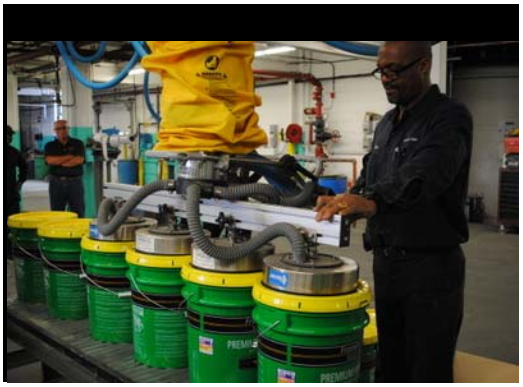
Massachusetts Toxics Use Reduction Program

Annual Report FY15



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
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Introduction

2015: Celebrating 25 Years of Toxics Use Reduction in the Commonwealth

Unanimously passed by the legislature in 1989 and enacted in 1990, 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 among 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. Facilities subject to TURA are required to report on their toxic chemical use and the wastes generated. Companies develop toxics use reduction (TUR) plans that identify and evaluate opportunities to use toxics more efficiently and reduce or eliminate the use of the most toxic and hazardous materials. Because these evaluations typically reveal toxics use reduction measures that save the companies money, this approach leads to voluntary reductions in toxic chemical use while reducing hazardous releases and toxic wastes. Toxics use reduction planning also decreases the risks of major transportation and storage accidents, protects workers from dangerous workplace exposures, and creates safer products for customer use.

In 2015, the TURA program celebrated its 25th Anniversary by honoring nine businesses, one small business organization, and one worker cooperative as Champions of Toxics Use Reduction. These honorees provide examples of the wide variety of accomplishments of TURA filers and other toxics users. The TURA program held recognition events for each of the champions, who were chosen for their accomplishments in toxics use reduction, energy conservation, and resource conservation. At each event, the companies demonstrated improvements made in their facilities, which have resulted not only in healthier work environments, but have led to monetary savings for the companies.

All of the 25th Anniversary Leaders were recognized at the annual State House Event in June of 2015.

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 implementing safer alternatives. When toxic users are required to evaluate how chemicals

are used and to identify and ways to reduce the amount wasted in production, they frequently improve manufacturing efficiency and substitute safer chemicals in production that leads to safer products, which boosts the competitive position 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; licenses Toxics Use Reduction Planners (TUR Planners), who review and approve toxics use reduction plans; analyzes the data submitted by companies to evaluate progress in the reduction in toxics use and waste generated, and works with two other implementing entities to prepare an annual public data release. The Department also is charged with promoting TUR as the preferred way to bring facilities into compliance with environmental regulations.
- **OTA:** The Office of Technical Assistance and Technology (OTA) staff of engineers, chemists and environmental experts provides Massachusetts businesses with free, non-regulatory, and confidential assistance with toxics use reduction, energy and water conservation, and compliance with relevant regulations. OTA provides onsite, phone and/or email technical support to help businesses save money while improving public and employee health through reducing toxics and conserving resources. OTA also produces fact sheets, case studies, and guidance documents on TURA and environmental compliance, and hosts workshops and other educational events.
- **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 for safer alternative chemicals and technologies; and maintains a specialized library on toxic chemicals and safer alternatives.

Together, the three implementing entities provide a full suite of services to help Massachusetts businesses and communities to reduce the use of toxic chemicals while promoting the economic competitiveness of Massachusetts businesses.

The three state agencies work in conjunction with:

- An **Administrative Council**, overseen by the Secretary of the Executive Office of Energy and Environmental Affairs, with seats for representatives from the Department of Environmental Protection, the Department of Public Health, the Executive Office of Labor and Workforce Development, the Executive Office of Public Safety and Security, and the Executive Office of Housing and Economic Development, that determines TURA policy and

coordinates toxics prevention state-wide, and is responsible for determining the list of chemicals covered under the act;

- An **Advisory Committee** to the Administrative Council, is composed of fifteen members from business, labor, advocacy, citizen and other stakeholders, that provide 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 chemical listing decisions on the best available science.

Future Program Directions

In FY16, the TURA program will continue its work to identify higher and lower hazard substances and will conduct outreach to TURA filers on the designations of hydrogen fluoride (HF), cyanide compounds, n-propyl bromide (nPB), and dimethylformamide (DMF) as Higher Hazard Substances. The program will continue working with a wide range of sectors, including users of previously designated Higher Hazard Substances and the metal finishing and paint stripping/furniture refinishing sectors.

OTA will be concentrating outreach efforts on four select Massachusetts industry sectors in FY16: food processing, life sciences, metal finishing, and chemicals and plastics. These four sectors represent hundreds of manufacturing facilities in Massachusetts and exhibit the potential for toxics use reduction and resource conservation opportunities. In FY16, OTA will finalize the Massachusetts Clean Auto Repair (MassCAR) grant for auto repair and auto body shops by hosting a series of trainings throughout the Commonwealth. OTA will also begin work on a grant focusing on emergency preparedness and climate change resiliency.

TURI will continue to provide a range of services, including research; education and training; grants for businesses, municipalities, and community organizations; and laboratory testing. Selected focus areas will include the following.

- TURI's academic research program will work directly with Massachusetts businesses to develop and implement research projects.
- Building on work begun in FY14, TURI will continue to support the work of the peer mentoring work group, a consortium of businesses working together to share best practices for toxics use reduction and resource conservation.
- TURI will continue its collaborative research project with businesses in the aerospace and defense sector, investigating safer alternatives to hexavalent chromium.
- TURI will roll out the newly designed Toxics Use Reduction Planners' class, providing a blend of online and in-person training.

MassDEP will continue to implement the TURA Reporting Amnesty program to encourage "non-filers" to submit required reports and will continue its expanded analysis of the TURA data to evaluate continued progress in toxics use reduction, and opportunities for further reductions. In FY16, MassDEP will begin work on improving the data reporting systems and develop improvements to the TURA reporting

process. MassDEP will also continue to work on improving the quality of plans and the skills of TUR planners.

Highlights from Fiscal Year 2015

Highlights of TURA program work in FY15 (July 1, 2014 to June 30, 2015) included the following:

- **25th Anniversary Leadership Tour:** During March, April, and May, the TURA program recognized nine Massachusetts businesses and two small business groups and hosted leadership events at each facility.
    - **Allston Collision Center in Allston**: This third generation family-owned business uses water-based paints, reducing the need for solvents. The business has reduced emissions of volatile organic compounds (VOCs) by more than 1,200 pounds per year and they recycle all of their materials, including recycling paint thinner for reuse, reducing waste and worker exposure to harmful chemicals.
    - **Analog Devices in Wilmington**: A manufacturer of integrated circuits, Analog reduced energy use by more than 16 million KWH per year and water consumption by nearly 90 million gallons per year. The company also reduced the use of sodium hydroxide and hydrochloric acid.
    - **ChemGenes Corporation in Wilmington:** ChemGenes, a biotechnology company, reduced the use of chloroform by more than 55% and hexane by more than 35%. The company improved manufacturing efficiency, saving $215,000 in chemical purchases, regulatory fees and disposal costs.
    - **Columbia Manufacturing in Westfield:** This manufacturer of school furniture recovers and reuses 98% of the nickel and chromic acid plating chemistry from a modern, efficient plating line. The company eliminated the use of 147,000 gallons per day of process water and no longer generates 130,000 gallons per day of wastewater.
    - **Franklin Paint Company in Franklin**: This manufacturer of paints for roads and playing fields completely eliminated the use of xylene and methanol and reduced the use of three other chemicals below reporting thresholds while increasing production and product quality.
    - **Independent Plating, Inc. in Worcester**: A metal finishing company, Independent Plating reduced the use of toxic chemicals by more than 500,000 pounds annually, by reducing the use of acids, bases and other reportable metal compounds.
    - **Ophir Optics in North Andover:** Ophir, a designer and producer of high performance optical elements and lenses, reduced VOCs by 70% and reduced the quantity of hazardous waste shipped by two-thirds, saving $60,000 annually.
    - **Shawmut Corporation in West Bridgewater**: Shawmut, the largest independent laminator in the U.S., saved approximately $1 million per year by implementing better process controls in solvent based adhesive lamination and completely eliminated the use of trichloroethylene (TCE) for an additional savings of $750,000 per year by converting to a hot-melt adhesion process.
    - **Stainless Steel Coatings, Inc. in Lancaster**: Stainless Steel Coatings, a manufacturer of anti-corrosive paints and coatings reduced the use of xylene by 57% and eliminated the

use of hexavalent chromium. The company has also reduced its hazardous waste by 52%.

- **Viva Verde Women's Cooperative of the Brazilian Women's Group in Brighton:** This cleaning cooperative has trained more than 1,000 Brazilian housecleaners across the Commonwealth on how to make safer cleaning products.
- **Professional Wet Cleaning Workgroup, multiple locations:** These dry cleaners have switched from using the solvent perchloroethylene (perc) to a professional wet cleaning process for cleaning clothes.

- **Grants:** TURI provided grants for three university research projects, five community-based projects, a business in the medical device sector, and three in the dry cleaning sector.
- **Demonstration Events:** The TURA program sponsored demonstration events at 912 Auto Center, showcasing its conversion to safer paint gun washing chemicals, and at Premier Cleaners, demonstrating professional wet cleaning technology. The program also held events exhibiting the accomplishments of each of the 25th Anniversary honorees.
- **Education and Training:** The TURA program provided a wide variety of educational opportunities, including a 7-week TUR planner course; two continuing education conferences; a special conference on greener materials for industry and academic researchers; and a series of webinars.
- **TUR Planner Certification:** MassDEP certified or recertified 44 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 hydrogen fluoride, cyanide compounds, and dimethylformamide as Higher Hazard Substances, and these designations were promulgated as regulations by EOEEA, along with n-propyl bromide which the Council voted as a HHS in FY14. The Council also voted to designate toluene diisocyanate (TDI) as

TURI hosted a Greener Materials Research Symposium at the UMass Lowell campus. Over 100 people from academia and industry attended. The keynote speakers were Jim Jones, US EPA Assistant Administrator; and Roger McFadden, Staples (Pictured, left), who spoke on government and market drivers for greener materials research. The symposium fostered collaboration between university research capacity and industry research needs. Currently funded academic researchers and their industry partners described the development of safer alternatives to chloroform, phenol and formaldehyde, lead and halogens. Massachusetts companies discussed current research needs for toxics use reduction. In addition to oral presentations, the symposium included a poster session exhibiting academic research work.

a HHS; the regulatory process was not completed for this chemical in FY15.

- **Case Studies and Fact Sheets:** The TURA program published new case studies on Stainless Steel Coatings Inc., 912 Auto Center, Ophir Optics, Allston Collision Center, Franklin Paint Company, Columbia Manufacturing, Shawmut Corporation, and Averica Discovery Services Inc. The program also updated two fact sheets, *Designation of TURA Higher and Lower Hazard Substances in Massachusetts* and *Right from the Start: A Pre-Permit Assistance Program for Massachusetts Businesses*.

In FY15, TURI provided technical guidance to the Four Seasons Hotel, located in Boston, as its onsite dry cleaning services transitioned away from traditional solvent garment cleaning. Using technical information gathered from other professional wet cleaners, the hotel chose to switch to professional wet cleaning. This process eliminates the use of the toxic chemical perchloroethylene, or perc. This is the first Massachusetts hotel to transition to professional wet cleaning and the program hopes that the example of the Four Seasons will influence other hotels and dry cleaners to do the same.

TURA Amnesty Program

In response to concerns about failure to file required TURA reports, and the lack of an incentive for companies to report voluntarily, MassDEP worked with OTA, TURI and the TUR Advisory Committee to develop a TURA Reporting Amnesty program. Under the terms of the amnesty program, companies that voluntarily submit past-owed reports will be subject to a warning letter in lieu of a Notice of Noncompliance (NON), and a reduction in the number of years for which prior year fees are owed from three to one. The reporting amnesty began on April 9, 2015 and will run until July 1, 2016.

The Administrative Council and Advisory Committee

A key component to the success of the TUR program is the structure of the program: three program agencies bring unique competencies to implement the program collaboratively. The program is governed by an Administrative Council representing six state secretariats and departments. A multi-stakeholder Advisory Committee provides policy advice to the Council, and a Science Advisory Board assists TURI in ensuring that TURA program policy recommendations have a firm scientific basis. Activities of the TURA Administrative Council and Advisory Committee in FY15 included the following:

- After considering the Advisory Committee and program agencies' recommendations, including input from the Science Advisory Board and comments submitted by various private parties, the

Council voted to designate hydrogen fluoride, cyanide compounds, and dimethylformamide as Higher Hazard Substances on August 19, 2014.

- The Administrative Council also voted to designate toluene diisocyanate (TDI) as a Higher Hazard Substance. Following a request from industry trade associations for further review of this chemical, EOEEA held a second public comment period, solely pertaining to the TDI designation. As of the end of FY15, the designation had not been promulgated, due to a regulatory pause in the Commonwealth.
- In FY14 and in early FY15, the Administrative Council, along with the Advisory Committee, discussed a proposed TURA fee increase. With input from the Advisory Committee, the TURA program staff and other stakeholders, the Administrative Council voted to increase the TURA fees, which would be the first increase since the inception of the program, 25 years ago. Extensive outreach on the proposal, along with a 21-day public comment period and four public hearings were held to gain additional input from the regulated community and stakeholders. The regulation was not promulgated in FY15, and at the end of the fiscal year, it remained under review due to Executive Order 562 and a regulatory pause in the Commonwealth.

Designations of Higher Hazard Substances in FY15

In FY15, the TURA Administrative Council voted to designate four chemicals or chemical categories as Higher Hazard Substances (HHS):

- Hydrogen fluoride (HF)
- Cyanide compounds
- Dimethylformamide (DMF)
- N-propyl bromide (nPB)

A HHS designation lowers the reporting threshold to 1,000 pounds per year for all uses of the chemical. The designation will be effective for calendar year 2016 use of these chemicals for reports due July 1, 2017.

A fifth chemical, toluene diisocyanate (TDI) was also voted by the Council to be designated as a (HHS) and underwent further review with an additional 60 day public comment period. A response to comments received was drafted, and the promulgation was not completed due to a regulatory pause in the Commonwealth.

Chemicals designated as HHS often have both acute and chronic worker health impacts and pose a range of risks to the environment and public health. Hydrogen fluoride, mainly reported under TURA for etching, cleaning of metals and production of glass fibers, is highly corrosive to all living tissue. Skin contact results in severe burns and necrosis, and underlying bone may be decalcified. Acute exposure through inhalation or skin contact may be fatal due to effects on the heart and lungs. Chronic exposure through inhalation of fluoride, in the form of either hydrogen fluoride or fluoride dusts, is associated with skeletal fluorosis, a disease that causes joint pain and problems with joint movement.

Cyanide compounds are mainly used by TURA filers in electroplating operations. The chemical poses significant acute and chronic toxicity concerns. High levels of exposure result in convulsions, unconsciousness, and death. Lower levels may result in headaches and dizziness. Chronic exposure to cyanide can affect the central nervous system and may cause numbness and tremors, and cardiovascular, respiratory, and thyroid effects. Cyanide is rapidly absorbed via inhalation and well-absorbed via skin and the gastrointestinal tract. Once absorbed, cyanide is distributed throughout the body, with the highest levels in the liver, lungs, blood, and brain.

Dimethylformamide (DMF) is an organic solvent that is reported under TURA mostly for coating fabrics, chemical manufacturing, and chemical distribution. The main routes of exposure to DMF are inhalation or dermal exposure in occupational settings. Systemic effects from DMF exposure primarily affect the liver, but also include kidney, cardiac, blood, and gastrointestinal effects.

N-propyl bromide (nPB) is a solvent used in vapor degreasing, metal cleaning, and dry cleaning and as a solvent carrier in adhesives. nPB has both acute and chronic adverse health effects. Acute effects can include eye, nose, throat, and lung irritation, headaches, dizziness, and nausea. The US National Toxicology Program states that nPB is reasonably anticipated to be a human carcinogen.

Prior to and following the four HHS designations, the program agencies conducted a large outreach effort to inform Massachusetts facilities, including both TURA and non-TURA filers, about the designations and resulting changes in the reporting thresholds.

Science Advisory Board

The Science Advisory Board (SAB) provides science-based advice on issues considered by the Advisory Committee and Administrative Council, as well as providing expert scientific review on chemical hazard to inform other agency decisions and guidance.

In FY15, TURI worked with the SAB to review the current literature on the Phthalate Esters category in order to inform deliberations at MassDEP regarding a possible update of its reporting policies on the category. The SAB reviewed 10 of these substances in depth, as well as reviewing basic information for the rest of the category and considering the potential for low-dose and cumulative effects.

The SAB reviewed current literature related to comments received during the TDI public comment period in November 2014. They did not find any new information to change its current categorization of TDI as an SAB More Hazardous Chemical.

They also began a review of the EPA Toxics Release Inventory “Diisocyanates Category” which includes methylene diphenyl diisocyanate (MDI) and other isocyanate monomers and polymers. The SAB is considering whether to categorize the entire Diisocyanates Category as SAB More Hazardous Chemicals; currently MDI is the only member of that category on the SAB’s More Hazardous Chemicals list.

TURA Program Revenue and Expenditures

FY15 Revenues

Chemical Fees: $2,948,350

TURA Planner Fees: $8,250

TOTAL: $2,956,600

FY15 Expenditures

OTA

Personnel Costs: $582,507

Administrative Costs: $15,716

Other Costs: $1,018

TOTAL: $599,241

MassDEP

Personnel Costs: $602,622

Administrative Costs: $10,000

TOTAL: $612,622

TURI

Personnel (staff and students): $1,044,500

Education and training events: $60,000

University research grants and laboratory testing services: $76,800

Grants to businesses: $52,000

Grants to community groups, municipalities, and organizations: $65,800

Administrative: $44,900

Library and information: $47,900

Communications, printing, website and outreach: $61,000

TOTAL: $1,452,900

The Office of Technical Assistance (OTA)

Assistance Services

Onsite technical assistance continues to be at the core of OTA's services. During FY15, OTA engineers made 54 site visits to Massachusetts facilities in the following industry sectors: automotive repair and other repair services, chemicals, electronics, fabricated metal products, food, furniture and fixtures and wood products, life sciences, machinery and other manufacturing industries, rubber and plastics, stone and concrete, textiles, transportation equipment, electric and gas, hotels, and instruments. Of the 54 visits, 22 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). 23 were a result of OTA outreach activities and TURA workshops and events, and the remaining 9 were company-initiated or from other sources.

During FY15, OTA engineers provided more than 183 recommendations to facilities. Of these, more than half concerned regulatory compliance, followed by toxics use reduction and pollution prevention and energy conservation, and a small percentage regarding air compliance and water conservation.

Of the recommendations made to facilities, over 60 percent were implemented or planned to be implemented by facilities. Most of the regulatory recommendations implemented during this fiscal year, involved air issues and hazardous waste management issues. These were followed by OSHA-related issues and TURA-related issues. The final 20 percent involved Tier II or TRI issues, maximum achievable control technology (MACT) standards, and universal waste or wastewater issues.

Sample outcomes of these recommendations include the following:

One company, located in Western Massachusetts, eliminated the use of TCE to clean machinery, reducing the company's chemical use by 55 gallons biannually.

Two facilities, one in the southeast region and one in the western region, changed their hazardous waste status from small quantity generator (SQG) to very small quantity generator (VSQG), saving the companies approximately $500 annually.

Energy and Water Conservation

In FY15, OTA gave recommendations regarding energy conservation to 32 facilities and water conservation recommendations to 3 facilities. The energy recommendations implemented during FY15 can be broken down into the following categories: 16 percent involved compressed air, 19 percent concerned energy procurement, 9 percent concerned building envelope improvements, insulation and heat recovery, 19 percent were suggestions and guidance for energy efficiency incentives and 9 percent concerned lighting.

Sample outcomes of these recommendations include the following:

One company, in the northeast region, implemented a lighting and lighting controls upgrade, suggested by OTA, which reduced the company's electricity use by 23,168 kilowatt hours and saves the company $3,707 annually.

Another facility, located in the southeastern region, reduced their energy use by 149,653 kilowatt hours, saving the company $14,965, by fixing leaks in the compressed air system.

EPA Grants

In FY15, OTA continued work on the Massachusetts Clean Auto Repair (MassCAR) grant from the US Environmental Protection Agency (US EPA). Specifically in FY15, OTA developed the MassCAR curriculum. OTA staff held a focus group in Jamaica Plain, presented at Massachusetts American Automotive Service Providers (AASP) and Inter-Industry Conference on Auto Collision Repair (I-CAR) chapters, and visited shops across the state to determine the environmental needs and wants of the automotive community. The data collected resulted in a MassCAR guide for both auto body and repair shops and an accompanying PowerPoint training that will be soon downloadable on OTA's MassCAR website.

Also in FY15, OTA won a second grant from the US EPA, focusing on community resiliency and chemical safety. With the grant, OTA will work with Regional Planning Agencies (RPAs) to educate Local Emergency Planning Commissions (LEPCs) and facilities with hazardous chemicals on incorporating toxics use reduction into emergency preparedness to reduce risks of chemical releases resulting from increased risks of storms and floods in an era of global warming. The duration of the grant is three years and work will begin in October of 2015.

OTA Publications

During FY15, the office published seven case studies of successful projects by companies that received OTA's assistance, including the following:

- In 2007, **912 Auto Center** relocated from Mattapan to Dorchester, and in the process, switched their gun washing system to an EPA-approved product. This change successfully eliminated acetone, naphthalene, toluene, and xylene from their system. In addition to reducing toxic chemical use, the switch to water-based paint has reduced operating costs, improved performance and productivity, and enhanced worker safety and satisfaction while saving the company more than $3,300 annually.
- **Allston Collision Center**, a third generation family-owned auto body shop, opened in Boston in 1928 and moved to its current location at 420 Cambridge St. in Allston, MA, in 1961. The current owner, Paul Chaet, and president, Elaine O'Neill, have proudly made their family history more "green" by making the switch from solvent-based to water-based paints, recycling and reusing paint thinner, and recycling spray gun cleaning solvent.
- **Averica Discovery Services Inc.,** a specialty contract research organization (CRO) based in Marlborough, MA, uses liquid CO^2 in lieu of hazardous solvents during supercritical fluid chromatography (SFC), which can reduce the generation of solvents by 80 to 90 percent when

compared to conventional liquid chromatography. The company is a good example of how life sciences can set themselves up in a sustainable fashion, and apply greener methods in the biotechnology sector.

- **Columbia Manufacturing Inc.**, a manufacturer of school furniture in Westfield, Massachusetts, eliminated the use of 147,000 gallons of water per day in their plating operations and has saved $3,000,000 in water and sewer fees, among other cost savings, by upgrading the plating equipment and integrating a zero-discharge wastewater treatment system. The new, efficient plating line enables the company to recover and reuse 98% of the plating chemistry that would previously have been lost, resulting in a drastic reduction of hazardous waste generation.
- **Franklin Paint Company** employs 28 people in Franklin, Massachusetts, and produces about 2 million gallons of traffic and field marking paint annually, primarily for customers on the Eastern Seaboard, though they have customers worldwide. In the past two decades, Franklin Paint has dramatically reduced the use of hazardous chemicals, including heavy metals, in its paint, and improved safety in the workplace. Franklin Paint has eliminated the use of xylene and methanol and reduced the use of three other TURA reportable substances below reporting thresholds, while increasing overall paint production. Annual use of approximately 100,000 pounds of lead compounds, 100,000 pounds of chromium compounds, 150,000 pounds of methanol, 50,000 pounds of xylene, and 500,000 pounds of toluene has been eliminated.
- **Ophir Optics** designs and produces a full range of high performance Infra-red (IR) optical lenses and elements. Its products are used in electro-optical systems for military, homeland security, commercial and industrial applications, ranging from Night Vision equipment to industrial metal processing. Ophir Optics has successfully utilized Lean Manufacturing and Six Sigma tools and methodologies for a variety of projects, including toxics use reduction and resource conservation, at their manufacturing facility in North Andover, Massachusetts. As a result of this work, Ophir has reduced its use of toxic chemicals and generation of hazardous waste, and increased the energy efficiency of its manufacturing operations.
- **Shawmut Corporation**, based in West Bridgewater, MA, is a producer of coated and laminated performance materials. The company laminates a variety of flexible substrates to create automotive headliner and interior trim materials, disposable medical products, protective work suits, filtration, military textiles, footwear, and breathable waterproof barriers. Shawmut historically utilized three principal processes: flame lamination, solvent-based adhesive lamination and thermoplastic adhesive lamination to bond a variety of substrates, including fabrics, foams, films, nonwovens, papers and foils. Since 1990, the company has been working consistently at toxics use reduction (TUR) to reduce both the use and emissions of trichloroethylene (TCE) from the solvent adhesive lamination process. In March of 2013, the company successfully eliminated all use of TCE at the facility by converting to a hot-melt adhesion process.
- **Stainless Steel Coatings Inc**. makers of STEEL-IT, a rugged, industrial coating used in corrosive and high-impact applications has taken a number of steps to reduce toxics, improve energy efficiency, and increase worker safety. Input substitutions in the production process have reduced the company's use of xylenes by 57% and eliminated hexavalent chromium. Stainless

Steel Coatings has also been able to reduce its hazardous waste costs by 52% by implementing a new production schedule. Furthermore, through a partnership with OTA and the MassSave energy efficiency program, National Grid, and Prism Energy Services, Stainless Steel Coatings has made its facility more energy efficient, reducing energy costs by 20-25%. For Stainless Steel Coatings, environmental compliance and worker health and safety are integral parts of a collective company effort to improve product quality and find new applications in the competitive paint and coatings market.

In FY15, OTA also updated two fact sheets:

- Designation of TURA Higher and Lower Hazard Substances in Massachusetts
- Right from the Start: A Pre-Permit Assistance Program for Massachusetts Businesses

Outreach and Collaboration

In FY15, OTA both attended and hosted a variety of events related to toxics use reduction or resource conservation. These events included:

- **Salcedo Auto Center** – In FY15, OTA worked with Salcedo Auto Center in Jamaica Plain, to transition away from using lead wheel weights, eliminating 83 pounds of lead annually from the shop. On June 20, Jamaica Plain Net Economy Transition (JP NET) hosted an event at Salcedo and the company received a resolution from a Boston City Councilor and citations from a State Senator and State Representative.

JP NET presenting at the Salcedo Auto Center event

- **Massachusetts Water Resources Authority (MWRA)** – In May, OTA staff hosted two presentations at the MWRA Significant User Conference. The presentations focused on OTA's services and possible future collaborations between the two groups.
- **TURA/TRI Trainings**: During the course of FY15, the TURA program hosted four TURA/TRI trainings in different regions across the Commonwealth.

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 FY15 included the following.

- **TUR Planners' Training Course.** Every year, the Institute presents a seven-day course to train new Toxics Use Reduction Planners. TURI continued to reformat 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 updated and utilized in the Fall 2014 course (FY15) and two were added, for use in the Fall 2015 (FY16) 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 2014 conference, TURA program staff and subject matter experts engaged participants on a range of topics including global toxics policies and their implications and opportunities for business. The Spring 2015 CE Conference included a 'back to basics' track to review core principles of TUR planning, as well as sessions on flame retardants and nanotechnology, among others.
- **Environmental Management Systems (EMS) Course.** This course is designed to give TUR Planners the knowledge they need to certify that a company's Environmental Management System satisfies the requirements of the Toxics Use Reduction Act (TURA). The first day educates participants on the elements of EMS as they relate to TUR planning. The course then focuses on the specific requirements of the TURA EMS and considers examples of source reduction policies and initiatives that should be incorporated into the TURA EMS.

- **Greener Materials Research Symposium.** TURI provided a full-day conference for industry and academic researchers to collaborate on the development of safer alternatives to toxic chemicals, including chloroform, phenol, formaldehyde, lead and halogens.
- **Workshops: "Beyond the MSDS."** The TURI library conducts on-going outreach to researchers and TUR planners, focusing on providing them with tools to better identify hazards of chemicals. TURI updated its 2-hour workshop, called "Beyond the MSDS", to train participants in the use of databases, tools and information sources to learn about chemical hazards. This workshop was repeated several times in FY15 – as an in-person 2-hour class, as a webinar, and as part of several UMass Lowell classes.
- **Webinars.** TURI also produced a new webinar, available to TUR planners as well as to the general public. The webinar, scheduled three times due to demand, covered the use of Hansen Solubility Parameters and an associated software tool. Understanding solubility is fundamental to identifying potential substitutes for toxic solvents.

TURA program staff work with TUR Planners at the Spring Continuing Education Conference

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.

Business Grants

- **Manufacturing sector:** Siemens Healthcare Diagnostics of Norwood, MA, was selected as the FY15 Industry Incentive Grant recipient. With support and facilitation from TURI, Siemens Healthcare Diagnostics will host and lead an industry peer mentoring work group for companies working on improving their identification of chemicals of concern and management of the use of chemicals throughout their production facilities. The goal of an effective chemicals management system is to achieve meaningful toxics use reduction, anticipate future global chemical restrictions and support continued competitive advantage.

- **Dry Cleaners:** In FY15, TURI provided a grant to T&P Cleaners in Woburn to completely eliminate their use of perchloroethylene and become a dedicated professional wet cleaner. TURI also provided Cedar Cleaners in Franklin with a grant for equipment that would allow them to become a 100% dedicated professional wet cleaner and awarded Jackson Cleaners in Melrose a grant towards a new steam cleaning machine. This steam cleaning equipment is a new technology for which TURI will collect use and results data for a case study to be distributed across the Commonwealth.

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. Three projects were supported at UMass Lowell in FY15:

- *Getting the Lead Out* – In the second year of funding, Assoc. Prof. Zhiyong Gu in Chemical Engineering worked to fully characterize a new type of lead- and halogen-free nanosolder paste for use in next-generation electronics assembly and manufacturing of computers, cell phones, automobiles, satellites and medical devices such as heart pacemakers. Dr. Gu's research team received a Phase 1 EPA P3 award for their innovative research in FY15, and participated in the competition for Phase 2 funding in Washington, DC in May 2015. (Industry partner: Benchmark Electronics)
- *Formaldehyde-free Thermosets*– Assoc. Prof. Ramaswamy Nagarajan in Plastics Engineering and his research team continued their investigation into inherently safer plastics using food grade feedstocks for formaldehyde- and phenol-free thermosets. (Industry Partner: Hollingsworth and Vose)
- *Elimination of Organic Solvents in Biobased Biodegradable Latex Coatings* - Assistant Prof. Meg Sobkowicz Kline in Plastics Engineering investigated new synthesis mechanisms to allow her to create versatile latex coatings from renewable resources without using toxic solvents. The resulting coatings could be an innovative solution to paper coating applications that currently rely on the use of highly toxic formaldehyde-based resins. (Industry partner: Worthen Industries)

Regional, Municipal, Community and Small Business Grants

Each year TURI sponsors a competitive community grants program available for community organizations, municipal departments and small businesses to create and promote healthier communities by raising awareness and educating people about safer alternatives to toxics. The following projects were funded in FY15.

- **City of Springfield Department of Parks, Buildings and Recreation Management**, "Transition of Public Land Management to Organic Land Care" - The project team developed a plan for the City to adopt organic land practices on six properties – Frederick Harris School grounds, Sweeny Playing Field at High School of Commerce, Forest Park Playing Field, Tree Top Park, Camp Wilder and the terrace at Mason Square. The team conducted soil analyses, implemented management

plans for pilot sites, developed bid specifications for materials and labor, created a program budget to implement organic land care practices and conducted training for staff, community groups and municipal partners in Northampton and Holyoke. The city plans to expand organic care practices to 50 school properties and 900 maintained acres of public land.

- **Full Circle Earth Greenhouse and Farm, Beverly**, "Healthy Communities Initiative: Reducing Pesticide Use through Practicing, Teaching" - Building upon a project funded by TURI in FY14, the project team empowered community citizens in Beverly and surrounding communities to reduce pesticide use. They taught organic land care principles through demonstrations, workshops and documentary films on the North Shore. The team built a composting pit at Long Hill Reservation in Beverly to produce nutrient-rich compost tea, an organic lawn care liquid fertilizer amendment that was provided to businesses, public works departments and local communities. The public was invited to drop off kitchen scraps and pick up compost tea for their gardens and yards. Partners included the Food Project, Beverly Farmers Market, Whole Foods in Lynnfield, and Change is Simple and Henry's Market in Beverly.
- **Jamaica Plain New Economy Transition**, "Cancer-Free New Economy Jamaica Plain: Integrating Toxics Reduction Approaches with Sustainable Community Development" - The Jamaica Plain New Economy Transition worked with retail businesses in Jamaica Plain to pursue toxics use reduction strategies, especially in the areas of cleaning and disinfecting, solvents and pesticide use. The project team developed model municipal policies to advance toxics use reduction in dry cleaning and other retail establishments. This effort builds upon last year's project that established the "Cancer-Free New Economy," an initiative that helps businesses transition away from using carcinogens and other toxics to safer alternatives. With last year's grant, they helped J&P Cleaners in Jamaica Plain make the switch from using perchloroethylene, a probable human carcinogen, to the safer alternative, professional wet cleaning. As part of this year's grant, JP NET provided educational outreach with a focus on auto shops, and supported the switch to lead free wheel weights for Salcedo Auto Center in Jamaica Plain.
- **The Town of Hudson**, "MetroWest Prevention & Wellness Partnership; Healthy Homes Initiative" - The Town of Hudson, in collaboration with Framingham, Marlborough and Northborough, worked to reduce household asthma triggers in children by distributing toolkits and materials to families. The information included how toxics in traditional cleaning products can cause or trigger asthma and safer ways to clean, including making your own cleaning products. The team made the materials available in English, Spanish and Portuguese. They used their network in the Prevention Wellness Trust Fund as a means to distribute the information more broadly across Massachusetts, including Worcester, Barnstable, New Bedford, Boston, Holyoke and Lynn.
- **YWCA of Lowell**, "Girls Going Green: Naturally Beautiful Green Cosmetics and Personal Care Products" - The Girls Going Green program at the YWCA of Lowell developed a series of interactive workshops for young people about safer beauty and personal care products. The project team of teen girls created an informational brochure that explains the toxins found in commercially marketed make-up and personal care products and the benefits of using safer products. They also provided the tools and information for teens to create their own safer make-up and personal care products at home.

Sector-Specific and Multi-Sector Projects

Aerospace and Defense Sector: TURI has continued a project working 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. Phase I research was completed in FY13 providing positive results for the use of non-hexavalent chromium primers. Phase II research was undertaken and completed in FY14. The result of the Phase II research was to provide sufficient technical results to enable the participating companies to specify non-hexavalent chromium sealants for new product designs. In FY15, Phase III research included other interested companies, Textron/Cessna, Boeing, UTC, and evaluated hex chrome free bond primers. During FY16, TURI will continue Phase III research.

Phase II Mechanical & thermal preconditioning of sealant test vehicles

Peer Mentoring Workgroup: Hosted by Siemens Healthcare Diagnostics, this peer mentoring workgroup is designed to share or define best practices for managing chemicals of concern across multiple life cycle phases. Members include Waters Corporation, EMD Millipore, Analog Devices, Inc., Essilor USA, Entegris, Biogen, and MassMEP. TURI worked with Siemens to launch the group in FY15, including identifying goals and metrics, as well as recruiting members. This workgroup will complete its efforts in FY16.

Dry Cleaning: TURI continues to take an integrated approach to helping dry cleaners shift to safer alternatives. Largely as a result of encouragement and financial support provided by TURI, a dozen dry cleaners across Massachusetts have made the switch from perchloroethylene to professional wet cleaning. In FY15, TURI sponsored a demonstration event at Premier Cleaners. TURI also provided a grant to T&P Cleaners in Woburn to completely eliminate their use of perchloroethylene and become a dedicated professional wet cleaner. TURI also provided Cedar Cleaners in Franklin with a grant for equipment that would allow them to become a 100% dedicated professional wet cleaner and awarded Jackson Cleaners in Melrose a grant towards a new steam cleaning machine. This steam cleaning equipment is a new technology for which TURI will collect use and results data for a case study to be distributed across the Commonwealth.

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. This work complemented the work conducted through JP NET, described above.

Research and Policy

TURI is a leader in the development 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. In addition to the research and policy activities described elsewhere, work in FY15 included:

- *Alternatives Assessment.* TURI completed a grant-funded project with Novozymes, manufacturers of enzyme-based products, such as cleaners and other surface preparations. Novozymes funded TURI to conduct a chemical hazard comparison of the alternative stabilizers possible for use with their enzyme-based cleaners. TURI conducted a two-part assessment of enzyme-based detergent formulation stabilizers Novozymes is developing. TURI conducted P2OASys and GreenScreen® assessments of the stabilizers and produced a report presenting the findings.
- *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 FY15, 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, jurisdictions request information on the Massachusetts program in order to learn about options for improving their own chemicals management policies. For example, in FY15, TURI staff provided information on the experiences of the TURA program to other states through the Interstate Chemicals Clearinghouse and to a nationwide collaborative of businesses through the Green Chemistry in Commerce Council.

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 in 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. The lab provided significant assistance to 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 citizens, students, faculty, industry, non-governmental organizations, and other MA agencies. The wide range of topics on which TURI has received requests for detailed information include artificial turf; pesticides; nanoparticles; lead in paint; chemicals in specific consumer products such as gloves, window frames, and particleboard; graffiti removal; medical devices; pharmaceuticals in watersheds; links between firefighting and specific cancers; and cleaning chemicals for a variety of sector-specific applications.

TURI has made a concerted effort to educate faculty, students, community grantees, and others about toxic chemicals and safer alternatives, focusing on TURI's online guide to resources on environmental, health and safety information. Hands-on workshops for "Beyond the MSDS" were presented to faculty and student researchers, public health and sustainability students, community grantees and Massachusetts Public Health Officers.

The TURI library's biweekly newsletter, Greenlist Bulletin, continued to provide information on recent news and publications. Greenlist also includes special topic issues in order to provide a deeper understanding; recent topics have included Nanotechnology and Green Building. Greenlist circulates to approximately 850 opt-in recipients.

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. TURI's FY15 publications are shown in the Appendix.

In FY15, TURI published information on hexavalent chromium free sealants and an assessment of safer sealant removers for the defense and aerospace industry in sector-specific trade journals.

TURI staff provided educational presentations in a variety of settings. Topics included an overview of TURA program resources; use of Hansen Solubility Parameters; information on the hazards of exposure to nanoparticles and techniques for reducing exposure; options for chemicals and materials to create safer products; alternatives and risk reduction approaches to trichloroethylene as a degreaser; the link between toxics use reduction and cancer reduction; green cleaning alternatives; safer alternatives in building materials; and, safer alternatives to perchloroethylene in garment care.

Press Coverage

Press and news coverage, both print and online, is another important route for public and business education about safer alternatives to toxic chemicals. In FY15, the work of the TURA program was featured in a variety of press outlets, with coverage of topics including the toxics use reduction successes of the Massachusetts organizations honored during the TURA program 25th anniversary; the potential health hazards of crumb rubber; and the advantages of wet cleaning. FY15 press coverage is shown in the Appendix.

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. On even calendar years large-quantity toxic users must also conduct TUR planning and submit a summary of the plan with the TUR report. These TUR, Resource Conservation or EMS plans must be approved by a MassDEP-certified TUR Planner.

In FY15, MassDEP processed close to 2000 TUR reports and TUR Plan summaries from 470 filers. Managing the reporting process involves assisting filers with the reporting process through phone or email, entering reporting and fee data into the data systems, checking reports for accuracy and compliance, following up on chemical use report and plan summary anomalies, identifying facilities that failed to submit required reports, plan summaries and fees, conducting inspections, taking enforcement actions, as necessary, and processing fees.

MassDEP also implemented a TURA Reporting Amnesty program for facilities that voluntarily disclose past failure to file one or more Toxics Use Reduction Act, M.G.L. Chapter 21I (TURA) Annual Chemical Use Reports (Form S's). MassDEP recognizes that there may be companies that are subject to TURA that are not aware of the reporting requirements 310 CMR 50.00 and legal obligations, or that have been reporting under TURA but have inadvertently missed one or more chemicals. The reporting amnesty began on April 9, 2015 and will end on June 30, 2016.

In addition MassDEP works closely with the other TUR agencies on the development of recommendations to the Advisory Committee and Administrative Council.

Data

In FY15, MassDEP worked with OTA and TURI to significantly update and expand the analysis of the reported TURA data. The most recent data available derives from the 2014 calendar use reports that were due on July 1 2015. These facilities use:

- Used a total of 901 million pounds of 145 different chemicals; and
- Generated 73 million pounds of chemical as byproduct (chemical waste)
- Released 3 million pounds of chemical waste as pollution
- Transferred 31 million pounds of chemical waste offsite for further treatment or management.

Outreach

MassDEP updated the TURA Reporting Instructions, the TURA Reporting Appendices, and the TURA Chemical List in FY15.

MassDEP worked with EPA, OTA, and TURI to provide four TUR Reporting Training sessions in the spring of 2015.

Enforcement

During FY15, MassDEP:

- Inspected 54 TURA Filers.
- Screened another 211 facilities to determine if they were subject to TURA.
- Issued enforcement actions, including
    - 19 notices of non-compliance based on report reviews for either late filing or failure to file.
    - 4 notices of non-compliance based on inspections for failure to file.
    - 3 administrative consent orders with penalties.

Fee Revenue

TURA-regulated facilities must pay annual fees, unless they have obtained a financial hardship waiver. In FY15 there were no fee-waiver requests. MassDEP collected:

- $2,948,350 in annual fees and statutory late fees, and
- $8,250 in fees from TUR planners who applied for the DEP's certification or recertification.

TUR Planner Certification

Toxic Use Reduction Planners (TUR planners), who are independent parties who review and approve annual toxics use reduction plans, must be certified by MassDEP. In FY15, MassDEP:

- Certified 6 new TUR Planners:
    - 1 General Practice TUR planners who took the TURI Toxics Use Reduction Planner course and passed the MassDEP Toxics Use Reduction Exam and are licensed to approve TUR Plans at any facility
    - 5 Limited Practice TUR planners who have demonstrated sufficient experience in TUR Planning to be licensed to approve TUR Plans at their place of employment
- Recertified 29 TUR planners whose two-year certification was due to expire.

Out of these 34 certifications and recertifications:

- 17 certifications were for "Limited Practice" TUR planners, who are only authorized to sign plans for their own company, Of these:
    - 13 were approved for TUR plans only.
    - 1 was approved for TUR and RC plans.
    - 2 were approved for TUR and EMS plans.
    - 1 was approved for EMS plans only

- 18 were for “General Practice” TUR planners, who are allowed to sign the plans for any toxic user, Of these:
    - 11 were approved for TUR plans only.
    - 2 were approved for TUR and RC plans.
    - 2 were approved for TUR, RC and EMS plans.
    - 3 were approved for TUR and EMS plans.

As of December 2016, there are a total of 167 Certified TUR Planners. 111 are General Practice and 65 are Limited Practice TUR planners.

- 115 are approved for TUR Plans Only
    - 59 General Practice
    - 55 Limited Practice
- 20 approved for TUR and RCP Plans
    - 18 General Practice
    - 2 Limited Practice
- 40 approved for TUR and EMS plans
    - 34 General Practice
    - 6 Limited Practice
- 1 Limited Practice TURPS approved just for EMS plans
- 16 approved for TUR, RCP and EMS plans
    - 15 General Practice
    - 1 Limited practice

3 applicants for General Practice TURP certification passed the exam administered by MassDEP.. The agency reviewed and approved 10 CEU training opportunities submitted by TURPs for continuing education credits, for maintaining TUR, RC, and EMS certifications.

Appendix

Policy Decisions

Designations of Higher Hazard Substances

In FY15, the Executive Office of Energy and Environmental Affairs promulgated regulations designating four chemicals or chemical categories as Higher Hazard Substances (HHS), which will lower the reporting threshold to 1,000 pounds per year for all uses of the chemical, effective as of January 2016. The three chemicals/chemical categories were:

- Hydrogen fluoride (HF)
- Cyanide compounds
- Dimethylformamide (DMF)
- n propyl bromide (1-bromopropane)

A fifth chemical, toluene diisocyanate (TDI) underwent further review, and although the Administrative Council voted to designate TDI a HHS, the regulation regarding the chemical's designation was not promulgated in FY15.

Events

TURI organized a variety of events in FY2015, including the following. (Note: this list does not include site tours for each of the TURA 25th Anniversary honorees or events organized by recipients of the FY15 TURI community grants.)

September 2014

TUR Planner Certification Course, September 11 through October 23 (15 students)
Beyond the MSDS training session at the TURI library, September 8 (14 attendees)
Demonstration of Environmentally Friendly Auto Body Shop Practices at 912 Auto Shop, Dorchester on September 16 and 23 (11 attendees)

November 2014

Toxics Use Reduction Planners' Continuing Education Conference (86 attendees)

February 2015

Premier Cleaners Wet Cleaning Demonstration, Westford (7 attendees)
Beyond the MSDS training session at the TURI library, February 24 (15 attendees)

March 2015

Environmental Management Systems Training, March 26, April 2 and 9 (3 attendees)

April 2015

Toxics Use Reduction Planners' Continuing Education Conference (91 attendees)

May 2015

Greener Materials Research Symposium (98 attendees)

June 2015

Champions of Toxics Use Reduction Recognition Event: Massachusetts State House
Speaker: Ned Bartlett, Undersecretary of Energy and Environmental Affairs
(~ 150 attendees)

Webinar:

- Identifying Safer Solvents Using Hansen Solubility Parameters, February 5 and 27, March 10, 2015. 208 attendees.

Publications

The TURA program and staff continued to make work accessible through a variety of publications and presentations. Note that some of the publications and presentations listed below are the result of non-TURA sponsored work.

Reports, Book Chapters, and Journal Articles:

Dunn KH, Tsai CSJ, Woskie SR, Bennett JS, Garcia A, Ellenbecker MJ., "Evaluation of Leakage From Fume Hoods Using Tracer Gas, Tracer Nanoparticles and Nanopowder Handling Test Methodologies," J. Occ. Environ. Hyg., 11(10):D164-D173 (2014).

Ellenbecker, MJ, and Tsai, S, Exposure Assessment and Safety Considerations for Working with Engineered Nanoparticles, Wiley Interscience, 2015.

Geiser, K, Edwards, S, Massey, R, Crumbley, C, "Guidance for Managing Information about Chemicals in Products." United Nations Environment Programme report, forthcoming.

Jacobs MM, Massey RI, Tenney H, Harriman E, "Reducing the use of carcinogens: the Massachusetts experience." *Reviews on Environmental Health* 2014; 29(4): 319-40. doi: 10.1515/reveh-2014-0048. Abstract in PubMed available at: http://www.ncbi.nlm.nih.gov/pubmed/25423668

Massey, RI and Jacobs MM, "The Massachusetts Toxics Use Reduction Act: Reducing the Use of Carcinogens." Chapter in in European Trade Union Institute, *Work and Cancer*, forthcoming.

Toxics Use Reduction Institute. Decision-Making under TURA: Resources for the TURA Administrative Council and Advisory Bodies. Methods and Policy Report No. 28, originally published in 2010, revised January 2015. Available at:
http://www.turi.org/TURI_Publications/TURI_Methods_Policy_Reports/Decision-Making_under_TURA_Resources_for_the_TURA_Administrative_Council_and_Advisory_Bodies._Updated_2015

United Nations Environment Programme, "POPs in Articles and Phasing-Out Opportunities," December 2014. Available at http://poppub.bcrc.cn/.

Fact Sheets

Office of Technical Assistance and Technology, "Designation of TURA Higher and Lower Hazard Substances in Massachusetts." Available at: http://www.mass.gov/eea/docs/eea/ota/fact-sheets/high-hazard-substance-faq-final.pdf

Office of Technical Assistance and Technology, "Right from the Start: A Pre-Permit Assistance Program for Massachusetts Businesses." Available at: http://www.mass.gov/eea/grants-and-tech-assistance/guidance-technical-assistance/agencies-and-divisions/ota/business-assistance/right-from-the-start-pre-permit-assistance/

Case Studies

Office of Technical Assistance and Technology, Case Studies for TURA Program 25th Anniversary honorees:

Allston Collision Center Available at http://www.mass.gov/eea/docs/eea/ota/allston-collision-center-case-study-final.pdf

Columbia Manufacturing, Inc. Available at http://www.mass.gov/eea/docs/eea/ota/case-studies/columbia-case-study-final.pdf

Franklin Paint Company Available at http://www.mass.gov/eea/docs/eea/ota/franklin-paint-company-final.pdf

Ophir Optics LLC Available at http://www.mass.gov/eea/docs/eea/ota/ophir-optics-case-study-final.pdf

Shawmut Corporation Available at http://www.mass.gov/eea/docs/eea/ota/case-studies/shawmut-corp-case-study-final.pdf

Stainless Coatings Available at http://www.mass.gov/eea/docs/eea/ota/case-studies/stainless-steel-coatings-case-study-25th-final.pdf

Office of Technical Assistance and Technology, Case Studies:

912 Auto Center Available at http://www.mass.gov/eea/docs/eea/ota/912-auto-center-case-study.pdf

Averica Discovery Services Inc. Available at http://www.mass.gov/eea/docs/eea/ota/averica-discovery-services-inc-case-study-final.pdf

Articles in Trade Journals

Morose, G, Lamb, D, Defranco K, Lemieux, C, "Hex Chromium-Free Sealants for Defense and Aerospace" August 2014, Products Finishing. Available at http://www.turi.org/TURI_Publications/TURI_Staff_Publications/Hex_Chromium-Free_Sealants_for_Defense_and_Aerospace._2014/Hex_Chromium-Free_Sealants_for_Defense_and_Aerospace

Morose, G, Lamb, D, Marshall, J, Uzor, C, "Assessment of Safer Polysulfide and Polythioether Sealant Removers for Aerospace/Defense Industry Applications" September 2014, Products Finishing. Available at http://www.turi.org/TURI_Publications/TURI_Staff_Publications/Assessment_of_Safer_Sealant_Removers._2014/Assessment_of_Safer_Sealant_Removers._2014

Myles, M, Joseph, G, "The Moulder Company: Alternative Strategies for Toxics Use Reduction" December 2014, American Accounting Association. Available at http://www.turi.org/TURI_Publications/TURI_Staff_Publications/Moulder_Company_Alternative_Toxics_Use_Reduction_Strategies._2014

Invited Conference Presentations, Workshops, and Training Presentations (Selected):

Below are listed both TURA and non-TURA funded presentations by TURI staff:

Butow, M. and Onasch, J., "Toxics in Communities and EHS Database Resources" Massachusetts Health Officers Association (MHOA) Educational Seminar, September 18, 2014, Devens, MA. ~ 50 attendees

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.

Eliason, P. "Considering chemicals and materials choices to create safer products and processes", Consumer Specialty Products Association conference (New Horizons), September 15, 2014, Stone Mountain, Georgia, approximately 50 in attendance.

Eliason, P., Washington Alternatives Assessment Advisory Workshop – IC2 AA Guide Performance and Materials Management Modules presentation. July 9, 2014 in Olympia, WA, Department of Ecology headquarters. Approximately 40 people in attendance.

Ellenbecker, M., "Controlling exposures to engineered nanoparticles using exposure prevention and minimization," American Industrial Hygiene Conference & Expo (AIHCE), San Antonio, TX, June 2014.

Harriman, E., "Performance and Economic Analysis." International Symposium on Alternatives Assessment - Advancing Science & Practice, National Institute of Health, Bethesda, MD, March 6, 2015

Harriman, E., "Perspectives on Materials of Concern and Safer Alternatives in Building Materials."Advancing the Design and Adoption of Safer Materials in the Building Sector: Challenges and Opportunities Workshop , Boston, MA, December 3, 2014

Marshall, J. USEPA Expert Public Workshop on Alternatives and Risk Reduction Approaches to Trichloroethylene Use as a Degreaser. Keynote speaker, 2 session presentations. Attendance: ~60 in person and an additional 100 on webinar over 2 day event. July 29, 30. Washington, D.C.

Massey, R. and Jacobs,. "Toxics Use Reduction and Cancer Prevention: Making the Link." Presentation at the Council of State and Territorial Epidemiologists Annual Conference, Boston, June 14, 2015. (Audience: 40.)

Massey, R. “Toxics Use Reduction: A Brief Introduction.” Presentation at Concord Turf Grass Forum, June 23, 2015. (Audience: 80-100.)

Onasch, J., July 28, 2014 Presentation to Merrimac Valley Health Round Table about toxics in the community and the work of TURI

Onasch, J. “Making the Business Case for Professional Wet Cleaning”, November 15, 2014, NEFA Fall Fest conference in New Castle NH

Onasch, J. “Alternatives to Perc in Dry Cleaning Sector”, December 2, 2014, NEWMOA regional meeting

Onasch, J. Westford Healthy Ponds and Lakes Collaborative presentation, April 2, 2015. Presentation on reducing herbicides in lakes via hand pulling projects, and Community grant information.

Wilcox, H., Presentation to MFAA in Salem MA September 17-19, 2015 about Green cleaning services and on-going projects at the lab. Co presented with Rex Morrison of Process Cleaning for Healthy Schools.

Wilcox, H. Presentation 10/23 in Waltham with MA vendor Casey and Geneon on sustainable and renewable cleaning. (Audience: 25.)

Wilcox, H., “Sanitizing and Disinfection and Green Cleaning”, New England Association for Healthcare Environment , February 27, 2015, hospital facility managers

Wilcox, H., DCR Central Regional meeting. Presentation to 50 – 60 regional workers on the transition of their facility to FAC 85 to comply with EO 515. April 16, 2015.

Wilcox, H., Training in Boston for DCAMM and their approved contractors with OSD and OTA April 21, 2015

Press Coverage

Angelo, Karen. “Faculty Receives TURI Grants to Research Green Materials” *UML Today*, 12/22/14. Available at http://www.uml.edu/News/stories/2014/TURIAcademicGrants.aspx

Angelo, Karen. “JP NET and J&P Cleaners Recognized at State House” June 25, 2015, Jamaica Plain News. Available at: http://www.jamaicaplainnews.com/2015/06/25/jp-net-and-jp-cleaners-recognized-at-state-house/12240

Anon., “TURI promotes wet cleaning through grant program”, *American Dry Cleaner*, February 13, 2015. Available at: https://americandrycleaner.com/articles/turi-promotes-wet-cleaning-through-grant-program

Anon., “The Science behind the Scorecard” Toronto Environmental Alliance. Available at: http://www.torontoenvironment.org/dryclean_scorecard_science

Anon., “Coming Clean About Our Wardrobe's Water Footprint and Toxic Legacy”, H2O Radio. Available at: http://h2oradio.org/textiles.html

Anon., “ChemGenes and Analog Devices earn awards from TURA program” Wilmington and Tewksbury Town Crier, May 23, 2015. Available at: http://homenewshere.com/tewksbury_town_crier/news/article_9ce4a606-009f-11e5-b43e-03b3fc552f38.html

Avery, Brad. “Hudson Board of Health awarded for asthma program” June 22, 2015, Wicked Local Hudson. Available at: http://hudson.wickedlocal.com/article/20150622/NEWS/150629186

Comeau, Zachary. “Medway: Town weighs organic landcare grant” May 29, 2015. Available at: http://www.milforddailynews.com/article/20150529/NEWS/150526014/

Gonsalves, Susan. “Targeting toxins: Hearings will look at proposed fee increase” *Worcester Telegram* October 26, 2014. Available at: http://www.telegram.com/article/20141026/NEWS/310269948/1002/business

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