Annual Report of the Massachusetts Toxics Use Reduction Program

Fiscal Year 2023

Prepared by the Office of Technical Assistance and Technology
in collaboration with the Toxics Use Reduction Institute
and the Massachusetts Department of Environmental Protection

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TURA Agencies

Massachusetts Department of Environmental Protection (MassDEP)
100 Cambridge Street, Suite 900, Boston, MA 02114
(617) 292-5500
https://www.mass.gov/guides/massdep-toxics-use-reduction-program

Certifies Toxics Use Reduction (TUR) Planners, receives and reviews toxics use reports submitted by companies, provides guidance, takes enforcement actions, and collects chemical use data and makes it available to the public.

Office of Technical Assistance & Technology (OTA)
100 Cambridge Street, Suite 1020, Boston, MA 02114
(617) 626-1060
www.mass.gov/eea/ota

A non-regulatory agency within the Executive Office of Energy and Environmental Affairs (EEA) that provides free, confidential, on-site technical and compliance consultations to Massachusetts businesses and institutions.

Toxics Use Reduction Institute (TURI)
126 John Street, Suite 14, Lowell, MA 01852
(978) 934-3275
https://www.turi.org/

Provides education, training, and grants for Massachusetts industry and communities; sponsors research and demonstration sites on safer materials and technologies; provides laboratory and information services and policy analyses; manages the TURA Science Advisory Board.

FY23 Executive Summary

Overview

The Toxics Use Reduction Act (TURA) Program works with Massachusetts businesses and communities to reduce the use of toxic chemicals while investigating and promoting the adoption of safer alternatives. This protects human health and the environment, makes Massachusetts a safer place to live and work, and improves the competitiveness of Massachusetts businesses. From 2007 to 2021, adjusting for production, TURA filers have reduced toxic chemical use by 62% and have reduced on-site releases of toxics to the environment by 76%.

TURA is administered by three agencies: the Massachusetts Department of Environmental Protection (MassDEP), the Office of Technical Assistance and Technology (OTA), and the Toxics Use Reduction Institute (TURI). In FY23, MassDEP processed and analyzed reports from over 400 TURA filers; maintained the certification of the 101 Toxics Use Reduction (TUR) planners, offered compliance guidance to the regulated community, and conducted enforcement. OTA worked closely with 17 facilities to offer technical assistance related to toxics use reduction, resource conservation, and compliance and conducted several trainings and presentations on source reduction and the TURA Program. TURI provided laboratory services to 13 Massachusetts businesses searching for safer cleaning and disinfection products and awarded $137,500 in toxics use reduction grants.

FY23 Projects

Environmental justice continued to be a program focus in FY23. Approximately 80% of facilities subject to TURA are located in or near environmental justice neighborhoods, in large part a product of the long history of disproportionate siting of industrial facilities near populations that are low-income, minority, and/or experience language access barriers. As part of the Executive Office of Energy and Environmental Affairs Environmental Justice Strategy, OTA established metrics to track progress towards environmental justice goals pertaining to staff outreach, stakeholder training, and technical assistance for facilities in environmental justice neighborhoods. TURI commissioned an analysis in FY23 on environmental justice and the TURA Program, comparing chemical use and release in Massachusetts communities with higher and lower percentages of the population residing in environmental justice block groups.

Nanomaterials: In FY23, the Science Advisory Board completed a review of single- and multi-walled carbon nanotubes and carbon nanofibers, resulting in recommendations to list all three nanomaterials under TURA.

PFAS: The TURA Program continued to pursue PFAS source reduction activities, including through outreach to wastewater treatment facilities in Drinking Water Protection Areas, the development of industry-specific PFAS source identification assessment tools, and the provision of reference materials and trainings on how to identify, reduce, and report on PFAS under TURA.

Safer cleaning and disinfection: The Science Advisory Board recommended the addition of two categories of quaternary ammonium compounds (QACs) to the TURA List of Toxic or Hazardous Substances. TURI also launched a “Drive to Zero” campaign for halogenated solvent replacement, conducting outreach to connect TURA filers using trichloroethylene (TCE) and other halogenated solvents to the TURI lab’s experts on safer alternatives.

Program Overview: Toxics Use Reduction in Massachusetts

Today, Massachusetts is significantly cleaner and safer because of the environmental initiatives of the Toxics Use Reduction Act (TURA).

The 1989 legislation and the Toxics Use Reduction Program it brought about have won awards from Harvard University's John F. Kennedy School of Government and the National Pollution Prevention Roundtable, have been recognized by independent research organizations such as the World Watch Institute, and have become a national model for toxics use reduction.

TURA's cornerstone principle is that the best way to reduce pollution and prevent human and environmental exposures to toxics is to address the root cause: the decision to use toxics in the first place. Facilities subject to TURA (TURA filers) are required to track and report the amounts of toxic chemicals used and generated as waste each year. This provides public information on the use and waste of covered toxic chemicals. In addition, every other year, TURA filers analyze whether it is in their best interest to adopt toxics use reduction techniques to use fewer pounds of toxic chemicals per unit of product produced.

Because the biennial Toxics Use Reduction Plans are designed to reveal cost savings and competitiveness opportunities, they lead to voluntary reductions in toxic chemical use, which lead to reductions in worker exposures, hazardous releases, and the generation of toxic wastes.

The resulting efficiencies, financial savings, product improvements, and improved environmental performance all work together to support the competitive position of Massachusetts businesses. Public data demonstrating progress by TURA filers is available through reporting year 2021.

Progress by TURA Filers

In reporting year 2021, the following chemical quantities were reported:

- Chemical use: 649 million pounds
- Byproduct generation: 71 million pounds
- Shipped-in product: 279 million pounds
- On-site releases: 2.5 million pounds
- Transfers off-site: 33 million pounds

From 2007 to 2021, when adjusting for production, 2007 Core Group facilities achieved the following reductions:

- reduced toxic chemical use by 62%
- reduced toxic byproducts by 41%
- reduced toxics shipped in product by 42%
- reduced on-site releases of toxics to the environment by 76%
- reduced transfers of toxics off-site for further waste management by 17%

The 2007 "Core Group" includes all industry categories and chemicals that were subject to TURA reporting in 2007 and remained subject to reporting in 2021 at the same reporting threshold. This Core Group is used to measure progress from 2007 to 2021.

Toxics Use Reporting and Data

Each July 1, large-quantity toxics users in TURA-covered industry sectors submit an annual Toxics Use Reduction (TUR) report to MassDEP including data on each TURA-listed chemical used in above-threshold amounts during the previous calendar year. These reports supplement the federal Toxics Release Inventory (TRI) reports that must be submitted on the same date to document the quantities of chemicals released to the environment or shipped offsite to be managed as waste. These TUR reports document the quantities of chemicals used, processed, or manufactured by each covered facility.

In FY23, MassDEP processed approximately 1,300 TUR reports from 432 facilities. MassDEP continues to update their guidance documents and data systems to improve the information received from TURA filers.

Managing the reporting process involves:

- Assisting filers with the reporting process
- Checking reports for accuracy and compliance
- Following up on chemical use report and plan summary anomalies
- Issuing invoices and processing fees
- Identifying facilities that failed to submit required reports, plan summaries, and fees
- Taking enforcement actions as necessary

TURA Compliance Training and Outreach

MassDEP worked with OTA and TURI to provide one online TUR Reporting Training session during FY23. The training focused on the various elements of TUR Reporting via the eDEP Online Filing Platform.

Compliance and Enforcement

MassDEP administers the regulatory components of the TURA program and supports the work of the other TURA agencies with data and policy analysis, strategic planning, training outreach, and education.

During FY23, MassDEP inspected 60 TURA filers and screened another 33 facilities to determine if they were subject to TURA. In FY23 new program enforcement staff was onboarded and issued enforcement for prior calendar years along with the current year. The inspections, screenings, and evaluations of electronic filings resulted in:

- 1 Reporting Penalty Assessment Notice (RPAN) for failure to file a Toxics Use Report and a Toxics Use Fee Worksheet for reporting year 2021.
- 35 Notices of Noncompliance (NON) for failure to submit complete or timely TUR reports or for failure to comply with reporting or planning requirements

Data Analysis

MassDEP manages the TURA data and information releases on the reported chemical use data and toxics use reduction progress. The most recent data available derive from the 2021 calendar year TUR reports that were due on July 1, 2022. Four hundred thirty-two (432) facilities submitted 1,344 individual chemical reports on 127 different chemicals.

The Toxics Use Reduction Institute makes the TURA data available to the public at www.turadata.org. In FY23, the site was updated with 2021 TURA data.

Champions of Toxics Use Reduction

In June of 2023, for the first time since the COVID-19 pandemic began, TURI hosted the TURA Program Champions of Toxics Use Reduction recognition event at the Massachusetts State House. This event honors community groups, municipalities, companies, or individuals from Massachusetts who are leaders in their field and have made impressive strides in advancing toxics use reduction. In FY23, this event honored two industries in Holliston and Norwood, two small businesses in Stow and Holyoke, a community group in Nantucket, and a business in Danvers that partnered with a university researcher in Lowell. Governor Maura Healey also proclaimed June 20 as Champions of Toxics Use Reduction Day to commemorate the awardees: Conklin Office Furniture, Donoma Gymnastics, Nantucket PFAS Action Group & Firefighter Partners, S.E. Shires, Steel Art, and Transene Company with their UMass Lowell research partners.


The Commonwealth of Massachusetts

A Proclamation

CHAMPIONS OF TOXICS USE REDUCTION DAY

God Save the Commonwealth of Massachusetts

Governor Healey's proclamation naming June 20, 2023 as Champions of Toxics Use Reduction Day

Transene Company and their UMass Lowell research partners, one of the 2023 Champions of Toxics Use Reduction

The event's distinguished speakers included Chair Daniel Cahill (Representative and Co-Chair of Joint Committee on Environment & Natural Resources), Stephanie Cooper (EEA Undersecretary for Environment), Rep. Kate Hogan (Speaker Pro Tempore of the House of Representatives), Bonnie Heiple (MassDEP Commissioner), and Dr. Anne Maglia (UMass Lowell Vice Chancellor for Research & Innovation).

TURA Program Staff Recognition

In 2022, The National Pollution Prevention Roundtable (NPPR) presented the Ken Zarker Memorial P2 Champion Award to TURI Senior Associate Director and Senior Policy Analyst Rachel Massey for her work in facilitating the work of the Nantucket PFAS Action Group to reduce the use of PFAS in firefighters' turnout gear.

TURI Senior Associate Director & Senior Policy Analyst Rachel Massey

Toxics Use Reduction Planner Certification and Continuing Education

Planner Certification

In even calendar years, large quantity toxic users must prepare (or update) a Toxics Use Reduction plan (TUR Plan) or update an existing plan and analyze whether there are feasible opportunities to change their production processes to reduce the use and release of toxics, and/or the generation of waste, while improving their competitiveness. These TUR plans must be reviewed and approved by a MassDEP-certified Toxics Use Reduction Planner (TUR Planner).

Facilities that have completed a TUR Plan and two updates can opt to substitute in every other planning year a Resource Conservation Plan which includes an analysis of the facility's water or electricity usage, generation of solid waste, or use of non-TURA-reportable toxic substances. These Resource Conservation Plans must be reviewed and approved by a MassDEP-certified TUR Planner who has also been specifically certified to aid in the preparation of Resource Conservation Plans. Alternatively, the business may incorporate TUR planning into its existing Environmental Management System (EMS). The EMS Progress Reports must also be reviewed and approved by a MassDEP-certified TUR Planner who is qualified to review EMS.

TUR Planners can be approved as General Practice TUR Planners, who can review and approve plans developed by any facility, or Limited Practice TUR Planners, who are allowed to review and approve plans at their place of employment only. General Practice TUR Planners are required to take the TUR Planner Certification Course offered by TURI and pass an exam managed by MassDEP.

As of the end of FY23, there were 101 MassDEP certified, active TUR Planners, including:

- 55 General Practice Planners
- 46 Limited Practice Planners

Toxics Use Reduction Planner Certification Course

Every year, TURI conducts an intensive course to train new TUR Planners. Required self-paced online sessions present the theory and details associated with TUR planning and the responsibilities of being a TUR planner, while the four classroom sessions are devoted to workshop exercises, group discussion, and team project work to develop a Toxics Use Reduction (TUR) Plan based on an example facility. The course culminates with group presentations designed as pitches to management about recommended toxics use reduction options featured in the group Plans. In FY23, 12 industry professionals and 4 new TURA program staff attended the full course. An additional 2 currently certified planners completed the online coursework as a refresher for their TUR planning skills.

A training presentation for Toxics Use Reduction Planners

Toxics Use Reduction Planner Continuing Education

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, safer alternatives, opportunities for reducing use of toxics and related policies and drivers influencing facility decisions regarding chemical use. The conferences allow planners to improve their skills, discover new opportunities for TUR to help their facilities minimize disruptions associated with future restrictions or regulations, and maintain their certifications. Each conference includes a TUR fundamentals topic designed to hone participants' skills in various aspects of TUR planning.

The fall 2022 conference was delivered virtually; topics included the fundamentals of process characterization, safer cleaning, sanitizing and aqueous cleaning techniques implemented by Massachusetts companies to reduce their use of toxics, methods for better understanding chemical hazards in the workplace and the impact of chemicals choices and management on facilities' climate change resiliency. The spring 2023 conference, an in-person event held in Marlborough, featured a keynote presentation on EPA's activities on solvents under TSCA, and offered sessions on topics including sustainability and TUR planning, PFAS replacements developed and implemented by a Massachusetts microelectronics supplier, PFAS reporting under TURA, and safer alternatives to vapor degreasing implemented by Massachusetts companies or investigated by TURI.

Other Continuing Education Opportunities

In FY23 TURI offered several other opportunities for TUR planners and companies to expand their knowledge and receive additional TUR planner continuing education credits. These included: Beyond the Safety Data Sheet, an in-depth practical training on gathering relevant information on the hazards associated with chemicals (offered in fall and spring), and an on-site demonstration of new technology (vacuum cycling nucleation) that shows promise as a safer alternative to vapor degreasing.

TURI also offered the Resource Conservation Planner Certification two-day training course in spring 2024 for planners interested in using their TUR planning skills to address a broader range of pollution prevention opportunities at their facilities. Six TUR planners attended the course, which was offered online and featured external speakers with experience in water conservation, energy conservation and techniques for reducing the use of materials that contribute to solid waste.

Credit Approval

TUR Planners can maintain certification by attending certain TURA program training and education events that offer TUR Planning continuing education credits. Other organizations may request approval from MassDEP to offer TUR Planner continuing education credits for their workshops and events. During FY23, MassDEP approved 10 courses offered by non-TURA program organizations for continuing education credit.

TURA Program Revenue

Facilities subject to TURA requirements pay an annual fee. These fees are designated as retained revenue at the Department of Environmental Protection (MassDEP) through an annual appropriation in the state budget and are dedicated to the support of TURA program activities. These funds support the TURA program activities at the Toxics Use Reduction Institute (TURI), the Office of Technical Assistance (OTA) and MassDEP.

FY23 Fee Revenue

TURA-regulated facilities must pay annual fees unless they have obtained a financial hardship waiver. There were no fee-waiver requests in FY23. MassDEP collected:

- $2,691,219 in annual fees
- $82,661 in statutory late fees
- $7,625 in fees from TUR Planners who applied for the DEP's certification or recertification

Appendix IV contains FY23 expenditure information.

TUR Policy

Administrative Council

Overview

The Administrative Council on Toxics Use Reduction coordinates toxics management statewide and is responsible for making decisions about the TURA Toxic or Hazardous Substances List. The Administrative Council is chaired by the Secretary of the Executive Office of Energy and Environmental Affairs and includes representatives from five additional state agencies.

The Administrative Council, and other TURA bodies, continued to meet remotely through FY23, in accordance with Governor Healey's extension of the temporary provisions pertaining to the Open Meeting Law, originally adopted under An Act Relative to Amending Certain COVID-19 Measures Adopted During the State of Emergency.

Members

The members of the TURA Administrative Council as of the end of FY23 were as follows (newly-appointed agency heads and designees are noted in bold):

Agency	Member	Designee
Executive Office of Energy and Environmental Affairs	**Secretary Rebecca Tepper**	**Undersecretary Stephanie Cooper**
Department of Environmental Protection	**Commissioner Bonnie Heiple**	Greg Cooper, Director, Hazardous and Solid Waste Division, Bureau of Air and Waste
Department of Public Health	**Commissioner Robert Goldstein**	**Kristopher Callahan**, Director of Policy and Regulatory Affairs, Bureau of Environmental Health
Executive Office of Labor and Workforce Development	**Secretary Lauren Jones**	Michael Flanagan, Manager, Department of Labor Standards Safety and Health Programs
Executive Office of Public Safety and Security	Secretary Terrence Reidy	**Jacob Nunnemacher or Kristen McDonough,** Fire Protection Engineers
Executive Office of Housing and Economic Development	**Secretary Yvonne Hao**	**Layla D'Emilia,** Undersecretary of Consumer Affairs and Business Regulation

FY23 Administrative Council Activity

TURA requires the Administrative Council to adjust the Toxic or Hazardous Substance List to add or delete substances consistent with changes in the Toxics Release Inventory (TRI) list, established by section 313 of the Emergency Planning and Community Right to Know Act (EPCRA). The 2020 National Defense Authorization Act (NDAA) added 172 PFAS to the Toxics Release Inventory (TRI) and provides for additional PFAS to be listed under TRI annually. During 2021 and 2022, EPA added eight additional

PFAS to the TRI list. In FY23, the Administrative Council voted to add these eight PFAS to the TURA Toxic or Hazardous Substance List to mirror the additions to the TRI list.

The Administrative Council also reviewed a draft policy analysis on quaternary ammonium compounds (QACs). This policy analysis was developed by TURI following the Science Advisory Board's FY21 recommendation to add a category of QACs to the TURA List.

Advisory Committee to the Administrative Council on Toxics Use Reduction

A multi-stakeholder Advisory Committee provides input to the Administrative Council. The Committee includes representation of large and small businesses, labor, environmental and health advocacy, and others. FY23 members were as follows:

- Robert Audlee, Stainless Steel Coatings
- Magdalena Ayed, Harborkeepers
- Karen Blood, Hollingsworth & Vose
- Lawrence Boise, Franklin Paint
- Michael Fiore, MA Dept. of Labor Standards
- Andrew Goldberg or Jillian Riley, Attorney General's Office
- William Judd, Industrial Compliance Group
- Tennis Lilly, Groundwork Lawrence
- Mark Monique, The Savogran Company
- Mark Rossi, Clean Production Action
- Lucy Servidio, Capaccio Environmental Engineering
- Laura Spark, Clean Water Massachusetts
- Jodi Sugarman-Brozan, Massachusetts Coalition for Occupational Safety & Health (MassCOSH);
- Matthew Taylor, Dupont
- Rebecca Weidman, Massachusetts Water Resources Authority

FY23 Advisory Committee Activity

The Advisory Committee to the Administrative Council met to discuss the TRI adjustments to the TURA List and the QACs policy analysis.

TURA Science Advisory Board

The Science Advisory Board works with TURI to provide a sound scientific basis for program decisions and includes members from a variety of scientific backgrounds. Members' organizational affiliations are listed, but members serve as individuals, bringing their diverse expertise to the board; they do not represent their organizations. FY23 members include:

- Lisa Cashins, MA Department of Labor Standards
- Robin Dodson (Chair), Silent Spring Institute
- Christy Foran, Rand Corporation
- Rich Gurney, Simmons University
- Wendy Heiger-Bernays, BU School of Public Health
- Denise Kmetzo, Collaborative Risk Solutions
- Heather Lynch, Cardno ChemRisk
- Helen Poynton, UMass Boston
- Christine Rioux (Vice Chair), Interdisciplinary health scientist
- Alicia Timme-Laragy, UMass Amherst

FY23 Science Advisory Board Activity

In FY23, the Science Advisory Board held five meetings, during which it continued its review of carbon nanotubes and nanofibers and began the process of evaluating flame retardants in connection with M.G.L. 21A §28.

In June 2020, the TURA Program received a petition to list carbon nanotubes and fibers. From FY21 to FY23, TURI and the Science Advisory Board reviewed over 100 scientific studies to work toward making a recommendation on these substances. In FY22, the SAB made a recommendation to list multi-walled carbon nanotubes, based on the evidence of pulmonary toxicity, biopersistence, lung cancer, mesothelioma, and environmental persistence, with additional concerns for genotoxicity and toxic environmental degradation products. In FY23, the SAB made a recommendation to list single-walled carbon nanotubes, based on evidence of pulmonary toxicity and environmental persistence, with additional concerns for reactive oxygen species (ROS) production and DNA damage. In FY23, the SAB also recommended listing carbon nanofibers, based on evidence of pulmonary toxicity. In FY23 they also began considering the petition's request to establish a lower reporting threshold for these nanomaterials.

Under An Act to Protect Children, Families, and Firefighters from Harmful Flame Retardants, manufacturers and retailers in Massachusetts may not sell, manufacture, or import any bedding, carpeting, children's products, residential upholstered furniture or window treatments containing any of eleven chemical flame retardants present at >1000 parts per million. The law further directs MassDEP to consult with TURI and the SAB regarding additional chemical flame retardants that should be prohibited under the law. In FY23, the SAB began its review of chemical flame retardants, advising MassDEP on additional CAS numbers, isomers and analogues to the eleven chemicals listed in the law., work that would continue into FY24.

Collaboration for TUR

OTA staff are active representatives on various committees and Advisory Boards such as the MA Department of Public Health's Occupational Health Surveillance Program (OHSP), the Massachusetts State Emergency Response Commission (SERC), and the New Hampshire Department of Environmental Services Biosolids Improvement Workgroup. Both TURI and OTA are on The New England Consortium (TNEC) advisory board, Participation in these committees allow the TURA Program to interact with like-minded agencies, collaborate with public health peers, and ensure that toxics use reduction is incorporated into other state programs.

TURA Program staff also collaborate across state lines with other state environmental technical assistance providers and environmental agencies, as well as with the Environmental Protection Agency, to stay abreast of emerging issues and changes in state and federal environmental policy. These interstate projects include work with the Interstate Chemical Clearinghouse (IC2), the National Pollution Prevention Roundtable (NPPR), and the Northeast Waste Management Officials' Association (NEWMOA), including participating in the planning of the April 2024 Science of PFAS Conference. OTA staff also chair the IC2 Environmental Justice Work Group, and TURI staff chair the IC2 Alternatives Assessment Work Group.

During FY23, OTA offered Chemical Safety and Climate Change Resiliency presentations with the goal of assisting companies and first responders in how to use OTA services to reduce risks of severe weather-related chemical or industrial accidents:

- On July 20, 2022, the National Association of City and County Health Officials (NACCHO) hosted its annual meeting, which included a sharing session on Local Perspectives on Resiliency in Climate & Health at which OTA presented on chemical safety and climate change resiliency.

- On March 14, 2023, NEWMOA hosted a training at which OTA presented on chemical safety and climate change resiliency.
- On May 24, 2023, The New England Consortium (TNEC) hosted a training at which OTA presented on chemical safety and climate change resiliency.

Per- and polyfluoroalkyl substances (PFAS) contamination is a high-priority topic for the TURA Program. OTA partnered with organizations including NEIWPCC and the National Association for Surface Finishing to offer trainings about PFAS source reduction and environmental justice; see Appendix III for details. TURI delivered two presentations on PFAS:

- On March 27, 2023, TURI hosted a webinar for TURA filers and planners about reporting requirements for the new PFAS NOL category under TURA.
- On April 12, 2023, at the spring TUR conference, TURI presented a profile of a Massachusetts company that switched to safer PFAS-free products.

On September 21, 2022, OTA presented at the US EPA 2022 TRI Virtual Conference about the TURA program and how it uses TRI data. TURI lab staff presented TURA success stories at the fall and spring TUR conferences and to the National Pollution Prevention Roundtable. In March 2023, TURI staff also delivered a presentation at Yale University about toxics use reduction and informed substitution.

TURI staff participate in the Clean Electronics Production Network (CPEN), a collaborative network that addresses complex workplace health and safety challenges in the electronics supply chain. CPEN's priority chemicals include many solvents, for which TURI brings deep expertise.

TURI research staff also participate in an ongoing Hex Chrome Free Aerospace Consortium project to evaluate various commercially available conversion coating materials that do not contain hexavalent chromium. Project partners include Boeing, Lockheed Martin, Blue Origin, NASA, RTX-Raytheon, and Textron Aviation.

Massachusetts Toxics Reduction Task Force

To facilitate implementation of EO 515, the Toxics Reduction Task Force (TRTF) was established in 2009 with oversight and leadership by the Operational Services Division (OSD) and OTA. The TRTF also includes staff from the Department of Public Health (DPH), the Department of Labor Standards (DLS), TURI, and MassDEP. The TRTF remains a technical advisory group to help the Environmentally Preferable Products Program identify additional toxics in products on statewide contracts and explore safer and healthier options. The goals and objectives of the TRTF are to select priority focus areas for reduction in toxic substances in products or services.

During FY23, the TRTF continued to facilitate discussions and provide feedback on safer disinfection practices and products. The TRTF also continued its focus on PFAS. TRTF FY23 activities are detailed in the FY 2023 TRTF Annual Report.

TURA Program Services

Technical Assistance

OTA provides Massachusetts businesses with free, non-regulatory, confidential assistance for toxics use reduction, energy and water conservation, compliance, and waste reduction. Its technical assistance

providers aim to help businesses save money while improving public and worker health through reducing toxics and conserving resources.

During FY23, OTA worked closely with seventeen Massachusetts facilities and provided recommendations related to regulations, pollution prevention, toxics use reduction, energy efficiency, and water conservation. OTA's work promoting environmental justice is discussed in greater detail elsewhere in this report.

All consultations with OTA technical assistance providers are bound by statutory confidentiality, unless waived by the company for case study development, special recognition, or other purposes. Confidentiality ensures that companies can form and maintain long-term partnerships with OTA. Through these relationships, OTA's technical assistance providers help Massachusetts companies discover opportunities to reduce their use of toxic or hazardous materials and achieve cost savings in the process.

Of the 17 Massachusetts facilities with which OTA worked in FY23, 71% were directly located in or within one mile of an environmental justice neighborhood.

Technical assistance usually consists of a site visit, report delivery with recommendations based on the facility's needs and interests, and email and phone communications to discuss finer points and assisting with the implementation of recommendations. To maximize the benefit to the company, for each visit, a team of technical assistance providers is selected based on the company's stated needs and interests.

OTA and TURI conduct in-person outreach to meet companies where they are. During FY23, TURA program staff participated in several Massachusetts manufacturing events, including the Massachusetts Manufacturing Mash-Up, meetings of the Massachusetts Chemistry and Technology Alliance (MCTA), and the annual meeting of the New England chapter of the National Association of Surface Finishers. OTA also seeks to reach companies through working with local authorities and organizations focused on pollution prevention; in FY23, OTA staff participated in events hosted by Cape Cod Cooperative Extension, the New England Regional Pretreatment Coordinators Association (NERPCA), the Massachusetts Water Environment Association (MAWEA), and others.

Among the companies and institutions that received extensive support from TURI in FY23, 71% were located directly in an environmental justice neighborhood, or in a municipality with at least 40% of the population living in an environmental justice neighborhood.

Lab Services

TURI's laboratory continues to provide free testing services to Massachusetts companies looking for safer cleaning alternatives. In FY23, the lab tested the performance of safer cleaning alternatives for thirteen Massachusetts businesses in various manufacturing industries, as well as in the food, beverage and office furniture sectors.

Additionally, the lab helped increase the available options for safer cleaning products by working on fee-for-service testing projects for 20 formulators of janitorial cleaning products. These projects were part of the companies' efforts to have products certified for Green Seal, EPA Safer Choice or UL Ecologo.

In FY23 TURI added a new search feature to its CleanerSolutions database: the ability to search by green certifications (EPA, Green Seal, UL, OSD). The lab continued to offer services to industry and the Commonwealth related to janitorial cleaning for both cleaning and disinfection. In addition, lab staff provided webinars and hands-on trainings.

Images of TURI laboratory staff at work, drawn from a video tour of the TURI lab.

Grants

TURI provides grants to Massachusetts businesses, community groups, municipalities, and industry-academic research partnerships to further the development, implementation, and dissemination of toxics use reduction strategies.

In FY23, TURI awarded $137,500 in grants to reduce the use of PFAS in manufacturing and firefighting gear; solvents in manufacturing and furniture refurbishing; and flame retardants in gym pit cubes.

Business and Industry Grants

- **Boyd (formerly Lytron**) of Woburn manufactures thermal management and liquid cooling products, used by industrial electronics, medical, military, aerospace, and semiconductor companies. Boyd successfully removed TCE from one of their cleaning processes in their facility in 2018 after working with the TURI Lab, thereby reducing costs, improving efficiency, and reducing health risks to employees. With this grant Boyd continued their effort to eliminate their use of TCE by replacing the last remaining solvent cleaning system with a new aqueous system.
- **Southbridge Sheet Metal Works, Inc.** of Sturbridge manufactures sheet metal products including enclosures and large structural frames. Their operations include layout, cutting, forming, milling, welding, painting, assembling, and shipping. The goal for Southbridge was to replace a vapor degreaser, which used 7,000 to 10,000 pounds of methylene chloride to clean

parts prior to painting with a safer, more environmentally friendly solution. Southbridge modified the existing tank to add ultrasonic transducers, and switched to a safer aqueous cleaner.

- **Vishay Barry** of Attleboro manufactures semiconductor packaging and resistive components including terminations, resistors and attenuators. An ISO9001 certified, ITAR registered company, Vishay Barry is an approved supplier to the leading manufacturers of military, commercial, aerospace, medical and fiber-optic devices. Vishay Barry's goal was to eliminate the use of halogenated solvent-based vapor degreasing technology from all onsite manufacturing. Grant work included purchasing aqueous cleaning equipment and cleaners. The equipment included ultrasonic baths, vacuum drying units and water-based parts washers.
- **Conklin Office Furniture** of Holyoke is a small business focused on providing sustainable office furnishings by recycling and refurbishing used office furniture. They received TURI grant to examine their use of products that contain toxic solvents as part of their ongoing work to implement an environmental management system. The project focused on finding safer options for their use of spray adhesives and paint/stain cleaners and thinners, which traditionally contain methylene chloride and toluene, respectively. The TURI team was joined by OTA staff to help Conklin discover and pilot opportunities for toxics use reduction.
- **Donoma Gymnastics** of Stow provides gymnastics classes, open play for families and children, birthday parties, and full- and half-day camps at its facility and also hosts a competitive gymnastics team. This project focused on replacing 3,000 foam gym pit cubes that contain flame retardants with cubes without flame retardants, to make the gym a safer space for children and their families.

Academic Research Grants

- **Professor Ramaswamy Nagarajan of Plastics Engineering at UMass Lowell** continued his research with **Transene Company** in Danvers**,** a manufacturer of chemical products for the electronics industry, to research safer chemicals to replace per- and poly-fluoroalkyl substances (PFAS) surfactants used in etching solutions for microelectronics manufacturing. The research team studied the compatibility, stability, and performance of safer non-PFAS alternative surfactants. Success was achieved the previous year when the UMass Lowell-TURI research team found successful alternatives for certain applications. In this second year of funded research, the team identified alternatives that met criteria for even more of Transene's customer applications. Transene Company quickly adopted the alternatives and started distributing the products to the majority of its customers.
- **Associate Professor Hsi-Wu Wong of Chemical Engineering at UMass Lowell** identified and evaluated safer, effective solvents in collaboration with **Johnson Matthey** (now called Veranova, in North Andover and Devens), a manufacturer of active pharmaceutical ingredients and intermediates. The safer alternatives could replace methylene chloride, a toxic chemical used in the pharmaceutical manufacturing processes. This project is a continuation of the previous research using thin layer chromatography conducted by Assistant Professor Grace Chen of the Plastics Engineering Department. The goal of the FY23 research was to further evaluate the

effectiveness of the identified safer alternative solvent blends for column chromatography and scale up from lab to commercial production levels.

Community Grants

- The **Lawrence Fire Department** continued its efforts to reach out to auto-body/repair shops and metal-plating facilities in the City of Lawrence to identify and mitigate potential workplace hazards related to toxic chemicals. Firefighters performed inspections, made recommendations, did follow-up site visits, and provided additional resources. In addition to suggesting alternatives for reducing chemical use, firefighters also assessed overall safety plans and PPE, hazardous materials storage, and ventilation systems to support worker health and safety.
- **The Professional Firefighters of Massachusetts,** in collaboration with the **Nantucket PFAS Action Group** and an investigator at Michigan State University, continued their work to replace firefighter gear containing PFAS, study the impacts of this replacement, and educate firefighters on PFAS and safer alternatives. PFAS, which is used in firefighting protective gear to repel oil and water, can shed from the gear, leading to human and environmental exposure. The project team shared information with firefighters, fire marshals, unions, and cancer prevention groups in Massachusetts by creating fact sheets and providing targeted training.

Educating Future Generations

One of TURI's strategic priorities is to build capacity for future generations of professionals. The TURI lab works closely with students from various UMass Lowell programs, including public health, engineering, science and business. In FY23, the TURI lab employed 31 students from UMass Lowell, ranging from volunteers to research assistants. The training and mentorship provided for these students includes toxics use reduction planning, chemical hazard comparisons, modelling tools to identify potentially viable safer alternatives to solvents used in specific applications, and good laboratory practice.

TURI staff have also participated in various guest lecture and class mentorship programs at UMass Lowell. TURI Research Manager Greg Morose, Sc.D., offers a graduate engineering course at UMass Lowell that covers toxics use reduction and life cycle assessment concepts.

OTA also holds trainings and produces content to inform toxics users about safer alternatives, toxics use reduction techniques, best practices, technologies, and environmental compliance topics.

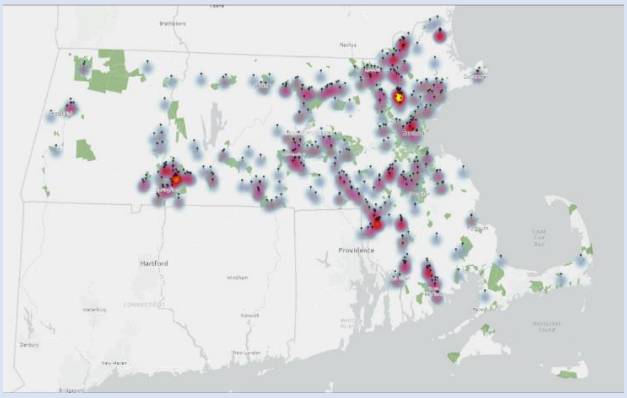
Information Services

TURI maintains web-based materials and resources related to toxics use reduction and pollution prevention, as well as a physical collection of monographs, periodicals, and reference materials. TURI staff also respond directly to information requests from businesses, state and municipal agencies, nongovernmental organizations, and individuals. During FY23, information requests included questions across a range of topics, including TURA compliance, PFAS, artificial turf, lawn care products, spray foam insulation, concrete and laminate dust, asbestos, foam pit blocks, pollution action, and glycol ethers. For subjects not pertinent to TURI's work, TURI staff referred the callers to more appropriate organizations and experts, but the diversity of inquiries reflects the TURA program's status as an information node for Massachusetts residents seeking assistance with chemicals and environmental health issues.

FY23 Projects

Spotlight: Environmental Justice

According to the EEA Environmental Justice Policy, environmental justice is based on the principle that all people have a right to be protected from environmental hazards and experience the benefits of a clean and healthy environment, regardless of race, color, national origin, income, or English language proficiency. In FY23, EEA released a Draft Environmental Justice Strategy for public comment containing strategies developed by individual agencies, including OTA and MassDEP. OTA responded to comments regarding the TURA program, and submitted a revised strategy to EEA in FY23 outlining key actions to integrate environmental justice principles throughout the TURA program. OTA has updated both its Pre-Site Visit Questionnaire (PVQ) and report templates to include standardized language about environmental justice and to provide tailored recommendations to facilities located in an environmental justice neighborhood (designated census block groups based on statutory criteria) or within a mile of an environmental justice population.



Toxics users are disproportionately sited in and near environmental justice neighborhoods in Massachusetts. This image overlays a spatial density analysis of TURA filers with environmental justice neighborhoods, demonstrating the overlap between them.

Approximately 80% of facilities that file under TURA are located in environmental justice neighborhoods or close to environmental justice populations, which tracks with the history of redlining and the disproportionate siting of industrial facilities in close proximity to populations who are low-income, minority, and/or experience language access barriers. In FY23, OTA established metrics to track progress towards environmental justice goals pertaining to staff outreach, stakeholder training, percentage of technical assistance site visits to facilities in environmental justice neighborhoods, appointments to committees, and referrals received from municipal and other agencies. In addition, goals for the TURA program include incorporating environmental justice into TUR Continuing Education Conferences, program grant review and awards, communications, and outreach. OTA hosted a graduate student Environmental Justice Intern in FY23 who conducted a spatial density analysis in ArcGIS to develop a strategic outreach plan (to be deployed in FY24) prioritizing technical assistance activities where they will provide the greatest impact on reducing toxic chemical use in proximity to environmental justice populations.

To better understand the situation in MA, TURI hired a consultant in FY23 to perform an analysis of toxics use and release through the lens of environmental justice. The analysis compares historic and current chemical use among communities in MA with higher and lower environmental justice populations. It also analyzes chemical use in different industrial sectors, linking environmental justice with occupational health. The study suggests next steps that TURA implementing agencies can take to advance environmental justice in Massachusetts. Key aspects of the analysis were presented internally, and it will be made publicly available in FY25.

Per- and Polyfluoroalkyl Substances (PFAS)

Safer alternatives

Identifying safer alternatives to PFAS continues to be central to the TURA Program's work, and is a strategic priority for TURI. TURI and OTA have continued to assist companies seeking to reduce their use of PFAS with identifying safer alternatives. One such company, Transene Co. of Danvers, MA, approached OTA and TURI for such assistance. Transene partnered with UMass Lowell faculty research team under a TURI research grant to investigate alternatives to PFAS surfactants. This project resulted in the identification and development of a suitable PFAS-free surfactant. Transene introduced its customers to the new surfactant, and over 90% adopted the PFAS-free formulation within the first two years. The project is described in a TURI case study and video.

> "This collaboration accelerated our ability to manufacture and sell safer etching products, which helps companies in the electronics supply chain meet new regulatory requirements and protect health and the environment."
>
> — Christopher Christuk, President of Transene Company, on his company's collaboration with the TURA program

Through a TURI Community Grant, the TURA program continued in FY23 to support work to replace firefighter gear containing PFAS, study the impacts of replacing PFAS-containing gear, and educate firefighters on PFAS and safer alternatives.

TRI listing updates

The Administrative Council continued to fulfill its statutory obligation to keep pace with changes to TRI-listed chemicals by updating the TURA List with eight PFAS that were added to TRI in 2021 and 2022, as discussed in the TUR Policy section.

Outreach efforts

Drinking water protection

The persistence of PFAS and the expense and difficulty of remediating it makes source reduction particularly critical. In FY23, OTA continued its collaboration with agencies including the Massachusetts Water Resources Authority, the DEP Surface Water Discharge and Wastewater Residuals programs, EPA Region 1, and local wastewater treatment facilities (WWTFs). The purpose of this work is to identify facilities located upstream from Drinking Water Protection Areas and WWTF, especially in industries that fall within the TURA Program purview where PFAS are likely to be used, to assist these facilities with identifying and eliminating sources of PFAS in their operations. Local WWTFs, who already had relationships with Significant Industrials Users in their areas, conducted initial outreach to introduce OTA to companies within their districts. Following this introduction, individual OTA staff contacted these facilities to offer information about PFAS, provide tools and resources, and offer tailored technical assistance.

Quabbin Reservoir

Metal finishing survey

OTA has continued offering surveys about different products and raw materials that often contain PFAS and processes where products containing PFAS are commonly used, with the goal of helping companies identify PFAS sources in their operations to help them reduce or eliminate it. During FY23, OTA made a concerted effort to recruit companies in the metal finishing industry to participate in this survey. Outreach to 31 metal finishers resulted in completed surveys from eight companies, enabling OTA staff to educate these companies about potential PFAS sources and alert them to the availability of safer alternatives.

PFAS reporting webinar

TURI sponsored a webinar in March 2023 for businesses to assist them in their reporting under the TURA Certain PFAS NOL category. "Reporting TURA Certain PFAS NOL: What you need to know" was recorded and is available online.

Safer cleaning and disinfecting

Quaternary Ammonium Compounds (QACs)

In FY21, the Science Advisory Board made a recommendation to list two categories of Quaternary Ammonium Compound (QAC) disinfectants, consisting of 5 DDAC and 19 ADBAC. TURI then prepared a policy analysis and conducted initial presentations for the Advisory Committee and Administrative Council. The policy analysis includes a summary of the SAB deliberations and sections on expected filers in Massachusetts; alternatives available; other state, federal, and international regulations; and expected impact on the TURA Program. In FY23, the Advisory Committee and Administrative Council reviewed the revised policy analysis, with the Administrative Council anticipated to vote on the proposed listing in FY24.

TURI has continued to identify and test safer cleaners and disinfectants, offer educational resources and training on safer cleaning and disinfection, update chemical comparison tools, and support community groups as they disseminate information to schools and to the public.

Halogenated solvent alternatives – "Drive to Zero"

During 2022-2023, TURI began a strategic focus on replacing TCE. During the fall of 2022, TURI staff completed an initial outreach to the TURA filers using TCE and make them aware of TURI's focus on reducing TCE and offer lab services for performance testing of safer substitutes. Several case studies were created and distributed. These reports were used to demonstrate how working with TURI can lead to the elimination of TCE. During the latter part of the fall and early part of winter, TURI staff arranged site visits with several of the facilities. During these visits, TURI gathered materials for TURI's lab testing process. Companies were directed to recently published chemical safety videos and training sessions.

During midwinter 2023, TURI conducted performance testing and held monthly check-ins with participating facilities to ensure timely updates on progress. By late spring 2023, several companies had potential options identified and validated in the lab setting.

Concurrent with traditional performance testing, TURI began to conduct additional research for novel chemical mixtures for vapor degreasing. This effort will help to address those future projects where TCE (or other halogenated solvents) cannot be directly replaced.

Nanomaterials

Multi- and single-walled carbon nanotubes and carbon nanofibers

FY23 marked the completion of the Science Advisory Board's review of single- and multi-walled carbon nanotubes and carbon nanofibers. This resulted in recommendations to list all three of these types of nanomaterials, as described in the TUR Policy section. TURI then began the process of developing a policy analysis about these materials. Once drafted, this policy analysis will be presented to the Advisory Committee and Administrative Council and revised according to their input, after which the Administrative Council will vote on whether to add these substances to the TURA List.

Appendices

1. Selected Events and Workshops

- TUR Planner Training course, both online and in person in Lowell, MA, August through October 2022.
- TURA fall Continuing Education conference, online, November 10 and 17, 2022.
- "Beyond the Safety Data Sheet: Understanding the Hazards of Chemicals" training, Lowell, MA, March 31, 2023.
- TURA spring Continuing Education conference, in person in Marlborough, MA, April 12, 2023.
- TURA/MassDEP Form S reporting training, online, May 11, 2023.
- "Champions of Toxics Use Reduction" recognition event, Massachusetts State House, June 20, 2023.

2. Selected Publications

The TURA program produces, curates and updates informational fact sheets on chemicals, technologies and pollution prevention techniques, case studies, regulatory guidance, and reports.

Reports, Journal Articles, Case Studies, and Fact Sheets

- "Transene Company Eliminates its Use of PFAS and Saves Money," TURI, June 2023. Available at https://www.turi.org/content/download/14435/223838/file/Transene%20Case%20Study%202023.pdf

Videos

- "Cedar's Mediterranean Foods: Journey to Safer Cleaning and Sanitizing Methods," TURI, January 2023. Available at https://www.youtube.com/watch?v=PNqQIHtesD0
- "Reporting TURA Certain PFAS NOL: What you need to know," TURI, March 2023. Available at https://www.youtube.com/watch?v=s-L6N4SS1QE

3. Selected Presentations and Webinars

Sasportas, K. “Chemical Safety & Climate Change Resiliency” Local Perspectives on Resiliency in Climate & Health, National Association of City and County Health Officials (NACCHO) 360. July 20, 2022

Skogstrom, T. “TRI Data & the Massachusetts Toxics Use Reduction Act (TURA).” US EPA 2022 TRI Virtual Conference. September 21, 2022.

Marshall, J. "Finding Alternatives for Traditional Cleaners and Sanitizers in the Beverage Industry," virtual presentation for National Pollution Prevention Roundtable, September 26, 2022.

Eliason, P. “Process Characterization: A Fundamentals Session”, Toxics Use Reduction Conference (virtual), November 10, 2022.

McCarthy, A, Salierno, G, Wagner, A. “TUR Success Stories: Working with the TURI Lab”, Toxics Use Reduction Conference (virtual), November 10, 2022.

Sasportas, K. “Climate Resiliency & Chemicals Management.” Toxics Use Reduction Conference (virtual). November 17, 2022.

Harriman, E. “Understanding Chemical Hazards: Going Beyond Your SDS,” TURA Continuing Education Conference, (virtual), November 17, 2022.

Foley, C. “Partnerships for Pollution Prevention: OTA Assistance and PFAS Source Reduction.” NEIWPCC Massachusetts Wastewater Training Management Program. January 18, 2023.

Sasportas, K. “Introduction to Environmental Justice Principles and Orientation to Mapping Tools.” Meeting of the New England chapter of the National Association of Surface Finishers. March 8, 2023.

Raschko, J. “Mass. Office of Technical Assistance (OTA) PFAS in Metal Finishing Survey.” Meeting of the New England chapter of the National Association of Surface Finishers. March 8, 2023.

Sasportas, K. “Chemical Safety & Climate Change Preparedness.” NEWMOA webinar on Hazardous Waste Safety & Climate Change Preparedness, March 14, 2023.

Eliason, P. “Toxics Use Reduction: Examples of Informed Substitution from Massachusetts”, Yale University Introduction to Green Chemistry and Green Engineering, March 27, 2023.

Tenney, H. “Reporting TURA Certain PFAS NOL: What you need to know.” TURA program webinar, March 27, 2023.

Harriman, E. “Understanding Chemical Hazards: Going Beyond Your SDS.” TURI Beyond the SDS seminar, Lowell, MA, March 31, 2023.

Harriman, E. and Skogstrom, T. “TURA Program Update.” TUR Conference, Marlborough, MA, April 12, 2023.

Harriman, E., Hudson, H., Tenney, H., and Thomas, K. “TUR Planning for Chemical Categories.” TUR Conference, Marlborough, MA, April 12, 2023.

McCarthy, A., Marshall, J. "Safer Alternatives to Degreasing and Industrial Case Studies." TUR Conference, Marlborough, MA, April 12, 2023.

Salierno, G. “Cold Plasma Technology as an Alternative to Vapor Degreasing.” TUR Conference, Marlborough, MA, April 12, 2023.

Morose, G., and Tenney, H. "Transene Switches to Safer PFAS-Free Products." TUR Conference, Marlborough, MA, April 12, 2023.

Tenney, H., "Nanomaterials," TUR Conference, Marlborough, MA, April 12, 2023.

Thomas, K. "Massachusetts Flame Retardant Law." TUR Conference, Marlborough, MA, April 12, 2023.

Salierno, G., and McCarthy, A. "Drive to Zero: Industry Case Studies and Current Research to Replace Halogenated Solvents." Parts Cleaning Conference, Cleveland, OH, April 19, 2023.

Morose, G. “Hex Chrome Free Consortium Research Results for Conversion Coatings," SAE Aerospace G8/G9 Technical Conference, Scottsdale, Arizona, May 2, 2023.

Sasportas, K. “Climate Change Resiliency & Chemical Safety.” The New England Consortium training, May 24, 2023.

4. TURA Program Revenues and Expenditures

Fiscal Year 2023 Revenues

TURA annual fees: $2,691,219
TURA statutory late fees: $82,661
TUR Planner fees: $7,625
Total revenues: **$2,781,505**

Fiscal Year 2023 Expenditures

OTA

Personnel costs: $615,489
Administrative costs: $4,345
Total: **$619,834**

DEP

Personnel costs: $451,408
Administrative costs: $11,500
Total: **$462,908**

TURI

Personnel (staff and students):* $1,166,800
Education and training events:* $29,500
University research and laboratory support: $46,500
Grants to businesses, community groups, and municipalities: $120,600
Administrative costs: $94,460
Library and information support: $6,100
Communications, printing, website and educational outreach:* $165,900
Total: **$1,629,860**

*Personnel expenditures include $62,500 for research assistants working on industry grant and laboratory projects. TURI also collected $38,900 in training registration fees, which is used to support staff salaries and operating expenses. Communications expenditures in FY23 were higher than normal because of website development costs.

Totals

Total expenditures: **$2,712,602**
Total revenues: **$2,781,505**
Surplus/(deficit): ..... **$68,903 ****

** Note on surplus: Surplus funds used in part to cover FY22 deficit of $128,850