ANNUAL REPORT

Massachusetts Toxics Use Reduction Program

FISCAL YEAR 2022

Massachusetts
Toxics Use Reduction

Report 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 in collaboration with the Toxics Use Reduction Institute and the Massachusetts Department of Environmental Protection
June 2023

TURA Agencies

Massachusetts Department of Environmental Protection (MassDEP)
100 Cambridge St. Suite 1020, 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, Boston, MA 02114
(617) 626-1060
www.mass.gov/eea/ota

A non-regulatory agency within the Executive Office of Energy and Environmental Affairs 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 library services and policy analyses; and manages the TURA Science Advisory Board.

Contents

TURA Agencies **2**
Executive Summary **4**
Toxics Use Reduction Grants 4
Technical Assistance and Lab Services for Massachusetts Businesses 4
Educational Materials 4
Toxics Use Reduction Reporting and Planner Certification 4
Toxics Use Reduction Policy Activities 4
Toxics Use Reduction in Massachusetts **5**
FY22 Project Highlights **6**
Pandemic-Related Activities 6
Per- and Polyfluoroalkyl Substances 6
Environmental Justice 7
Grant Projects **8**
Industry Grants 8
Small Business Grants 8
Academic Research Grants 8
Community Grants 8
Confidential Technical Assistance **9**
Laboratory and Information Services **10**
Laboratory Services 10
Library and Information Services 10
Education and Training **11**
Toxics Use Reduction Planner Certification Course 11
Toxics Use Reduction Planner Continuing Education Conferences 11
Other Conferences and Workshops 11
Toxics Use Reporting and Planner Certification **13**
Toxics Use Reporting 13
Toxics Use Reduction Planner Certification 13
Toxics Use Reduction Planner Continuing Education Credit Approval 13
TURA Enforcement and Data Analysis **14**
TURA Compliance Training and Outreach 14
Enforcement 14
Fee Revenue 14
Data Analysis 14
Toxics Policy **15**
Administrative Council on Toxics Use Reduction 15
Updates to TURA Toxic or Hazardous Substance List: Per- and Polyfluoroalkyl Substances (PFAS) 15
Update on the TURA Program Strengthening Ad Hoc Committee 15
Members of the Advisory Committee to the Administrative Council on Toxics Use Reduction 16
Members of the Science Advisory Board 16
Science Advisory Board 16
Massachusetts Toxics Reduction Task Force 17
TURA-Related work on Toxic Chemicals 17
Appendix I: Grants **19**
Appendix II: Selected Events and Workshops **21**
Appendix III: Selected Publications **22**
Appendix IV: Selected Presentations and Webinars **23**
Appendix V: TURA Program Revenue and Expenditures **24**

Executive Summary

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 work helps to protect human health and the environment, making Massachusetts a safer place to live and work while improving the competitiveness of Massachusetts businesses.

In Fiscal Year 2022 (FY22), the TURA program's work included scientific assessment of chemicals for possible addition to the TURA list of reportable substances, research, technical assistance for businesses, grants, educational events, and guidance documents and other publications.

Toxics Use Reduction Grants

TURI supported projects to reduce the use of PFAS in manufacturing, firefighting gear and consumer products; reduce solvents in manufacturing, voc-tech auto shops and dry cleaning; and reduce toxics in personal care products.

Technical Assistance and Lab Services for Massachusetts Businesses

OTA personnel worked closely with 27 Massachusetts facilities and provided recommendations related to regulations, pollution prevention, energy efficiency, and water conservation.

The TURI laboratory provided no-cost services to manufacturers of semiconductor components, cooling and heating systems, architectural signs, batteries, industrial coatings, adhesives, and musical instruments, as well as a food processor and a precision metal finisher.

Educational Materials

TURI published a number of new resources, including reports, videos and peer-reviewed journal articles on topics including safer alternatives to hexavalent chromium in conversion coatings, methylene chloride in chromatography, and halogenated solvents in cleaning. Also, TURI staff provided information in response to a wide variety of inquiries about chemicals and products, including PFAS, artificial turf, and cleaning chemicals; queries came from individuals, businesses, state and municipal agencies, and others.

In order to assist companies with identifying and eliminating per-and polyfluoroalkyl substances (PFAS) in their operations, OTA began offering industry-specific surveys aimed at finding common applications of PFAS in industry. OTA also revised the supplier notification letter template it provides for businesses to determine whether any PFAS listed under the Toxics Release Inventory or TURA are in use in their facilities.

Toxics Use Reduction Reporting and Planner Certification

MassDEP processed approximately 1,300 chemical use reports from 410 facilities. There are 132 Toxics Use Reduction Planners currently certified as having the training and expertise needed to review and approve toxics use reduction plans. TURI led 17 professionals through the TUR Planner Certification course, and MassDEP certified 10 new planners from that class.

Toxics Use Reduction Policy Activities

The Administrative Council voted in August 2021 to list a category of Certain PFAS Not Otherwise Listed and to clarify the definition of "substance." Following a public hearing and comment period, the Council took a final vote in December 2021 to list the category and clarify the definition. The final regulations were promulgated January 1, 2022.

Following the FY21 SAB recommendation to list certain quaternary ammonium compounds (QACs)—DDAC (5 CAS numbers) and ADBAC (19 CAS numbers), TURI prepared a policy analysis recommending the listing, which was presented to the Advisory Committee and Administrative Council.

The SAB spent FY22 deliberating on the petition to list certain engineered nanomaterials – multi-walled and single-walled carbon nanotubes and carbon nanofibers. The SAB considered each type separately beginning with multi-walled carbon nanotubes (MWCNTs), and in March 2022, voted to recommend listing MWCNTs.

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 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 2020.

Progress by TURA Filers

In reporting year 2020, the following chemical quantities were reported:

- Chemical use: 620 million pounds
- Byproduct generation: 65 million pounds
- Shipped-in product: 327 million pounds
- On-site releases: 2.4 million pounds
- Transfers off-site: 29 million pounds

From 2007 to 2020, 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 75%
- reduced transfers of toxics off-site for further waste management by 25%

The 2007 "Core Group" includes all industry categories and chemicals that were subject to TURA reporting in 2007 and remained subject to reporting in 2020 at the same reporting threshold. This Core Group is used to measure progress from 2007 to 2020.

In FY22, The National Pollution Prevention Roundtable (NPPR) presented two 2021 Most Valuable Pollution Prevention awards to TURA staff:

- Liz Harriman, TURI's Deputy Director, received the Fred Granek Memorial P2 Ambassador Award, for helping to lead the TURA program's development and helping to guide difficulty public conversations on chemicals.
- TURI's Cleaning Lab, led by lab director Jason Marshall, received the P2 Educator Award for providing more than 15 trainings on safer disinfecting practices and chemicals for combating the spread of COVID-19.

NPPR also presented the P2 Project Award to CD Aero (in New Bedford) for replacing a large vapor degreaser with an aqueous alternative. CD Aero had worked with both TURI and OTA over several years to find a suitable alternative cleaning process.

Rick Reibstein presents the NPPR 2021 P2 Educator Award to Jason Marshall of the TURI Cleaning Lab.

FY22 Project Highlights

Pandemic-Related Activities

Beginning in March 2020, due to the COVID pandemic, the TURA agencies had shifted many projects to virtual workspaces. OTA and DEP continued to work remotely until January 2022, at which point all EEA departments and agencies adopted a hybrid model, with staff in-person at least one day per week. The TURI lab fully reopened in summer 2021. TURI launched a hybrid work plan for its remaining staff in March 2022, blending in-office work with remote work for greater efficiency.

In Fall 2021, OTA staff resumed in-person technical assistance visits, in accordance with new guidance from the Executive Office of Energy and Environmental Affairs (EEA). OTA has continued to offer virtual assistance to companies who request or would benefit from it.

TURI continued to identify and test safer cleaners and disinfectants effective against the SARS-CoV-2 virus, as well as creating and delivering webinars on safer cleaning, updating chemical comparison tools, and funding community groups to disseminate information to schools and to the public. As the pandemic showed signs of easing in spring 2022, TURI reintroduced in-person events with its spring TURA conference. With virtual meeting tools now in place, TURI plans to offer a mix of online and in-person events in the future.

OTA and TURI also participated in the state's Toxic Reduction Task Force (TRTF) to develop recommendations on safer cleaning and disinfection for Massachusetts facilities and contracts. These activities are further detailed later in this report, in the "Toxics Policy" section.

Meetings of public bodies, including the TURA Administrative Council, Advisory Committee, and Science Advisory Board, continued to be held remotely throughout FY22, consistent with An Act Extending Certain COVID-19 Measures Adopted During the State of Emergency, Governor Baker's March 2020 Executive Order resulting from the outbreak of the COVID pandemic. Remote meeting provisions were extended until March 31, 2023.

Per- and Polyfluoroalkyl Substances

TURA Program staff continued their activities on per-and polyfluoroalkyl substances.

TURA List Updates: Following the Science Advisory Board's June 2020 recommendation, , the Administrative Coun cil voted in August 2021 to list a category referred to as PFAS Not Otherwise Listed (PFAS NOL) and to add the word "substance" to the definition section. Draft regulations were provided for public comment, comments were received and responded to, and the Council took a final vote in December 2021 to list the category as "Certain PFAS Not Otherwise Listed" (Certain PFAS NOL) and add the definition. (See the full definition in the "Toxics Policy" section of this report.)

Education: TURA Program staff developed several resources for companies seeking to reduce or eliminate PFAS in their facilities, including resources about common uses and sources of PFAS, a template of a letter that facilities can use to communicate with suppliers about notification requirements under the Toxics Release Inventory (TRI) and TURA, and information about how to identify PFAS belonging to the Certain PFAS NOL category. Program staff also conducted public presentations on PFAS source reduction, including webinars and in person conferences sponsored by the American Groundwater Trust,- Central Massachusetts Business Environmental Network, Licensed Site Professionals Association, New England Pretreatment Coordinators Association, NEWMOA's Science of PFAS Conference, and the Pacific Northwest Pollution Prevention Resource Center. Undersecretary Beth Card also presented TURA Program PFAS Source Reduction efforts to the Massachusetts PFAS Interagency Task Force.

Surveys: OTA has targeted outreach to four industry sectors where PFAS are commonly used (metal finishing, paper, coatings, and textiles). began developing 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 FY22, OTA offered draft surveys for the paper and metal finishing industries. OTA collaborated with several other state environmental agencies to develop these surveys, including the Michigan Department of Environment, Great Lakes, and Energy; the Minnesota Technical Assistance Program; the Vermont Department of Environmental Conservation (DEC), and the Washington Department of Ecology. In particular, OTA collaborated closely with Vermont DEC while refining the metal finishing survey, since DEC was simultaneously administering one of its own.

Safer alternatives work: TURI and OTA assisted companies seeking to reduce their use of PFAS with identifying safer alternatives. One such company, having approached OTA and TURI for such assistance, partnered with UMass Lowell faculty research team under a TURI research grant to investigate

alternatives to PFAS surfactants. In FY22, a safer alternative surfactant was identified and the company began piloting the new formulation with customers.

Drinking water protection: The persistence of PFAS and the expense and difficulty of remediating it makes source reduction particularly critical. In FY22, 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.

Fire-Fighting Foam and gear: As part of the Toxics Reduction Task Force (TRTF), Statewide contract PSE01 ("Public Safety Equipment and Two-Way Radio") requires bidders awarded under this contract who offer firefighting foam to *also* offer GreenScreen Certified™ for Firefighting Foam options. This certified option requires manufacturers to disclose all intentionally added chemicals in the product, requires analytic testing to ensure products are free from PFAS, and prohibits over 2,000 other chemicals of high concern. As PFAS free firefighting gear becomes available, vendors will be able to offer them under this contract.

Firefighting gear: The Nantucket PFAS Action Group received a community grant from TURI and partnered with Dr. Courtney Carignan of Michigan State University to work with firefighters to study the impacts of PFAS replacement turnout gear and educate firefighters about PFAS and safer alternatives. TRTF will be following progress on this study and sharing information as needed with vendors.

TURI and OTA continue to collaborate with other state and local governments through the Interstate Chemicals Clearinghouse (IC2) to share information and experiences with fluorine-free foams (F3).

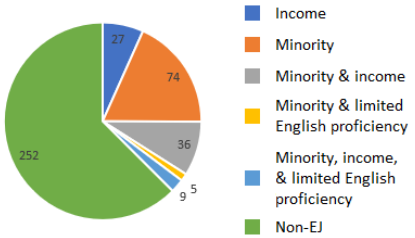
TURI also is part of a federal DOD-funded alternatives assessment project, begun in FY22, that is working to understand gaps in comprehensive alternatives assessments for Aqueous Film Forming Foam (AFFF). The project reviewed existing assessments; developed generalizable approaches and guidance to strengthen future alternatives assessments by defining criteria for "safer," non-fluorinated AFFF alternatives and determining "fit for purpose" performance assessment considerations; and outlining lessons learned from existing efforts to accelerate the adoption of safer alternatives to AFFF, including barriers and enabling factors.

Environmental Justice

Environmental justice (EJ) is based on the principle that all people have a right to be protected from environmental hazards and to live in and enjoy a clean and healthful environment regardless of race, ethnicity, color, national origin, income, or English language proficiency. In addition, EJ is based on the principle of meaningful involvement, signifying that all people have a right to participate in processes and decision-making that impact their neighborhoods and communities. EJ populations are those neighborhoods that experience greater vulnerability to environmental hazards due to current and historic disproportionate environmental burdens in their communities. A focus on EJ is necessary as these populations have not been equally protected from environmental health hazards and have not had equal representation and voice in decisions that impact their neighborhoods and communities.

To promote EJ across Massachusetts, EEA has convened an Environmental Justice Task Force ("Task Force"). This Task Force, comprising representatives from each EEA agency, has developed a Secretariat-wide EJ Strategy and is overseeing the implementation of EEA's 2021 EJ Policy. The 2021 EJ Policy also directs EEA agencies to codify the key actions they are undertaking, or plan to undertake, to integrate EJ into their work. OTA Director Tiffany Skogstrom and OTA Outreach and Policy Analyst Kari Sasportas are members of the EEA EJ Task Force.

Over one-third (1/3) of TURA-filing facilities are located directly in EJ neighborhoods and approximately 70% are located in or within a mile of an EJ neighborhood. OTA has been conducting outreach to facilities located in EJ areas, as well as to municipalities and community-based organizations to encourage these entities to refer businesses to OTA for technical assistance. Throughout FY22, OTA continued this outreach, and codified its key actions for promoting EJ and supporting clients in integrating EJ principles into their toxics use reduction activities. The OTA and TURA program section on EJ drafted in FY22 is on page 47 of the Draft EEA Strategy.



TURA Filers in Environmental Justice Neighborhoods

Grant Projects

Each year, TURI allocates 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 FY22 TURI awarded $177,500 in grants to reduce the use of PFAS in manufacturing, firefighting gear and consumer products; reduce solvents in manufacturing, auto shops and dry cleaning; and reduce toxics in personal care products. The projects addressed areas including manufacturing, pharmaceutical production, dry cleaning, electronics processing, firefighting, school auto shop programs, and community education. See Appendix I for complete details on the grant projects.

Industry Grants

- **Central Metal Finishing (North Andover),** a precision metal finisher that provides electroplating and coating services, purchased new cleaning equipment to eliminate the use of n-propyl bromide.
- **S.E. Shires (Holliston),** a brass musical instrument manufacturer, purchased an aqueous ultrasonic cleaning machine instead of using trichloroethylene (TCE).

Small Business Grants

- **Rindge School of Technical Arts (Cambridge)** replaced chemical cleaning products containing toluene, methanol, acetone, and perchloroethylene with bio-based parts washing systems; the program also replaced lead wheel weights with non-lead weights.
- **North Randolph Cleaners (Randolph)** eliminated the use of perchloroethylene by switching to Professional Wet Cleaning.

Academic Research Grants

- **Associate Professor Hsi-Wu Wong of Chemical Engineering at UMass Lowell** partnered with **Johnson Matthey (North Andover and Devens),** a manufacturer of active pharmaceutical ingredients and intermediates, to evaluate the effectiveness of safer alternatives to methylene chloride.
- **Professor Ramaswamy Nagarajan of Plastics Engineering at UMass Lowell** partnered with **Transene Company (Danvers),** an electronics processor, to investigate replacing PFAS surfactants with safer alternatives in etching applications.

Community Grants

- **Community Action Works and Clean Water Fund (Boston)** provided workshops and resources to community members about PFAS uses in consumer products and safer alternatives, as well as general information on health and environmental effects and contamination in drinking water.
- **Nantucket PFAS Action Group (Nantucket)** worked with firefighters to replace firefighter gear containing PFAS, study the impacts of this replacement and educate firefighters about PFAS and safer alternatives.
- **Silent Spring Institute (Newton) and Resilient Sisterhood Project (Boston)** used social media, resulting in over 100,000 views, 1700 shares and 900 saves, to share information about toxic chemicals in personal care products marketed to Black women. These chemicals can include phthalates, parabens, phenols, and antimicrobials, which are associated with a broad range of health effects.

Instagram posts by the Resilient Sisterhood Project seeking volunteers for a study with Silent Spring Institute on toxic chemicals in personal care products marketed to Black women.

Confidential Technical Assistance

OTA provides Massachusetts businesses with free, non-regulatory, and confidential assistance for toxics use reduction, energy and water conservation, regulatory compliance, and waste reduction. The technical assistance providers aim to help businesses save money while improving public and worker health through reducing toxics and conserving resources. 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.

During FY22, OTA worked closely with 27 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.

Of the 27 Massachusetts facilities with which OTA worked in FY22, 81% were directly locate in or within one mile of an environmental justice community.

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 can better help companies discover opportunities to reduce their use of toxic or hazardous materials and achieve cost savings in the process.

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 assist 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.

Laboratory and Information Services

Laboratory Services

TURI's laboratory continues to provide free testing services to Massachusetts companies looking for safer cleaning alternatives. In FY22, the lab tested the performance of safer cleaning alternatives for ten Massachusetts businesses, primarily in the manufacturing industry, but also in the food and beverage sectors.

Additionally, the lab helped increase the available options for safer cleaning products by working on fee-for-service testing projects for 15 formulators of cleaning products. These projects were part of the companies' efforts to have products certified for Green Seal, EPA Safer Choice or UL Ecologo. Of these, two companies were from Massachusetts.

In FY22 TURI completed the upgrades to its CleanerSolutions database of 30 years of lab test results, as well as the companion Pollution Prevention Options Analysis (P2OASys) tool, a web-based analysis tool that facilitates assessment of the relative hazards of chemical ingredients in household and industrial cleaners.

The lab continued to offer services to industry and the Commonwealth in janitorial cleaning. The lab staff provided webinars on safer cleaning and disinfecting. Additionally, lab staff and students, in conjunction with Dr. Nancy Goodyear of UMass Lowell, continued disinfection research and product testing to identify safer alternatives effective against COVID-19.

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

Library and 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 dissertations. TURI staff also respond directly to information requests from businesses, state and municipal agencies, nongovernmental organizations, and individuals. During FY22, information requests included dozens of queries covering a variety of topics, including safer cleaners, TURA chemical reporting, TURA data, alternative energy and toxics, artificial turf, building materials, the dry-cleaning solvent DF-2000, and many queries about chemicals including TCE and PFAS. 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.

Education and Training

Toxics Use Reduction Planner Certification Course

Every year, TURI conducts an intensive course to train new Toxics Use Reduction Planners (TUR Planners). Required pre-recorded sessions are available online, where participants can learn at their own pace, 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 the chosen toxics use reduction options featured in the group Plans. In FY22, 17 industry professionals took the course.

Toxics Use Reduction Planner 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 opportunities. The conferences allow planners to improve their skills and maintain their certifications. The fall 2021 conference was delivered virtually; topics included building a creative TUR team, lean manufacturing and TUR, water conservation and climate change, and metal finishing and TUR solutions. The spring 2022 conference, an in-person event, offered sessions on economic evaluation methods, PFAS reporting obligations, making safer choices, and a look ahead to future chemical restrictions, as well as a keynote presentation from TURI's new Director on how TUR can help protect human rights.

Other Conferences and Workshops

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), The New England Consortium (TNEC), and the New Hampshire Department of Environmental Services Biosolids Improvement Workgroup. OTA's 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) and the Northeast Waste Management Officials' Association (NEWMOA).

During FY22, 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 October 28, 2021, the Pacific Northwest Pollution Prevention Resource Council (PPRC) hosted a Virtual Pollution Prevention Roundtable at which OTA presented on chemical safety and climate change resiliency.
- On May 25, 2022, 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 delivered several presentations on this topic during FY22:

- On September 21, 2021, Undersecretary Beth Card presented TURA PFAS Source Reduction and Resources to the Massachusetts PFAS Interagency Task Force.
- On October 12, 2021, the Central Massachusetts Business Environmental Network (CMBEN) hosted a training for its members at which OTA presented on PFAS regulatory changes under TRI and TURA and about PFAS source reduction.
- On October 20, 2021, the American Groundwater Trust hosted a webinar at which OTA presented on the importance of PFAS source reduction.
- On October 21, 2021, the Pacific Northwest Pollution Prevention Resource Council (PPRC) hosted a Virtual Pollution Prevention Roundtable at which OTA presented on partnering with companies and utilities for PFAS source reduction.
- On October 27, 2021, Northeast Regional Pretreatment Coordinators' Association (NERPCA) held their annual meeting at which OTA and DEP presented on their joint efforts to partner with wastewater treatment facilities to reach out to companies requiring assistance with PFAS source reduction.
- On November 16, 2021, OTA and TURI staff presented "Reducing PFAS Upstream Through Partnership and

Policy" at the 2021 Pacific Northwest Virtual Pretreatment Workshop.

- On March 15, 2022, the Licensed Site Professionals Association (LSPA) hosted a training at which OTA presented on PFAS toxics use reduction and resources for licensed site professionals.

TURI also delivered several presentations on PFAS; see Appendix IV for details.

In April of 2022, the TURA program partnered with NEWMOA to deliver a major Science of PFAS Conference. OTA staff participated on the organizing committee, helping to shape the conference. OTA, TURI and DEP staff all presented in sessions, moderated sessions, and helped to staff the conference, contributing to a successful 2 days of learning, information exchange, and collaboration. OTA staff is committed to participate in the planning committee for the continuation of this important event scheduled for spring 2024.

Images from the NEWMOA Science of PFAS Conference, held April 5-6, 2022. OTA staff assisted with organizing the conference, which featured speakers and moderators from all three TURA administering agencies. Liz Harriman, TURI Deputy Director, presents in the second picture at right.

Toxics Use Reporting and Planner Certification

Toxics Use Reporting

Each July 1, large-quantity toxics users in TURA-covered industry sectors submit an annual 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. The TURA report documents the quantities of chemicals used, processed, or manufactured.

In FY22, MassDEP processed approximately 1,300 chemical use reports from 410 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
- identifying facilities that failed to submit required reports, plan summaries, and fees
- taking enforcement actions as necessary
- processing fees

Toxics Use Reduction Planner Certification

In even calendar years, large quantity toxic users must prepare a Toxics Use Reduction Plan or update an existing plan and analyze whether there are changes that can be made to their production processes that would reduce toxics use, waste, and production costs sufficiently to be in the company's interest to adopt. These TUR Plans must be reviewed and approved by a MassDEP-certified Toxics Use Reduction Planner (TUR Planner).

Facilities that have completed a 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 that 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 FY22, there were 93 MassDEP certified TUR Planners, including:

- 60 General Practice Planners
- 33 Limited Practice Planners

In FY22, MassDEP reviewed the qualifications of 93 TUR Planners.

Toxics Use Reduction Planner Continuing Education Credit Approval

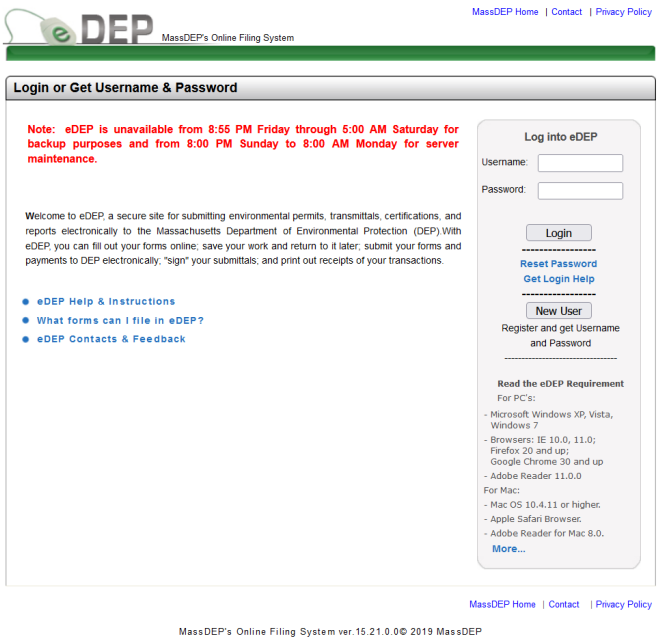
TUR Planners can maintain certification by attending certain TURA program training and education events that offer TUR Planning continuing education credits. Other organizations may request approval from MassDEP to offer TUR Planner continuing education credits for their workshops and events. During FY22, MassDEP approved 10 courses offered by non-TURA program organizations for continuing education credit.

TURA Enforcement and Data Analysis

TURA Compliance Training and Outreach

MassDEP worked with OTA and TURI to provide one online TURA Reporting and Planning Training session during FY22. The training focused on the various elements of TUR Reporting via the eDEP Online Filing Platform and on TUR Planner certification.

Enforcement



A screenshot of MassDEP's online filing system

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 FY22, MassDEP inspected 67 TURA filers and screened another 47 facilities to determine if they were subject to TURA. These inspections and screenings resulted in:

- 1 Administrative Consent Order with Penalty for failure to file a Toxics Use Report and a Toxics Use Fee Worksheet for reporting years 2019 through 2021.

  *Enforcement numbers in FY22 were lower due to staff retirement.

Fee Revenue

TURA-regulated facilities must pay annual fees unless they have obtained a financial hardship waiver. There were no fee-waiver requests in FY22. MassDEP collected:

- $2,585,300 in annual fees
- $10,500 in statutory late fees
- $7,500 in fees from TUR Planners who applied for the DEP's certification or recertification

Appendix V contains FY22 expenditure information.

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 2020 calendar year reports that were due on July 1, 2021. Four hundred ten facilities submitted 1,294 individual chemical reports on 126 different chemicals.

Toxics Policy

Administrative Council on Toxics Use Reduction

The TURA Administrative Council 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.

Fiscal Year 2022 Council Members

- Secretary Kathleen Theoharides, Executive Office of Energy and Environmental Affairs (Chair) (July 2021–May 2022); Secretary Bethany Card, Executive Office of Energy and Environmental Affairs (Chair) (May 2022–June 2022)
  Designee: Bethany Card, Undersecretary of Environmental Affairs (July 2021–May 2022); Gary Moran, Undersecretary of Environmental Affairs (May 2022–June 2022)
- Commissioner Martin Suuberg, Department of Environmental Protection
  Designee: Greg Cooper, Director, Hazardous and Solid Waste Division, Bureau of Air and Waste
- Commissioner Margret Cooke, Department of Public Health
  Designee: Marc Nascarella, Director of Toxicology
- Secretary Rosalin Acosta, Executive Office of Labor and Workforce Development
  Designee: Michael Flanagan, Manager, Department of Labor Standards Safety and Health Programs
- Secretary Terrence Reidy, Executive Office of Public Safety and Security
  Designee: Jennifer Hoyt, Chief Fire Protection Engineer
- Secretary Michael Kennealy, Executive Office of Housing and Economic Development
  Designee: Edward Palleschi, Undersecretary for the Office of Consumer Affairs and Business Regulation

Updates to TURA Toxic or Hazardous Substance List: Per- and Polyfluoroalkyl Substances (PFAS)

Effective January 1, 2021, pursuant to pursuant to EPCRA Section 313 and MGL 21I, section 9(A), 172 per- and polyfluoroalkyl substances (PFAS) were added to the list of reportable substances in 301 CMR 41.00 (Toxic or Hazardous Substance List) following their inclusion in the Toxics Release Inventory (TRI). Tracking of these chemicals by Massachusetts filers began on January 1, 2021, and initial reporting to MassDEP is due by July 1, 2022.Following the May 2021 policy analysis and recommendation to list a category of PFAS Not Otherwise Listed, and multiple meetings of the Advisory committee and Administrative Council, the Administrative Council voted in August 2021 to list a category referred to as PFAS Not Otherwise Listed (Certain PFAS NOL) and to add the word "substance" to the definition section. Draft regulations were provided for public comment, comments were received and responded to, and the Council took a final vote in December 2021 to list the category as "Certain PFAS Not Otherwise Listed" ("Certain PFAS NOL") and add the definition. Tracking of these chemicals by Massachusetts filers began on January 1, 2022, and initial reporting to MassDEP will be due by July 1, 2023.

The Certain PFAS NOL category is defined as those PFAS that contain:

- a perfluoroalkyl moiety with three or more carbons (e.g., $–C_nF_{2n}–$, n ≥ 3; or $CF_3–C_nF_{2n}–$, n ≥ 2)
- a perfluoroalkylether moiety with two or more carbons (e.g., $–C_nF_{2n}OC_mF_{2m}–$ or $–C_nF_{2n}OC_mF_m–$, n and m ≥ 1)

wherein for the example structures shown, the dash (–) is not a bond to a hydrogen and may represent a straight or branched structure, and that are not otherwise listed.

Update on the TURA Program Strengthening Ad Hoc Committee

In FY20, the chair of the TURA Administrative Council had outlined a proposal for an Ad Hoc Committee of the TURA Advisory Committee. The Ad Hoc Committee, open to all Advisory Committee members, would also include additional TURA stakeholders. The objective of the TURA Program Strengthening Ad Hoc Committee was to review and strengthen the effectiveness and value of TURA program activities to Massachusetts businesses while ensuring ongoing progress in reducing the use of toxics in the Commonwealth and increasing the adoption of safer materials.

Nominees for the Ad Hoc Committee were proposed to the TURA Administrative Council Executive Director and designated in the February 2020 Administrative Council meeting. The Ad Hoc Committee met throughout FY21 to

discuss the topics of compliance and enforcement; alternative planning options for TURA filers; ensuring the quality of TUR plans and planners; and the TURA List of Toxic or Hazardous Substances. The final meeting of the Ad Hoc Committee, concerning TURA fees, was held in FY22. Concluding the Ad Hoc Committee's meetings, program staff summarized its discussions and presented the proceedings to the Advisory Committee. A draft synthesis document was shared in late FY22; the most recent version can be found here. A number of topics were identified for further consideration by the Advisory Committee, Administrative Council, and TURA Program staff.

TURA Program Strengthening Ad Hoc Committee Members

- Larry Boise, Franklin Paint
- Lauren Bradford, Cabot Corporation
- Tom Estabrook, The New England Consortium (TNEC)
- Wendy Heiger-Bernays, BU School of Public Health
- Andy Irwin, Irwin Engineers
- Bill Judd, Industrial Compliance Group
- Jay Kaufman, Beacon Leadership Collaborative
- Terry McCormack, Umicore Electrical Materials, Inc
- Mark Monique, The Savogran Company
- Elise Pechter, MA Dept. of Public Health
- Jim Reger, Massachusetts Asphalt & Aggregate Paving Association
- Rick Reibstein, Former TURA Program Staff/BU School of Public Health
- Robert Rio, Associated Industries of Massachusetts
- Katherine Robertson, Massachusetts Chemistry and Technology Alliance (MCTA)
- Cora Roelofs, UMass Lowell
- Mark Rossi, Clean Production Action
- Elizabeth Saunders, Clean Water Action
- Lucy Servidio, Capaccio Environmental Engineering
- Laura Spark, Clean Water Action
- Jodi Sugerman-Brozan, MassCOSH
- Matthew Taylor, Dupont

Members of the 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. FY22 members include:

- Robert Audlee, Stainless Steel Coatings;
- Magdalena Ayed, Harborkeepers;;
- Karen Blood, Hollingsworth & Vose;
- Lawrence Boise, Franklin Paint;
- Diana Ceballos-Ochoa, Boston University School of Public Health
- 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; and,
- Rebecca Weidman, Massachusetts Water Resources Authority.

Members of the 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. FY22 members were:

- Amy Cannon, Beyond Benign
- Lisa Cashins, MA Department of Labor Standards
- Robin Dodson (Vice 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, Interdisciplinary health scientist
- David Williams (Chair), Massachusetts Department of Public Health

Science Advisory Board

In FY22, the Science Advisory Board held eight meetings and continued their review of carbon nanotubes and fibers in response to a petition.

In June 2020, the TURA Program received a petition to list carbon nanotubes and fibers. In FY21, the Science Advisory Board began its review of the science related to these materials. In FY21, TURI and the SAB reviewed over 50 scientific studies to work toward making a recommendation on these substances. In FY22, TURI and the SAB reviewed an additional 175 scientific studies and 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. The SAB is continuing work related to the petition by reviewing single-walled carbon nanotubes and carbon nanofibers. This work will be completed in FY23.

In May 2021, the Science Advisory Board had made a recommendation to list a group of 24 Quaternary Ammonium Compound (QAC) disinfectants. TURI prepared a policy analysis and conducted initial presentations for the Advisory Committee and Administrative Council. The policy analysis includes sections on expected filers in Massachusetts; alternatives available; other state, federal, and international regulations; and expected impact on the TURA Program. Meetings of the Advisory Committee and Administrative Council during FY22 discussed these issues. Revisions based upon stakeholder feedback are ongoing and final presentations of the policy analysis to the Advisory Committee and Administrative Council are planned for FY23.

Massachusetts Toxics Reduction Task Force

To facilitate implementation of the Massachusetts Executive Order to Establish an Environmental Purchasing Policy (EO 515), the Toxics Reduction Task Force (TRTF) was established in 2009 with oversight and leadership by the Operational Services Division (OSD) Office of Technical Assistance and Technology (OTA). The TRTF includes staff from OSD, OTA, the Department of Public Health (DPH), the Department of Labor Standards (DLS), the Toxics Use Reduction Institute (TURI), and the Department of Environmental Protection (DEP). The TRTF acts as a technical advisory group for the EPP Program identify additional toxics in products on statewide contracts and explore safer and healthier purchasing options. The goals and objectives of the TRTF are to select priority focus areas for reduction in toxic substances in products or services.

During FY22, the TRTF continued to facilitate discussions and provide feedback on safer disinfection practices and products which remain an issue due to COVID. The TRTF continued its focus on Quaternary Ammonium Compounds, per- and poly-fluoroalkyl substances (PFAS), flame retardant regulations, and provided information about climate friendly refrigerants. TRTF FY22 activities are detailed beginning on page 15 in the in the OSD Environmentally Preferable Purchasing Annual Report.

TURA-Related work on Toxic Chemicals

Flame Retardants

MassDEP continues to work on proposed regulations from chapter 261 of the acts of 2020, *An Act to Protect Children, Families and Firefighters From Harmful Flame Retardants*, signed into law on January 1, 2021 and codified at M.G.L. c. 21A, § 28. MassDEP is promulgating 310 CMR 78.00 based on this new law. The statute prohibits the sale, distribution and importation into Massachusetts "covered products" that contain certain chemical flame retardants or chemical analogues over 1000 parts per million for any component part of the covered product. Covered products are defined as bedding, carpeting, children's products, residential upholstered furniture, and window treatments. There are some exemptions outlined in the background document. The statute and the regulation require MassDEP, at least every three years, to consult with TURI and the SAB to review, identify and recommend, if applicable, other chemical flame retardants known or reasonably anticipated to present a toxic hazard to people, and the regulation includes enforcement and penalty provisions. OSD will continue to communicate any regulatory changes once promulgated in bids and to Statewide Contract vendors.

APPENDICES

Appendix I: Grants **19**
Appendix II: Selected Events and Workshops **21**
Appendix III: Selected Publications **22**
Appendix IV: Selected Presentations and Webinars **23**
Appendix V: TURA Program Revenue and Expenditures **24**

Appendix I: Grants

Annual TURA Program Grants

Each year, TURI allocates 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 FY22, TURI awarded approximately $177,500 in grants.

Safer Cleaning

- Central Metal Finishing Inc. of North Andover purchased new cleaning equipment to eliminate the use of n-propyl bromide, a hazardous chemical that can affect the central nervous and reproductive systems. Working with the TURI Lab, Central Metal Finishing worked to find a safer alternative that works with the new equipment. The company's goals are to protect worker health and safety and increase production capacity for its aerospace and medical device customers.
- S.E. Shires of Holliston, a maker of custom brass musical instruments, purchased an aqueous ultrasonic cleaning machine for a new line of larger instruments. In 2018, the Massachusetts Office of Technical Assistance helped S.E. Shires eliminate the use of trichloroethylene (TCE), a toxic solvent that was used to clean the instruments. To continue using a water-based cleaning solution and not revert back to using TCE, S.E. Shires worked with the TURI Lab to identify aqueous products that effectively remove debris and oils from brass surfaces.
- North Randolph Cleaners converted its dry-cleaning shop from using perc, a likely human carcinogen, to Professional Wet Cleaning. This safer alternative allows the small business to clean "dry-clean-only" clothes with water and detergents in computer-controlled machines. Workers then use special tensioning and pressing equipment to achieve high-quality results. North Randolph Cleaners expects to eliminate the use of 200 gallons of perc annually, improve worker health and safety and market the shop as environmentally friendly.

Auto Shops

- Rindge School of Technical Arts of Cambridge created a safer environment for students who learn and work in the automotive technology program by replacing solvents with bio-based parts washing systems. These safer products replaced aerosol brake and parts cleaners that contain solvents such as toluene, methanol, acetone and perchloroethylene (perc). The automotive technology program staff also replaced lead wheel weights, which are physically handled by students on a daily basis, with non-lead weights.

Safer Solvents for Manufacturers

- Associate Professor Hsi-Wu Wong in the Department of Chemical Engineering at UMass Lowell aimed to identify safer, effective solvents in collaboration with Johnson Matthey, a manufacturer of active pharmaceutical ingredients and intermediates at its facilities in North Andover and Devens. The safer alternatives were intended to replace methylene chloride, a toxic chemical used in the company's manufacturing processes. This project was a continuation of previous research conducted by Assistant Professor Grace Chen of Plastics Engineering. The goal of the FY22 research was to further evaluate the effectiveness of the identified safer alternative solvent blends.

Reducing PFAS

- Professor Ramaswamy Nagarajan in the Department of Plastics Engineering at UMass Lowell worked with Transene Company of Danvers to research safer chemicals to replace per- and poly-fluoroalkyl substances (PFAS) surfactants used in electronic processing. The research team studied the compatibility and stability of pectin-based and other safer surfactants in etching solutions. This work was designed to help Transene phase out the use of PFAS and provide useful results for other industries that use PFAS surfactants in manufacturing.
- Nantucket PFAS Action Group worked with firefighters to replace firefighter gear containing PFAS, study the impacts of this replacement and educate firefighters about 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 exposures. Working with the Nantucket and Fall River Fire Departments, the project team shared information with firefighters, fire marshals, unions and cancer prevention

groups in Massachusetts. The team created fact sheets, hosted a webinar and used social media to share information on PFAS and safer alternatives, and hosted a training day with different types of turnout gear to measure PFAS exposure.

Community Education

- Community Action Works and Clean Water Fund of Boston provided workshops and resources to community members about PFAS uses and safer alternatives, as well as contamination in drinking water. These chemicals have been linked to health effects such as cancer, liver damage, decreased fertility, asthma and thyroid disease. The project team provided community members with information about health and environmental concerns, safer alternatives and practical steps to reduce the use of, and exposure to, PFAS.
- Silent Spring Institute of Newton and Resilient Sisterhood Project of Boston used social media to share information about toxic chemicals in personal care products marketed to Black women. These chemicals – including phthalates, parabens, phenols and antimicrobials – are associated with a broad range of health effects, including endocrine disruption, asthma and cancer. Based on in-depth research about how women seek information on personal care products, the team worked with social media influencers to share accurate information about safer alternatives, resulting in over 100,000 views, 1700 shares and 900 saves. This work was a continuation of a project started in FY21.

Appendix II: Selected Events and Workshops

TURA Program Workshops

Each year the TURA program agencies hold workshops to provide continuing education for Toxics Use Reduction Planners, regulatory guidance and updates, and tools and resources for businesses to enhance their ability to implement pollution prevention. Some of these workshops and events are described in greater detail in the main report.

Note: This list does not include events led by TURI grantees.

Workshops and Training Events:

- TUR Planner Training course, both online and in person in Lowell, MA, August through October 2021.
- TURA fall Continuing Education conference, online, November 4, 8, and 9, 2021.
- TURA Resource Conservation (RC) planning basics training, online, March 7, 2022.
- TURA Resource Conservation (RC) water conservation training, online, March 31, 2022.
- TURA spring Continuing Education conference, in person in Marlborough, MA, April 13, 2022.
- TURA Resource Conservation (RC) energy conservation training, online, April 20, 2022.
- TURA Resource Conservation (RC) solid waste reduction training, online, April 27, 2022.
- TURA/MassDEP Form S reporting training, online, May 12, 2022.
- Community Champions of Toxics Use Reduction legislative briefing and grantee recognition event, online, June 22, 2022.

Appendix III: Selected Publications

TURA Program 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

- Kaplan, S., Pollard, L., Massey, R. "Organically Managed Grass Athletic Fields," Green Building Alliance guest blog, March 18, 2022. Available at https://gba.org/blog/organically-managed-grass-athletic-fields/
- Kaplan, S., Massey, R. "Artificial Turf Fields: Health and Environmental Concerns," Green Building Alliance guest blog, January 6, 2022. Available at https://gba.org/blog/artificial-turf-fields-health-and-environmental-concerns/
- Morose, G., Pinsky, D., Humphrey, C., DeFranco, K., "Evaluation of Conversion Coatings Without Hexavalent Chromium for Aerospace and Defense Applications," Journal of Aerospace Technology and Management, vol. 14, January 7, 2022. Available at https://www.turi.org/content/download/13831/219196/file/Hex%20Chrome%20article%20in%20Journal%20of%20Aerospace%20Technology.pdf
- Nallar, M., Tenaglia, N., Morose, G., and Wong, H., "Safer Solvent Blends for Food, Dye, and Environmental Analyses Using Reversed-Phase High Performance Liquid Chromatography," *Chromatographia* 84:769-780, June 18, 2021. Available at https://link.springer.com/article/10.1007/s10337-021-04061-8
- "Per- and Poly-fluoroalkyl Substances (PFAS): Policy Analysis," TURI, May 2021. Available at https://www.turi.org/content/download/13639/207519/file/PFAS+Policy+Analysis+May+2021.pdf

Videos

- "CD Aero Eliminates the Use of nPB," TURI, July 2021. Available at https://www.youtube.com/watch?v=1Z-JdjPKVbQ
- "Get Started: Tutorial for using the Pollution Prevention Options Analysis System (P2OASys) Tool," TURI, June 2022. Available at https://www.youtube.com/watch?v=vHVVJ69aBhE
- "Pollution Prevention Options Analysis System (P2OASys) Introduction," TURI, June 2022. Available at https://www.youtube.com/watch?v=K-2j9va5f2A
- "Selecting Safer Disinfectants," TURI in collaboration with environmental consultant Lynn Rose, June 2022. Available at https://www.youtube.com/watch?v=XgyN58TIsDI

Appendix IV: Selected Presentations and Webinars

About Presentations and Webinars

Throughout the year, TURA program staff present a wide variety of pollution prevention and regulatory topics to audiences at TURA program events and at events held by partner organizations. As presentations may have been repeated at multiple venues, this list includes both categories.

- Eliason, P. “Massachusetts Works to Reduce Use of Carcinogens,” virtual presentation to National Association for Chronic Disease Directors (NACDD), February 15, 2022.
- Foley, C. “Partnerships for P2: Working With Companies and Utilities for PFAS Source Reduction.” Pacific Northwest Pollution Prevention Resource Council 2021 Virtual P2 Roundtable, October 21, 2021.
- Harriman, E. “MA TURA PFAS Category and Avoiding Regrettable Substitutes,” NEWMOA The Science of PFAS Conference, Marlborough, MA, April 5, 2022.
- Harriman, E., Skogstrom, T., “Massachusetts PFAS Policies, Regulations, and Partnerships,” 2021 Virtual Pacific Northwest Pretreatment Workshop, November 16, 2021.
- Hudson, H., and McCarthy, A., “TCE Alternative Research” virtual presentation to Kansas TCE Roundtable, Pollution Prevention Institute, January 26, 2022.
- Marshall, J., "Cleaning and Disinfecting: How to Make it Safer While Being Effective," virtual presentation to Emory University School of Nursing, August 25, 2021.
- Marshall, J., "Disinfecting Devices and Best Practices," virtual presentation to the American College of Medical Toxicology, September 8, 2021.
- Massey, R., and Pollard, L., “Synthetic Turf and Safer Alternatives,” Collaborative on Health and the Environment webinar, January 27, 2022.
- McCarthy, A., "Advances in Disinfection Technology,” virtual presentation for the 2021 Spring Symposium, American Industrial Hygiene Associate, Pacific Northwest Section, April 21, 2021.
- McCarthy, A., “Toxics Reduction: Cleaner Solutions Database, Pollution Prevention Options Analysis System (P2OASys),” virtual demo at National Steering Committee (NSC) Technical Monthly Meeting, National Small Business Environmental Assistance Program (SBEAP), July 22, 2021.
- McCarthy, A., and Tickner, J., “Dangerous Chemicals and the Reduction of Toxic Products in Manufacturing with Joel Tickner and Alicia McCarthy,” Finding Genius Podcast, April 7, 2021.
- Sasportas, K. “Chemical Safety & Climate Change Resiliency.” The New England Consortium training, May 25, 2022.
- Sasportas, K. “PFAS: Toxics Use Reduction and Resources for LSPs.” Licensed Site Professionals Association (LSPA) meeting, March 15, 2022.
- Skogstrom, T. “Collaborating with Wastewater Treatment Facilities on Industrial PFAS Source Reduction.” NEWMOA The Science of PFAS Conference, Marlborough, MA, April 5, 2022.
- Skogstrom, T. “Massachusetts PFAS Policies, Regulations & Partnerships.” American Groundwater Trust meeting, October 20, 2021.
- Skogstrom, T. “Chemical Safety & Climate Change Resiliency.” Pacific Northwest Pollution Prevention Resource Council 2021 Virtual P2 Roundtable, October 28, 2021.
- Skogstrom, T., Wood, J. “Massachusetts PFAS Policies, Regulations & Partnerships.” New England Regional Pretreatment Coordinators Association (NERPCA) meeting, October 27, 2021.
- Skogstrom, T., Wood, J., Tenney, H. “Massachusetts PFAS Policies, Regulations & Partnerships.” Central Massachusetts Business Environmental Network (CMBEN) meeting, October 12, 2021.
- Tenney, H. “TURA Science Advisory Board Evaluation of 11 PFAS,” NEWMOA The Science of PFAS Conference, Marlborough, MA, April 6, 2022.

Appendix V: TURA Program Revenue and Expenditures

Fiscal Year 2022 Revenues

TURA annual fees: $2,585,300
TURA statutory late fees:.....$10,500
TUR Planner fees: $7,500

Total revenues: $2,603,300

Fiscal Year 2022 Expenditures

OTA

Personnel costs: $602,881
Administrative costs: $17,974
Total: $620,855

DEP

Personnel costs: $451,408
Administrative costs: $30,086
Total: $481,495

TURI

Personnel (staff and students)[1]: $1,176,900
Education and training events[2]: $23,800
University research and laboratory support: $43,800
Grants to businesses, community groups, and municipalities: $144,500
Administrative costs[3]: $81,500
Library and information support: $13,700
Communications, printing, website and educational outreach[4]: $145,600
Total: $1,629,800

Total expenditures:..... $2,732,150
Total revenues: $2,603,300
Surplus/(deficit) [5]:.....($128,850)

[1]Personnel expenditures include $78,200 for research assistants working on industry grant and laboratory projects.

[2]TURI also collected $38,200 in training registration fees, which goes to support staff salaries and operating expenses.

[3]Administrative expenses in FY22 were higher than normal because of Director search costs and strategic planning fees.

[4]Communications expenditures in FY22 were higher than normal because of web-tool development costs.

[5]Funding revenue shortfall incurred by MassDEP due to low revenue was absorbed by other DEP funding accounts.

MassDEP
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Department of Environmental Protection

OTA
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ASSISTANCE & TECHNOLOGY

TURI
TOXICS USE REDUCTION INSTITUTE
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