,” 2014. Available at: <http://www.mass.gov/eea/docs/eea/ota/case-studies/crane-case-study.pdf>.
- Office of Technical Assistance and Technology, “Noor Oriental Rugs: Toxics Use Reduction Case Study,” 2014. Available at: <http://www.mass.gov/eea/docs/eea/ota/case-studies/noor-study-oct27-14.pdf>.

#### Articles in Trade Journals:

- Eliason, P., “Making the Switch from Hex to Tri Chrome: Massachusetts finisher Independent Plating switches with the help of TURI university program”, *Products Finishing*, May 1, 2014. Available at: <http://www.pfonline.com/articles/making-the-switch-from-hex-to-tri-chrome>.
- Onasch, J. “Helping Switch to Non-Solvent Cleaning Systems”, *New England Service Station & Automotive Repair Association*, Summer Issue 2013, Pg. 9.

#### MassDEP Documents:

- 2013 Toxics Use Reduction Reporting Instructions (updated March 2014)
- Complete List of TURA Chemicals (updated April 2014)
- Toxics Use Reduction Planning and Plan Update Guidance (significantly revised March 2014)
- Resource Conservation Planning Guidance under the Toxics Use Reduction Act (updated March 2014)
- Environmental Management Systems Planning Guidance under the Toxics Use Reduction Act (updated March 2014)
- Directory of Toxics Use Reduction Planners (updated monthly through June 2014)

- Reporting Year 2012 Toxics Use Reduction Information Release (June 2014)

#### Press Coverage:

- Alliance for a Healthy Tomorrow blog. "A state success story: carcinogen use falling in Massachusetts." August 15, 2013. Available at: <http://www.healthytomorrow.org/2013/08/turi-report.html>.
- Anon., "Dramatic decline in Massachusetts carcinogen releases." *Chemical Watch: Global Risk & Regulation News*, June 13, 2013, <http://chemicalwatch.com/> (available by subscription).
- Anon. "General Framework for Safer Chemical Alternatives Attracts 100 Signatories." *Bloomberg BNA Occupational Safety and Health Reporter*, page 1020, 10-24-13.
- Doggett, M. "Massachusetts manufacturers reduce use of carcinogens." August 14, 2013. Available at: <http://blog.saferchemicals.org/2013/08/massachusetts-manufacturers-reduce-use-of-carcinogens.html>.
- Grossman, E. "Carcinogen use and release declines dramatically in Massachusetts: An important step in cancer prevention." *The Pump Handle*, June 26, 2013. Available at: <http://scienceblogs.com/thepumphandle/2013/06/26/carcinogen-use-and-release-declines-dramatically-in-massachusetts-an-important-step-in-cancer-prevention-2/>.
- Grossman, E. "Stopping Chemical Catastrophes: Can we do better than calling for stronger storage tanks?" *The Pump Handle*, February 25, 2014. Available at: <http://scienceblogs.com/thepumphandle/2014/02/25/stopping-chemical-catastrophes-can-we-do-better-than-calling-for-stronger-storage-tanks/>.
- Harriman, E. "How Organizations are Reducing Toxic Chemicals to Protect Public Health." Toxic Free Talk Radio with Debra Lynn Dadd, March 24, 2014. Available at: [http://reneradioarchives.com/toxic\\_free\\_talk\\_radio/#032514](http://reneradioarchives.com/toxic_free_talk_radio/#032514).
- Jones, Philippa Nuttall. "Differences emerge over UNEP chemicals in products guidance: Industry says need to reflect complex supply chains." *Chemical Watch: Global Risk & Regulation News*, December 20, 2013, <http://chemicalwatch.com/> (available by subscription).
- Angelo, K. "UMass Lowell: Greener Materials Take Center Stage" Accessed at: <http://www.uml.edu/News/stories/2013/Green-Research.aspx>
- Sato, H. "A greener clean: From fruit peels and algae, UML team works to create less-toxic detergent" *Lowell Sun*, July 7, 2013. Available at: [http://www.lowellsun.com/todaysheadlines/ci\\_23614146/greener-clean](http://www.lowellsun.com/todaysheadlines/ci_23614146/greener-clean).
- Shekhtman, L. "Toxics Use Reduction Institute helps companies switch to safer chemicals." *Worcester Telegram and Gazette*, July 1, 2013. Available at: <http://www.telegram.com/article/20130701/NEWS/307019989/1237>.
- *The Hill* – TURI's letter to the Federal Trade Commission on wet cleaning quoted in blog, "No more 'dry clean only' labels?". Available at: <http://thehill.com/blogs/regwatch/pending-regs/198735-green-groups-want-to-kill-dry-clean-only-labels>.
- White, M. "Cancer-Causing Chemicals Used by Mass. Companies on the Decline." *GoLocal Worcester*, Saturday, June 8, 2013. Available at: <http://www.golocalworcester.com/news/use-of-cancer-causing-carcinogens-on-the-decline-umass-report/>.

- *Wire Journal International*. "TURI event highlighted potential cable challenges from EU directives." November 2013.