

ANNUAL REPORT

Massachusetts Toxics Use Reduction Program

FISCAL YEAR 2019

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
October 2020

TURA Agencies

Massachusetts Department of Environmental Protection (MassDEP)

One Winter Street, Boston, MA 02108
(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 900, 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 01854
(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.

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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 2019 (FY19), 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 review and updating of guidance and other publications.

Toxics Use Reduction Grants

The [Toxics Use Reduction Institute](#) (TURI) supported projects that investigated alternatives to chemicals used in industrial and food-manufacturing applications; reduced solvents used in auto shops, dry cleaners, and schools; sought alternatives to chemicals used in nail polish removers, textile coatings, and chromatography; reduced lead use in transducer manufacturing; reduced pesticide and herbicide use and encouraged organic land care; communicated the dangers of BPA and BPS; and protected young athletes from toxic chemical exposure by replacing foam-pit cubes in gyms.

Technical Assistance and Lab Services for Massachusetts Businesses

The [Office of Technical Assistance and Technology](#) (OTA) personnel worked closely with 62 Massachusetts facilities and provided recommendations related to regulations, pollution prevention, energy efficiency, and water conservation. With OTA's help during FY19, Massachusetts companies eliminated the annual use of one million gallons of water and eliminated more than 48,300 pounds of toxic chemicals. OTA's guidance helped companies save \$57,517 in energy and electricity costs.

The [TURI laboratory](#) provided no-cost services to businesses in sectors including metalworking, electronics, and industrial machinery, among others. TURI continued its work to research and test safer alternatives to [paint strippers](#) and toxic chemicals used in the [aerospace and defense sector](#).

Conferences and Workshops

TURI provided several training events. TURI's 40-hour course provided [training for new Toxics Use Reduction planners](#). The two [Continuing Education conferences](#) covered topics such as improving process efficiency and identifying safer solvents. Two [library-based workshops](#) provided guidance on how to use chemical databases and other tools.

OTA trained many first responders, businesses, drinking water regulators, health centers and community members on how to identify and collaborate with chemical users in climate change vulnerable areas in order to reduce the risk of weather-related industrial accidents. [OTA's Chemical Safety and Climate Change Preparedness curriculum](#) was presented at Local and Regional Emergency Planning Committees, national and statewide conferences, and publicly available webinars. OTA also helped introduce the [Massachusetts Municipal Vulnerability Preparedness \(MVP\) Program](#) to businesses and industry in an effort to get toxics users active and involved with their local MVP partners.

Through the Central Massachusetts Business Environmental Network (CMBEN), OTA staff organized and presented on the topics of Chemical Safety and Climate Change Resiliency, TURI's business and industry grants, and updates regarding Mass DEP's multi-media inspection and the US EPA's Toxics Release Inventory (TRI) inspection.

OTA also presented its existing [Massachusetts Clean Auto Repair \(MassCAR\)](#) training for the Lawrence Fire Department's TURI grant-funded effort to educate auto body shops on environmental health and safety. TURI had the MassCAR materials translated into Spanish and OTA performed a [bilingual Spanish / English training](#) for an audience of approximately 25 people who learned about safer alternatives to common toxic chemicals and general worker health and safety practices.

Educational Materials

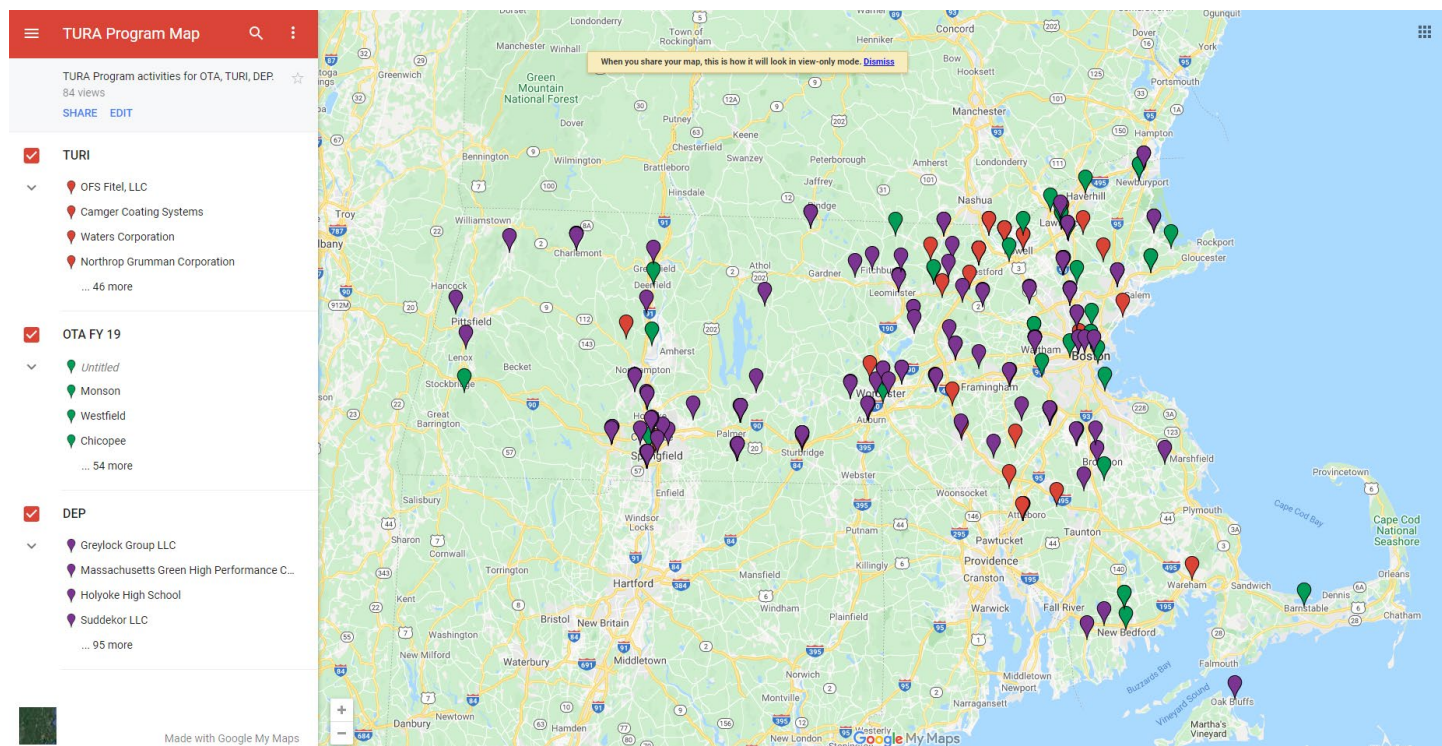
TURI published a number of new resources, including reports on [synthetic playing fields and playgrounds](#), [videos](#) on Massachusetts organizations that have switched to safer alternatives, and [case studies](#) profiling the success of companies that have implemented toxics use reduction initiatives. Also, the TURI library provided information in response to a wide variety of inquiries on specific chemicals and publications; queries came from individuals, businesses, state and municipal agencies, and others.

OTA created a short [Chemical Safety and Climate Change Resiliency video](#) to promote services to communities and businesses to reduce the risk of weather-related industrial accidents. In addition, a pollution prevention case study was published on [S.E. Shires Company](#) for the successful elimination of trichloroethylene (TCE) and methylene chloride.

Inspired by a mapping activity conducted at a TURA program staff retreat, OTA created a [Google map](#) displaying the location of toxics use reduction activities throughout the state for FY19. The map includes TURI grantees and

companies collaborating with the lab and researchers at UMass Lowell, DEP Notices of Noncompliance and enforcement actions, and confidential site visits conducted by OTA. To avoid a breach of confidentiality, other than workshops or events, OTA site visits are solely listed by town or city name. The map, which OTA intends to continue to update in FY20, is a visual that demonstrates the reach and breadth of the TURA programs statewide work to reduce the use of toxic chemicals.

lengths. These substances have been detected in water supplies in the Commonwealth, and are a high priority for action nationally and internationally. The Board recommended adding the PFAS substances reviewed in FY19 to the TURA Toxic or Hazardous Substance List; the Board's review of other PFAS will continue in FY20.



Toxics Use Reduction Reporting and Planner Certification

The [Massachusetts Department of Environmental Protection](#) (MassDEP) collected more than 1,600 chemical use reports from 468 companies. There are 188 Toxics Use Reduction Planners currently certified as having the training and expertise needed to review and approve toxics use reduction plans.

Toxics Use Reduction Policy Activities

On September 25, 2018, the Administrative Council on Toxics Use Reduction voted to list the nonylphenol ethoxylates (NPE) category, added by the US EPA on June 7, 2018, to the list of reportable substances under EPCRA Section 313. This initiated the public process according to MGL c.30A to add the category to 301 CMR 41.00 Toxic or Hazardous Substance List.

The Science Advisory Board continued its review of per- and polyfluoroalkyl substances (PFAS) of varying carbon chain

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 Worldwatch 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 2017.

"Switching to the chemicals that we identified as good alternatives did not cost us a dime. It may even save us some money. You can't put a price on having clean air for the staff to breathe – we've gained long-term benefits for health and safety of our workers."

- Kevin Soleil, Assistant Director, Outdoor and Bicycle Programs, UMass Lowell

Progress by TURA Filers

In 2017, the following chemical quantities were reported:

- Chemical use: 692 million pounds
- Byproduct generation: 78 million pounds
- Shipped-in product: 348 million pounds
- On-site releases: 3 million pounds
- Transfers off-site: 34 million pounds

From 2007 to 2017, 2007 Core Group facilities achieved the following reductions:

- reduced toxic chemical use by 41% (from 792 to 468 million pounds)
- reduced toxic byproducts by 3% (from 75 to 73 million pounds)
- reduced toxics shipped in product by 10% (from 272 to 244 million pounds)
- reduced on-site releases of toxics to the environment by 51% (from 6 to 3 million pounds)
- increased transfers of toxics off-site for further waste management by 21% (from 25 to 30 million pounds)

The 2007 "Core Group" includes all industry categories and chemicals that were subject to TURA reporting in 2007 and remained subject to reporting in 2017 at the same reporting threshold. This Core Group is used to measure progress from 2007 to 2017.

FY19 Project Highlights

Methylene Chloride: Safer Alternatives for Paint-Stripping Products

Methylene chloride, a component in paint-stripping products widely used in industrial, professional, and consumer markets, can cause acute and chronic effects on the central nervous system. The [U.S. National Toxicology Program](#) classifies methylene chloride as "reasonably anticipated to be a human carcinogen." Methylene chloride poisoning has resulted in numerous occupational and consumer [deaths](#) during paint-stripping operations. Because of this, there is increasing demand for safer paint-stripping products. There are several alternative products on the commercial market, but they perform much more slowly than the products containing methylene chloride, and some of the replacement chemicals introduce other environmental and health hazards.

TURI worked with University of Massachusetts Lowell (UMass Lowell) faculty and students to identify, test, and develop a [safer paint stripper](#). This project provided learning benefits to the research students and intellectual property to UMass Lowell, and will provide health and safety benefits to the users.

Over the course of this research, three existing safer chemicals were identified that, when combined in a certain ratio, remove most paint coatings within 20 minutes, which is comparable to the time it takes for products that contain methylene chloride. While trying to find a viable solution, the TURI researchers filtered out any chemicals with significant known toxicity issues and then worked with the safer chemicals to develop a solution that performed as well as methylene chloride. In addition, a toxicology firm and two other universities provided independent environmental health and safety evaluations.

A licensing agreement was completed between the University of Massachusetts Lowell and SRD NewGen to commercialize the new coating removal technology.

Chemical Safety and Climate Change Preparedness

When facilities that use and store hazardous chemicals lose power or are otherwise impacted by severe weather, they risk losing business and pose health and safety risks to workers, communities and the environment. What was initially an OTA a program pilot training provided through US EPA grant funding has now become a standard OTA offering. OTA trained many first responders, businesses, drinking water regulators, health centers and community members on how to identify and collaborate with chemical users in areas vulnerable to climate change impacts in order

to reduce the risk of weather-related industrial accidents. OTA has provided first responders and emergency management personnel training on how to identify toxics users in climate vulnerable areas through the [Massachusetts Toxic Users and Climate Vulnerability Factors map](#) while encouraging participants to refer businesses to the TURA program for pollution prevention interventions. **OTA's Chemical Safety and Climate Change Preparedness curriculum was presented at local and regional emergency planning committee meetings, national and statewide conferences, and publicly available webinars. OTA also helped introduce the [Massachusetts Municipal Vulnerability Preparedness \(MVP\) Program](#) to businesses and industry in an effort to get toxics users active and involved with their local MVP partners.**

OTA's Chemical Safety and Climate Change Resiliency training was offered to first responders and companies participating in the [Boston Community Health Center Emergency Preparedness Committee](#), Boston and Chicopee Local Emergency Planning Committees, South Wachusett Regional Emergency Planning Committee, and the 2019 Massachusetts Emergency Management Agency All Hazards Conference. In addition, Barnstable County Cape Cod Cooperative Extension hosted a [Chemical Safety and Climate Change Workshop](#) for the community and invited OTA to provide their training at their [24th Annual Southeast Massachusetts Drinking Water Fair](#).

OTA also partnered with other organizations to deliver the TURA program's toxics use reduction mission. OTA's Chemical Safety and Climate Change Resiliency Preparedness curriculum was presented at the [2018 North American Hazardous Materials Management Association \(NAHMMA\)](#) in Portland, ME. The Environmental Business Council of New England also featured OTA's pollution prevention work at a seminar called *Preventing Toxic Exposures During Climate Events*.

OTA has offered to provide outreach to industries and accept referrals from participating MVP communities and helped organize events to publicize the MVP mission to Massachusetts businesses. One such event, hosted by the Environmental Business Council of New England, was called [Lessons Learned from Massachusetts MVP Grant Program](#). MVP program staff also co-presented a climate change session along with staff from OTA and the US EPA at TURI's Continuing Education Conference for Toxics Use Reduction Planners.

OTA's Climate Change Work was also featured in two webinars during FY19, "[Preparing Facilities and Communities for Severe Weather](#)" and as part of the Collaborative on

Health and the Environment (CHE) Boston University Superfund Project's three part climate change series "[Before, During, and After the Storm.](#)"

Success Stories

The OTA Chemical Safety and Climate Change Resiliency curriculum has become so popular that OTA has made it a standing program within OTA, with partners such as Barnstable County, Haverhill, New Bedford and Taunton promoting OTA's free and confidential site visits as part of their MVP and emergency preparedness programs. An OTA training hosted by the Southeastern Regional Planning and Economic Development District (SRPEDD) led to the [Taunton Emergency Management Agency partnering with a local company performing on an emergency ammonia evacuation exercise.](#)



In addition, at the close of the US EPA grant, OTA hosted four Worcester Polytech Institute (WPI) students for seven weeks to evaluate the Chemical Safety and Climate Change training and curriculum with the goal of discovering what businesses or first responders found useful from the trainings, and how the trainings might be adapted to meet their future needs. The students surveyed participants and provided [results](#) that will help OTA improve materials and better meet the needs of the community, such as:

- ◆ Developing webinars and online tools
- ◆ Developing hands on training, such as table top exercises
- ◆ Focusing on northeast severe weather events

Comments from Chemical Safety and Climate Change Resiliency training participants included:

- ◆ "OTA, TURA ... are a win-win for companies"
- ◆ "OTA is a great resource to have"
- ◆ "One of the best kept secrets in Massachusetts"
- ◆ "For anybody not to take up some of their services ... it's a no brainer"
- ◆ "For us, [OTA services were] very beneficial. We've made some terrific contacts, just in terms of knowing people who can get the information"
- ◆ "Thanks to our OTA connections, we were able to call in state OSHA ... and I figure we probably got probably \$8,000 to \$12,000 worth of free industrial hygiene consulting"

This informal evaluation will help OTA improve and expand this program.

Artificial Turf: Safer Alternatives for Sports Fields

With support from the Heinz Endowments, TURI continued to provide information and assistance to municipalities, schools and other institutions related to [artificial turf](#), organically managed natural grass playing fields, and playground surfacing materials.

Tire crumb used in artificial turf fields contains chemicals of concern, including metals, polyaromatic hydrocarbons (PAHs), and others. Artificial turf fields can also pose other concerns, including excess heat and migration of rubber and plastic particles into the environment. Organic management of natural grass fields provides a safer alternative to artificial surfaces.

In FY19, TURI's work included publication of reports on athletic fields and on playground surfacing as well as publication of two case studies on the successful [organic grass management programs](#) in Springfield and Marblehead. Springfield has had an organic program since 2014, and currently manages just under 70 acres organically. Marblehead's program has been in place since 2002, and all its publicly owned grass fields are managed organically. TURI's case studies provide information on these municipalities' experiences, including maintenance protocols, costs, and number of hours of use.

TURI also collected laboratory test data on alternative artificial turf infills and fielded approximately 50 queries from parents, school administrators and community members.

Natural Grass Playing Field Case Study: Springfield, MA

Organic Grass Fields Meet Athletes' Needs and Protect Connecticut River Watershed

THE CITY OF SPRINGFIELD, Massachusetts, manages 12 properties, or a total of 67 acres, organically. This includes sports fields, park areas, and other public properties. Springfield's organically managed fields fully meet the community's needs for sports and other recreational activities, with high quality grass and soil.

Since starting the organic program in 2014, the city has doubled the number of properties in the program and experienced an increase in overall recreational use due to the improvement in soil and grass conditions.

This case study provides detailed information on the number of hours played at three parks in Springfield: two large complexes and one single, full-sized soccer field. Communities wishing to estimate the number of playable hours on a soccer field can use Treetop Park, the full-sized soccer field, as the most relatable model of the three parks discussed here. Treetop Park is used for approximately 1,050 hours of practice, play, and informal activity



Children playing a pick-up soccer game on an organically-managed field in Springfield.

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 FY19, TURI provided roughly \$167,000 to 10 businesses and community groups, and roughly \$69,000 to three academic research projects carried out in partnership with industry.

The projects addressed many areas, including industrial cleaning, educational facilities, gymnastics, manufacturing, food processing, pesticide reduction, and textile coatings. See Appendix I for complete details on the [grant projects](#).

Industry Grants

- ♦ **Kettle Cuisine (Lynn):** Worked with UMass Lowell to test safer alternatives to sodium hydroxide used for cleaning.
- ♦ **Morgan Advanced Ceramics (New Bedford):** Phased out trichloroethylene from its cleaning process.
- ♦ **MSI Transducers (Littleton):** Reduced its use of lead and generation of lead waste.
- ♦ **US Pack (Leominster):** Reduced chemicals used in production and cleaning through equipment efficiency

Small Business Grants

- ♦ **Auto Repair Shop at Assabet Valley Technical High School (Marlboro):** Invested in bio-based washing systems, reducing the use of hazardous solvents.
- ♦ **Dory Cleaners (Swampscott):** Eliminated the use of perchloroethylene by converting their dry cleaning shops to professional wet cleaning technology.
- ♦ **Absolute Gymnastics (Tyngsboro), All Around Gymnastics (Plainville), Black & Gold Gymnastics (Middleton), Gymnastic Academy of Boston-Norwood, and Kaleidoscope of Dance and Gymnastics (Wareham):** Replaced foam pit cubes containing endocrine-disrupting flame retardants with flame-retardant-free cubes.

Academic Research Grants

- ♦ **Bradford Industries (Lowell), partnering with Dr. Ram Nagarajan of UMass Lowell:** Evaluated the performance and cost of alternatives to the toxic solvent dimethylformamide used in textile coating applications.

- ♦ **Dr. James Reuther, Assistant Professor, Department of Chemistry, UMass Lowell:** Investigated safer alternatives to acetone-based nail polish remover.
- ♦ **Waters Corporation (Milford), partnering with Dr. Hsi-Wu Wong of UMass Lowell:** Tested safer replacements for harmful solvents used in liquid chromatography.

Community and Municipal Grants

- ♦ **Don't Take That Receipt! (Haydenville):** Communicated the dangers of BPA and BPS through personal exchanges and social media, and encouraged adoption of safer alternatives.
- ♦ **The Field Fund (Martha's Vineyard):** Created videos and other outreach tools to convey the advantages of organic natural grass over artificial turf playing fields.
- ♦ **Lawrence Fire Department (Lawrence):** Encouraged toxics use reduction among all 103 auto body and car repair shops in the city.
- ♦ **Worcester Public Schools:** Made school buildings safer by identifying and adopting safer alternatives to toxics-containing products used in building maintenance.

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 often 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 FY19, OTA worked closely with 62 Massachusetts facilities and provided recommendations related to regulations, pollution prevention, toxics use reduction, energy efficiency, and water conservation. Forty four percent of those facilities were directly located in or within one half mile of an Environmental Justice community (27 out of 62).

During follow-up with facilities in FY19, OTA recorded that, as a result of OTA recommendations, companies:

- ◆ eliminated the annual use of one million gallons of water
- ◆ eliminated more than 48,300 pounds of toxic chemicals
- ◆ saved \$57,517 in energy and electricity costs

During FY19, OTA also embarked on an effort to identify and reach out to manufacturers serving the energy storage industry as well as exploring the viability of cold climate heat pumps for Massachusetts commercial and industrial applications.

OTA's assistance to companies during FY19 include the following success stories:

Kettle Cuisine: OTA revisited Kettle Cuisine in FY19 to follow up on recommendations and to view progress on facility expansion. The company requested the [Industrial Assessment Center's](#) (IAC) energy efficiency assessment and have begun acting upon suggested projects toward saving nearly \$200,000 in annual energy costs. After OTA helped to identify direct and indirect benefits of water conservation, Kettle Cuisine reduced water consumption by a million gallons per year. Additionally, Kettle Cuisine came into compliance with new environmental regulations that OTA made it aware of. As Kettle Cuisine successfully builds greater production capacity, OTA looks forward to another visit and review upon completion of facility construction.

Morgan Advanced Ceramics: OTA has worked with this company, a manufacturer of ceramic feedthroughs for the medical and aerospace industries, on a number of projects over the years. These included identifying alternatives for

the trichloroethylene (TCE) and n-propyl bromide (nPB) used in several vapor degreasers, and maintaining compliance with DEP's air regulations for cold solvent metal cleaning.

Based on OTA's recommendations, the company focused on replacing TCE, which was used to remove wax used in a machining operation. They researched and developed a wax suitable for their application that can be removed in an aqueous based cleaning system.

In order to effectively use this methodology for their current production volumes, the company needed to invest in a new piece of equipment. Morgan Advanced Ceramics applied for a TURI industry grant in 2019 and was awarded \$30,000 to help purchase a new aqueous cleaning system that is expected to eliminate their use of 3,300 pounds of TCE per year. By not using TCE, the company expects to reduce operating costs, reduce regulatory obligations, improve worker health and safety, and increase process efficiencies.

Synventive: OTA helped the company file its first Form S report and made recommendations regarding its vapor degreasers. OTA staff also referred Synventive to the TURI lab, allowing it to begin replacing its cleaning applications with aqueous cleaning.

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 open partnerships with OTA.

Through these relationships, OTA's technical assistance providers are able to 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. In order 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 Services and Technical Assistance

Laboratory Services

[TURI's laboratory](#) continues to provide free testing services to Massachusetts companies looking for safer cleaning alternatives. In FY19, the lab tested the performance of safer cleaning alternatives for 11 Massachusetts companies in the metalworking, aerospace/military, jewelry, food and beverage, furniture refinishing, heat/cooling systems, electronics, and advanced ceramic components sectors.

Additionally, the lab completed 32 fee-for-service testing projects for 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, four companies were from Massachusetts.

The lab continued to offer services to industry and the Commonwealth in janitorial cleaning. The lab worked with the [Massachusetts Toxics Reduction Task Force](#), the [Massachusetts Operational Services Division \(OSD\)](#) [Environmentally Preferable Products \(EPP\) Procurement Program](#), and various cities across the state, helping both state agencies and schools move to greener janitorial cleaning chemicals and systems.

Library and Information Services

The [TURI Library](#) responds to information requests from businesses, state and municipal agencies, nongovernmental organizations, and individuals. During FY19, information requests included queries about:

- ◆ specific chemicals (e.g., glyphosate, formaldehyde, brominated flame retardants)
- ◆ chemicals/alternatives assessment (e.g., styrene)
- ◆ products/safer alternatives (e.g., floor finishing)
- ◆ international regulatory requirements (e.g., REACH, RoHS)

Industry Focus: Food Processing Sector

Food and beverage manufacturers in Massachusetts use various hazardous chemicals to meet their cleaning and sanitizing needs. TURI is working with [this sector](#) to identify and test alternatives to improve efficiency and worker safety. OTA has a dedicated technical assistance provider for the food and beverage industry.

In FY19, TURI worked with produce growers (including Little Leaf Farms of Devens and Fat Moon Mushrooms of Chelmsford) and soup manufacturers (Kettle Cuisine of Lynn and Plenus Group of Lowell) to find safer alternatives to chemicals used in cleaning processes. TURI also began developing an alternatives assessment to evaluate

alternatives to traditional cleaners and sanitizers used in breweries; this work will continue into FY20.

Education and Training

Demonstration Events

TURI organizes [industry demonstration events](#) to highlight the efforts of facilities that have reduced their use of toxic chemicals and the TUR Planners that have helped in the process. **During FY19, TURI held demonstration events at US Pack and at Luongo's Cleaners.** US Pack in Leominster is one of the only custom-formulation chemical-product blending and packaging facilities in New England; it installed a new filling line to reduce its chemical use and implemented lean manufacturing techniques to reduce waste. Luongo's Cleaners in Bedford switched from using a perchloroethylene-based system to a professional wet cleaning system.

"Beyond the SDS" Workshop

TURI conducts ongoing outreach and workshops for researchers and TUR Planners, educating them about databases, tools and information to better identify hazards of chemicals. This [workshop](#) was provided twice in FY19 for classes of 13 to 18 attendees.

Toxics Use Reduction Planner Certification Course

Every year, TURI conducts an intensive course to train new Toxics Use Reduction Planners (TUR Planners). Recorded sessions are available online, where participants can learn at their own pace, while the seven 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 a group presentation designed as a pitch to management about the chosen toxics use reduction option featured in the Plan. In FY19, 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. It allows them to improve their skills and assists them with maintaining their certifications. At the fall 2018 conference, topics included pre-planning, working with supply chains, water conservation, identifying safer ingredients for formulated products, improving process efficiency, and chemical security/climate change. The spring 2019 conference included sessions on process characterization, best practices, tools for finding and assessing safer solvent alternatives, energy conservation

incentives, and C1-C4 halogenated chemicals used as refrigerants.

Central Massachusetts Business Environmental Network (CMBEN)

The Central Massachusetts Business Environmental Network (CMBEN) is a network of environmental health and safety professionals serving industry in Central Massachusetts. The network meets to discuss and hear presentations on environmental health and safety topics. OTA sits on the board of CMBEN and helps to coordinate meetings and topics. During FY19, CMBEN held meetings on the topics of Chemical Safety and Climate Change Resiliency, TURI's business and industry grants, and updates regarding Mass DEP's multi-media inspection and EPA's Toxics Release Inventory (TRI) inspection.

Chemical Safety & Climate Change Preparedness

OTA provided chemical safety and climate change preparedness training to various audiences. See page 8 for details.

Massachusetts Clean Auto Repair (MassCAR) Training

During FY19, the Lawrence Fire Department received a TURI grant to conduct environmental outreach to auto body shops within the city. OTA offered to present their existing [Massachusetts Clean Auto Repair \(MassCAR\)](#) training. TURI had the MassCAR materials translated into Spanish and OTA performed a [bilingual Spanish / English training](#) for an audience of approximately 25 attendees who learned about safer alternatives to common toxic chemicals and general worker health and safety practices.

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 FY19, MassDEP processed 1,600 individual chemical use reports from 468 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 Toxic Use Reduction Plan, or update an existing plan and analyze whether or not there are changes that can be made to their production processes that would reduce toxics use, waste and reduce 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).

The plans are a powerful tool for promoting toxics use reduction: The data show that typically in each planning cycle over 70% of the companies completing a TUR Plan find at least one toxics use reduction technique they choose to implement.

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-listed 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 are allowed to 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 FY18, there were 188 MassDEP certified TUR Planners, including:

- ♦ 119 General Practice Planners
- ♦ 69 Limited Practice Planners

In FY19, MassDEP reviewed the qualifications of 24 new TUR Planners; MassDEP also reviewed the successful completion of the required continuing education credits for 24 TUR Planners who were renewing their certifications. The TUR Planner Exam was offered on December 7, 2018.

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 FY19, MassDEP approved 20 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 four TURA [Reporting and Planning Training sessions](#) in spring 2019. These annual trainings provide a refresher course on TURA reporting and planning and the eDEP portal that companies use to submit their information.

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 FY19, MassDEP inspected 63 TURA filers and screened another eight facilities to determine if they were subject to TURA. These inspections and screenings resulted in:

- ◆ 23 enforcement actions for failure to fully comply with reporting and planning requirements
- ◆ 20 Notices of Non-Compliance (NON) for failure to submit complete or timely TURA reports

In FY19, MassDEP sent out formal Requests for Information to twelve facilities based on the facility size, the number of high hazard chemicals used, industrial sector, enforcement history and their TUR Planner's qualification and number of plans the TUR Planner prepared in FY19. These facilities were asked to submit their latest TUR Plan for MassDEP review. The purpose of these reviews was to evaluate whether additional compliance support focused on particular aspects of the TURA program would be beneficial to TURA filers, as well as issuing enforcement to those facilities and TUR Planners who did not comply with the TURA regulations. Two facilities and two TUR Planners received Notices of Non-Compliance for deficiencies in their TUR Plans.

Fee Revenue

TURA-regulated facilities must pay annual fees, unless they have obtained a financial hardship waiver. In FY19 there were no fee-waiver requests. MassDEP collected:

- ◆ \$2,864,110 in annual fees
- ◆ 29,745 in statutory late fees
- ◆ \$7,225 in fees from TUR Planners who applied for the DEP's certification or recertification

Appendix VI contains FY19 expense 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 2017 calendar-year use reports that were due on July 1, 2018. Four hundred sixty eight facilities submitted 1,602 individual chemical reports on 131 different chemicals. These facilities:

- ◆ used a total of 692 million pounds of these chemicals
- ◆ generated 78 million pounds of chemical as byproduct (chemical waste)
- ◆ released 3 million pounds of chemical waste on-site as pollution
- ◆ transferred 34 million pounds of chemical waste offsite for further treatment, management or disposal

Toxics Policy

Administrative Council on Toxics Use Reduction

The TURA program is governed by the [Administrative Council](#), which coordinates toxics management statewide and is responsible for managing 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 2019 Council Members

- ◆ Secretary Matthew Beaton, Executive Office of Energy and Environmental Affairs (Chair)
Designee: Daniel Sieger, Assistant Secretary for Environment
- ◆ Commissioner Martin Suuberg, Department of Environmental Protection
Designee: Greg Cooper, Director, Business Compliance and Recycling Division, Bureau of Air and Waste
- ◆ Commissioner Monica Bharel, Department of Public Health
Designee: Dr. 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 Tom Turco, 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: John Chapman, Undersecretary for the Office of Consumer Affairs and Business Regulation
Designee as of March 2019: Edward Palleschi, Undersecretary for the Office of Consumer Affairs and Business Regulation

Council Vote to List Nonylphenol Ethoxylates Category

On September 25, 2018, the Administrative Council voted to list the nonylphenol ethoxylates (NPE) category, added by US EPA to the EPCRA Section 313 Toxic Chemical List on June 7, 2018.

Response to Request for Policy Development on Nanomaterials

In 2016, a coalition of environmental, occupational and public health groups requested that the TURA program investigate the use of nanomaterials in the Commonwealth and associated hazards. In response to this request, OTA created an online nanomaterial survey that was widely distributed through trade organizations, academia, health departments, social media, industry contacts and other sources.

Only 13 Massachusetts manufacturers responded. Out of the 13 respondents, 10 companies reported currently using nanomaterials and many companies only answered certain questions. Although the Commonwealth is a center for growth in the nanotechnology field and nanomaterials are now ubiquitous in consumer products, information is limited on the manufacture or use of nanomaterials in Massachusetts.

Other regulatory and data gaps exist as well:

- ◆ The [Toxic Substances Control Act](#) (TSCA) does not capture nanomaterial data when a company moves from using a micrometer-sized material to nanometer-sized material. For existing chemicals, EPA under TSCA issued a one-time reporting rule that went into effect on August 17, 2017, requiring reporting in August 2018. As of October 2018, there were only 67 responses from across the country. No Massachusetts companies have reported under the new TSCA rule.
- ◆ NIOSH guidelines are merely recommendations rather than regulations or law. NIOSH guidelines vary by nanoparticle shape, size and chemical because these factors affect the risks of the materials.
- ◆ Companies and manufacturers may be unaware of their own use of nanomaterials due to complex supply chains and lack of particle size disclosure on Safety Data Sheets (SDSs).

Fiscal Year 2019 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. FY19 members were:

- ◆ Robert Audlee, Stainless Steel Coatings;
- ◆ Kathryn Flannery, Department of Labor Standards;

- ◆ Andrew Goldberg or Jillian Riley, Attorney General's Office;
- ◆ Jodi Sugarman-Brozan, Massachusetts Coalition for Occupational Safety & Health (MassCOSH);
- ◆ William Judd, Industrial Compliance Group;
- ◆ Mark Monique, The Savogran Company;
- ◆ Gary Nedelman, Mexichem;
- ◆ Mark Rossi, Clean Production Action;
- ◆ Kari Sasportas, Lexington Board of Health;
- ◆ Elizabeth Saunders, Clean Water Action;
- ◆ Lucy Servidio, Capaccio Environmental Engineering;
- ◆ Ronald Westgate, Philips Lightolier; and,
- ◆ Rebecca Weidman, Massachusetts Water Resources Authority.

Fiscal Year 2019 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' current organizational affiliations are listed, but members serve as individuals, bringing their diverse expertise to the board; they do not represent their organizations. FY19 members were:

- ◆ Amy Cannon, Beyond Benign;
- ◆ Robin Dodson (Vice Chair), Silent Spring Institute;
- ◆ Christy Foran, Rand Corporation;
- ◆ Hilary Hackbart, Massachusetts Department of Labor Standards;
- ◆ Wendy Heiger-Bernays, BU School of Public Health;
- ◆ Denise Kmetzo, Collaborative Risk Solutions;
- ◆ Margo Levine Newman, Consultant;
- ◆ Heather Lynch, Cardno ChemRisk;
- ◆ Christine Rioux, Tufts University;
- ◆ Kenneth Weinberg, Safdoc Systems; and,
- ◆ David Williams (Chair), Massachusetts Department of Public Health.

Science Advisory Board Work on Per- and Poly-Fluoroalkyl Substances

In FY19, the Science Advisory Board continued review of the current literature on per- and poly-fluoroalkyl substances (PFAS) of varying carbon chain lengths.

These substances have been [detected in water supplies in the Commonwealth](#), and are a high priority for action nationally and internationally. In FY17, the Board recommended adding

two eight carbon chain length (C8) substances, perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) and their salts, which are very persistent, bioaccumulative and toxic, to the TURA List of Toxic and Hazardous Substances. In FY19, the Board reviewed additional PFAS — perfluorohexane sulfonic acid (PFHxS) (C6), perfluorohexanoic acid (PFHxA) (C6), perfluorobutanesulfonic acid (PFBS) (C4), and perfluoro-n-butyric acid (PFBA) (C4) — and recommended them and their salts for listing. In FY19, the Board also reviewed PFHpA (C7) and PFNA (C9); GenX and Adona (PFECAs); and PFPA/PFPiAs (phosphonic and phosphinic acids). In order to accomplish this work, TURI developed detailed [environmental health and safety summaries](#) for the PFAS compounds. They summarize current information available on these chemicals, including the results of a detailed review of existing peer reviewed literature and information submitted by stakeholders and Science Advisory Board members. These environmental health and safety summaries are used by the Board as the basis for their review of each chemical.

Massachusetts Toxics Use Reduction Taskforce

Toxics Reduction Task Force Identifies Chemicals of Concern in Products: The [Toxics Reduction Task Force \(TRTF\)](#) was

established in 2009 to facilitate implementation of [Executive Order 515](#), establishing an environmental purchasing policy (EPP). The TRTF is lead and overseen by the Operational Services Division (OSD) and OTA. The TRTF is composed of staff from the OSD, OTA, the Department of Public Health (DPH), the Department of Labor Standards (DLS), TURI, and DEP. The TRTF remains a technical advisory group to help the OSD's EPP Program identify additional toxics in products on statewide contracts (SWCs) 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. For FY19 the TRTF discussed per- and polyfluoroalkyl substances (PFAS), methylene chloride, N-methylpyrrolidone (NMP), and flame retardants.

- ◆ **Per- and polyfluoroalkyl substances:** The TRTF continued to discuss per- and polyfluoroalkyl substances, a family of chemicals commonly referred to as PFAS, which have been found in many brands of compostable disposable food service ware. This class of chemical has come under increasing scrutiny from toxicologists, ecologists, and regulators given their persistence and connection to potential health effects. MassDEP worked towards revisions to the [Massachusetts Contingency Plan](#) (310 CMR 40.0000) related to PFAS to establish reportable concentrations and reportable quantities for PFAS, PFAS cleanup standards in soil and groundwater and to define toxicity

information that would be required for use in a site-specific risk characterization for PFAS. The TRTF will track progress with this regulation, which could have impacts on numerous products on statewide contracts, including food packaging, firefighting foams, paints, waxes, and polishes.

The TRTF requested that price sheets for the GRO35 contract ("Foodservice Supplies and Equipment, Institutional Commercial Grade Large and Small") be updated with a PFAS disclosure. Compostable dishware sold on this contract are required to have a third-party environmental certification including the Biodegradable Products Institute (BPI), Cedar Grove Composting Approved, OK Compost – TUV Austria, Australian Bioplastics Association, Japan BioPlastics Association, and DIN CERTCO (European Union). However, criteria in these certifications to reduce/eliminate PFAS will not go into effect until FY20.

The TRTF recommended that vendors provide a disclosure in their price sheet on whether products contained PFAS, and the GRO35 contract manager worked with the vendors to update their price sheets to include the disclosure. In FY20, a review will be conducted of the products to make sure they meet the existing requirements.

- ◆ **Safer Firefighting Foam:** The TRTF reviewed the New York State Pollution Prevention Institute's report [Per- and Polyfluorinated Substances in Firefighting Foam](#) developed for the [Interstate Chemicals Clearinghouse](#). This report "summarizes the results of precursory work to assist with scoping an alternatives assessment of the use of perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) in Class B aqueous film-forming foam (AFFF), also known as "firefighting foam." The TRTF will continue to discuss alternatives and find out more from those that are using the alternatives on whether they could be added to an OSD statewide contract.
- ◆ **Methylene chloride and N-methylpyrrolidone:** The TRTF continues to discuss methylene chloride, also called dichloromethane, and N-methylpyrrolidone (NMP) as chemicals of concern. Methylene chloride is a volatile chemical that has a variety of uses, including paint and coating removal, and it is found in a range of adhesives and other products used for automotive care, lubrication, lithography, and general cleaning. NMP is a solvent used in paint and coating removal, and it also is present in a range of coating products, including adhesives, cleaners, dyes, and more. TURI worked with the US EPA, UMass Lowell researchers, paint stripper product manufacturers, bathtub refinishers and

furniture refinishers to identify and test safer solvent blends that have general paint stripping performance comparable to that of methylene chloride based paint strippers and documented their findings in the [Assessment of Safer and Effective Alternatives for Coating Removal Products](#). In addition, UMass Lowell and TURI researchers developed a safer and effective alternative to methylene chloride-based paint strippers. OSD will explore how to add the commercial product that resulted from this research to a statewide contract.

In FY19 the TRTF worked with the OSD's Maintenance, Repair and Operations vendors to request a list of products containing these chemicals of concern from their catalogs. Since the federal administration announced its intentions to ban methylene chloride in paint and coating removal products from retail distribution facilities, the TRTF decided to distribute information about the EPA's intentions to the vendors. The TRTF will continue to evaluate other products and alternatives to explore whether there are enough alternatives available to recommend removal of products with these chemicals from the contracts.

- ◆ **Flame Retardants:** The TRTF hopes to review other products in SWCs containing flame retardants and will explore alternative recommendations.

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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 Fiscal Year 2019, TURI gave roughly \$167,000 to 10 businesses and community groups, and roughly \$69,000 to 3 academic research projects carried out in partnership with industry.

Auto Shops

- ◆ The Auto Repair Shop at Assabet Valley Technical High School of Marlboro replaced toxics that were used to clean vehicle parts. The project team purchased bio-based parts washing systems to reduce chemical exposures for high school students and their instructors and teach them environmentally-friendly practices. The project team reduced the use of perchloroethylene (a Higher Hazard Substance under TURA) and other solvents by 92 gallons per year. These changes will save the school over \$3,000 annually.
- ◆ The Lawrence Fire Department integrated toxics use reduction awareness into their fire safety visits to all 103 auto body and car repair shops in the city. During the visits, the fire prevention team conducted an initial safety assessment, provided owners with a list of safety concerns to work on and encouraged owners to use safer products. Products that contain toxic chemicals include wheel washes, spray gun washers, brake cleaners, degreasers and lead wheel weights. The Fire Department also piloted a safer paint gun washing system. Annual inspections will continue to encourage toxics use reduction and safer product trials.

Dry Cleaning

- ◆ Dory Cleaners of Swampscott converted their dry cleaning shop from using perchloroethylene to professional wet cleaning technology. This safer alternative allows the small businesses to clean "dry-clean-only" clothes with water and detergents in computer-controlled machines. Workers then use tensioning and pressing equipment to achieve high-quality results.

Education

- ◆ Don't Take That Receipt! of Haydenville, a public health and environmental justice group of youth and adults, built upon a previous project that included the creation of an educational video about exposure to bisphenol A (BPA) and bisphenol S (BPS) from store receipts. View the video at www.bpa-free.me. The next phase of the project included communicating the dangers of BPA and BPS through personal exchanges and social media, and encouraging retailers to adopt safer alternatives. The team reached out to stores in and around the low-income community of Holyoke and other towns in western Massachusetts, focusing on retailers, workers and consumers.

Flame Retardants

- ◆ Absolute Gymnastics (Tyngsboro), All Around Gymnastics (Plainville), Black & Gold Gymnastics (Middleton), Gymnastic Academy of Boston-Norwood, and Kaleidoscope of Dance and Gymnastics (Wareham) replaced foam pit cubes containing flame retardants with cubes not containing flame retardants. Many flame retardants are endocrine disruptors and have a range of adverse human health effects.

Food Processing

- ◆ Kettle Cuisine of Lynn, a maker of small-batch, all natural soups for restaurants, food-service operators and grocery retailers, continued its work with UMass Lowell's Food Safety Lab to reduce the use of sodium hydroxide. Sodium hydroxide, which is used to clean food processing tanks, is corrosive to the eyes, skin and the respiratory tract. Project work determined how the facility could optimize its use of the cleaning chemical (thereby reducing volume) and identified potential alternatives.

Manufacturing & Laboratories

- ◆ Morgan Advanced Ceramics of New Bedford, a manufacturer of ceramic feedthroughs for the medical and aerospace industries, eliminated trichloroethylene (TCE) used in a vapor degreaser. The company purchased a water-based cleaning system that is expected to eliminate 3,300 pounds of TCE use per year. By not using TCE, the company expects to reduce operating costs, improve worker health and safety, and reduce regulatory obligations.
- ◆ MSI Transducers Corp. of Littleton is a designer and manufacturer of acoustic transducers used for a variety of commercial and defense applications. The company reduced its use of lead and lead waste generated in the manufacturing process by re-engineering five injection molding tools.

Organic Landscapes

- ◆ The Field Fund, Inc. works to preserve and maintain Martha's Vineyard's playing fields using an organic, systems-based approach. The project team is sharing their success with other communities that are evaluating whether to invest in natural grass or artificial playing fields. The team created a video, web site and fact sheets showing that with proper maintenance, natural grass is a durable, safe, economical playing surface that is also beneficial to children and the environment.

Safer Cleaning

- ◆ Worcester Public Schools worked to make school buildings safer for students, teachers and tradesmen. The project team identified safer alternatives that tradesmen use to maintain the buildings. Products containing toxics include adhesive removers, caulking, lubricants, rust removers, and boiler additives. The project team also identified safer products for maintaining school buses, such as degreasers, lubricants, oils and coolants. They are sharing the information with facility managers and vocational teachers across the state.

Safer Alternatives Research

- ◆ Prof. Ram Nagarajan of the Department of Plastics Engineering at UMass Lowell partnered with Bradford Industries in Lowell for a second year. The goal of this work was to find and evaluate safer solvent blends to replace the use of the toxic solvent dimethylformamide (DMF). In the first phase of the project, the research team identified combinations of safer and effective solvents that dissolve the target polymer used by the company. The second phase tested the relative ratios of solvents in the mixtures to meet the company's performance and cost requirements.
- ◆ Assistant Prof. Hsi-Wu Wong of the Department of Chemical Engineering partnered for a second year with Waters Corporation, an analytical laboratory instrument and software company located in Milford. The project team continued identifying and testing the performance of safer solvents used in liquid chromatography equipment. The new formulations will replace the harmful solvents currently in use; these include methanol, acetonitrile and tetrahydrofuran.
- ◆ Assistant Prof. James Reuther of the Chemistry Department and his project team worked to identify a safer and more effective nail polish remover for methacrylate-based gel nail polish. Gel nails are popular with customers due to a harder surface that reduces chipping and extends nail polish life. However, the removal of the polish requires application of acetone remover for up to 15 minutes. Acetone can cause serious eye irritation, drowsiness and dizziness; chronic exposure to acetone-based nail removers may damage the central nervous system and renal system.

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.

Fiscal Year 2019 Events and Workshops

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

Workshops and Training Events:

- ◆ "Beyond the Safety Data Sheet" workshops in Sturbridge, MA, August 23, 2018, and in Lowell, MA, September 20, 2018.
- ◆ Lowell High School class visits: UMass Lowell students working in the TURI Laboratory gave hands-on training in industrial cleaning test methods to two groups of Lowell High School students and their teachers, TURI, Lowell, MA, November 7, 2018, and April 26, 2019.
- ◆ Assabet Valley Regional Technical High School student visit: Two students from the Assabet biotech program visited the TURI Laboratory to test the performance of a new cleaning solution recommended for a bio-based parts cleaner used by the Assabet Automotive Technology program, January 24, 2019.
- ◆ "Reusable Bags Are Green, But Are They Clean?" workshops: TURI Lab students provided hands-on demonstrations about how to properly clean reusable grocery bags. Workshops were given at the Lowell Senior Center as part of Healthy Lowell Week on April 1, 2019, and at the UMass Lowell Inn & Conference Center as part of the Lowell Earth Day Festival on May 5, 2019.
- ◆ Toxics Use Reduction Planner certification course, TURI, Lowell, MA, August 30, September 27, October 4, 11, and 25, 2018.
- ◆ TRI/TURA compliance workshops, in Dartmouth, Worcester, Greenfield, and Newburyport, April 25, May 16, May 21, and May 29, 2019.
- ◆ TURA Environmental Management Systems (EMS) certification training, at TURI in Lowell, MA, February 5, and at Umicore in Attleboro, MA, February 12, 2019.
- ◆ TURA Fall Continuing Education Conference, Westborough, MA, November 13, 2018.
- ◆ TURA Spring Continuing Education Conference, Devens, MA, April 4, 2019.
- ◆ UMass Lowell Sustainability Engineering Camp: TURI Green Cleaning Laboratory hosted a group of high-school students for a half-day of hands-on development of alternative cleaning solutions, TURI, Lowell, MA, July 17, 2018.

Recognition Events:

- ◆ "Champions of Toxics Use Reduction" recognition event, State House, Boston, MA, June 13, 2019.
- ◆ Recognition of Maura Hawkins as Champion of TUR, hosted by Pittsfield Generating Co, Pittsfield, MA, September 21, 2018.
- ◆ EPA Environmental Merit Award delivered to Mark Richey Woodworking, Inc for efforts to reduce toxic chemicals and save energy, US EPA Regional Office, Boston, MA, September 12, 2018 – Nominated by OTA.

Demonstration Events:

- ◆ Demonstration of production unit modernization at US Pack, Leominster, MA, September 11, 2018.
- ◆ "Ideas to Innovations" tour of startup companies and their toxics use reduction initiatives at the 110 Canal Street complex in Lowell, October 25, 2018.
- ◆ Wet cleaning demonstration, as an alternative to perc-based dry cleaning, Luongo's Cleaners, Bedford, MA, March 31, 2019.

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

Fiscal Year 2019 Publications (Reports, Journal Articles, Case Studies, Fact Sheets and Blog Posts)

- ◆ Dembsey, N., Brokaw, F., Stapleton, H., Dodson, R., Onasch, J., Jazan, E., Carignan, C., "Intervention to reduce gymnast exposure to flame retardants from pit foam: A case study," *Environment International*, June 2019, 127:868-875. Available at <https://www.sciencedirect.com/science/article/pii/S016041201831849X?via%3Dihub>
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- ◆ TURI, "Gym Creates Healthier and Safer Foam Pits," June 2018. Available at https://www.turi.org/TURI_Publications/Case_Studies/Gyms/Gym_creates_healthier_and_safer_foam_pits

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- ◆ United Nations Environment Programme (UNEP), 2019. *Risk Reduction Tools for Chemicals Control*. Rachel Massey and Lindsey Pollard of TURI were contributing writers. Available at https://www.turi.org/TURI_Publications/TURI_Staff_Publications/UNEP_Guidance_Development
- ◆ United Nations Environment Programme (UNEP), 2019. *Global Chemicals Outlook II – From Legacies to Innovative Solutions: Implementing the 2030 Agenda for Sustainable Development*. Rachel Massey and Lindsey Pollard of TURI were contributing writers. Available at <https://www.unenvironment.org/explore-topics/chemicals-waste/what-we-do/policy-and-governance/global-chemicals-outlook>

Fiscal Year 2019 Videos

- ◆ "2018 Champions of Toxics Use Reduction: Community Organizations" video resource, TURI, September 2018. Available at https://www.turi.org/Our_Work/Grants/Past_Grant_Projects/Grant_Projects_Awarded_in_2017
- ◆ "Assabet Valley Regional Technical High School Replaces Solvents with Safer Solutions" video resource, TURI, April 2019. Available at https://www.turi.org/Our_Work/Business/Small_Businesses/Auto_Repair_and_Body_Shops
- ◆ "Building Chemical Safety into Climate Change Resiliency Planning" video resource, OTA, August 8, 2018. Available at https://www.youtube.com/watch?v=JrDfIDFi5AE&feature=emb_logo
- ◆ "Lytron Reduces TCE Emissions by 6,000 pounds" video resource, TURI, March 2019. Available at https://www.turi.org/TURI_Publications/Resources/Video_Library
- ◆ "Organic Management of Natural Grass" video resource, TURI, January 2019. Available at https://www.turi.org/Our_Work/Community/Topic_Areas/Pesticides/Springfield's_Transition_of_Public_Land_Management_to_Organic_Land_Care
- ◆ "TURI Laboratory Tour" video resource, TURI, January 2019. Available at https://www.turi.org/Our_Work/Cleaning_Laboratory
- ◆ "Walker's Gymnastics and Dance Replaces Foam Pit Cubes" video resource, TURI, October 2018. Available at https://www.turi.org/Our_Work/Business/Small_Businesses/Gymnastics_Facilities
- ◆ "WPI Student Project Evaluates Chemical Safety and Climate Change Resiliency Plans" video resource, OTA, February 5, 2019. Available at <https://www.youtube.com/watch?v=VXf3Tnq-QcE>

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.

Fiscal Year 2019 Presentations and Webinars

- ◆ Eliason, P., "Find the Hidden Toxics!," National Association of Hazardous Materials Management annual conference, Portland ME, August 28, 2018.
- ◆ Eliason, P., "Going Beyond the Safety Data Sheet: Finding Information to Inform Decision Making about Chemical Hazards," OFS Fitel Global EH&S annual meeting, Sturbridge, MA, October 10, 2018.
- ◆ Eliason, P., "Toxics Use Reduction Planning as a Strategy for Even More Effective Management of Chemicals at Your Facility," OFS Fitel Global EH&S annual meeting, Sturbridge, MA, October 10, 2018.
- ◆ Eliason, P., "TURI Resources and Grants," TURA/TRI Compliance and Reporting workshop, UMass Dartmouth Innovation Center, Fall River, MA, April 25, 2019.
- ◆ Eliason, P., "Using Peer Mentoring to Enhance Learning," National Association of Hazardous Materials Management annual conference, Portland ME, August 28, 2018.
- ◆ Harriman, E., "Toxics Use Reduction in Massachusetts," The Chemicals Class Approach Towards Healthier Products / Healthier People workshop, BCBSMA Innovation Center, Boston, MA, June 13, 2019
- ◆ Harriman, E., "US Alternatives Assessment Development," 2nd International Symposium on Alternatives Assessment, Sacramento, CA, November 1, 2018.
- ◆ Illingworth, J., "Chemical Safety & Climate Change Resiliency," South Wachusett Regional Emergency Planning Committee, October 31, 2018.
- ◆ McCarthy, A., "Safer Alternatives and Cleaning Methods: Toxics Use Reduction Institute," Parts Cleaning Conference, Cleveland, OH, April 3, 2019.
- ◆ Morose, G., "Green Chemistry and Regrettable Substitutions," GC3 Roundtable, Cincinnati, OH, May 8, 2019.
- ◆ Morose, G., "Safer and Effective Alternatives to Methylene Chloride for Paint Stripping" webinar for an audience of Canadian retailers, November 29, 2018.
- ◆ Onasch, J., "The Massachusetts Toxics Use Reduction Institute: Reducing Toxics in Auto Shops," Massachusetts Association of Vocational Administrators annual conference, Marlborough, MA, June 27, 2019.
- ◆ Onasch, J., "Reducing Toxics in Produce," NOFA Winter Conference, Worcester State University, January 12, 2019.
- ◆ Onasch, J., "Toxics Use Reduction in the Food & Beverage Sector," National Association of Hazardous Materials Management annual conference, Portland, Maine, August 30, 2018.
- ◆ Skogstrom, T., "Chemical Safety & Climate Change Resiliency," National Association of Hazardous Materials Management annual conference, Portland, Maine, August 28, 2018. - <https://www.dropbox.com/s/qbmp9l5skbehepi/Skogstrom%20NAHMMMA%20Chem%20Safety.pptx?dl=0>
- ◆ Skogstrom, T., "Chemical Safety & Climate Change Resiliency," Boston Community Health Centers Emergency Preparedness Committee, September 26, 2018.
- ◆ Skogstrom, T., "Chemical Safety & Climate Change Resiliency," Chicopee Local Emergency Planning Committee, October 9, 2018.
- ◆ Skogstrom, T., "Chemical Safety & Climate Change Resiliency," Boston Local Emergency Planning Committee, December 6, 2018.
- ◆ Skogstrom, T., "Chemical Safety & Climate Change Resiliency," Barnstable County Cape Cod Extension's Chemical Safety & Climate Change Workshop, December 12, 2018.

- ◆ Skogstrom, T., "Chemical Safety & Climate Change Resiliency," Northeast Waste Management Officials Association (NEWMOA) webinar, March 11, 2019.
- ◆ Skogstrom, T., "Chemical Safety, Climate Change Resiliency and Community Partnership," Massachusetts Emergency Management Agency (MEMA) 2019 All Hazards Emergency Preparedness Conference, June 19, 2019.
- ◆ Skogstrom, T., "Chemical Safety and Resiliency for Water Utilities," Massachusetts Water Works Association's 24th Annual Southeastern Massachusetts Drinking Water Fair, June 20, 2019.
- ◆ Skogstrom, T., "Chemical Safety & Climate Change Resiliency," Central Massachusetts Business Environmental Network (CMBEN) meeting, September 10, 2019.
- ◆ Skogstrom, T., "Climate Change and Toxics Hazards: Before the Storm," Collaborative on Health and the Environment and Boston University Superfund Research Program webinar, January 24, 2019. - <https://www.healthandenvironment.org/webinars/96467>
- ◆ Skogstrom, T., "Lessons Learned from the Massachusetts MVP Grant Program," Environmental Business Council of New England Climate Change Program Event, March 15, 2019. - https://ebcne.org/event/ebc-climate-change-program-a-massachusetts-response-to-municipal-adaptation-resiliency-the-municipal-vulnerability-preparedness-program/?instance_id=
- ◆ Skogstrom, T., "Preparing Facilities and Communities for Severe Weather," OTA webinar, May 1, 2019. - <https://www.mass.gov/event/webinar-preparing-facilities-and-communities-for-severe-weather-2019-05-01t100000-0400-2019>
- ◆ Skogstrom, T., "WPI Chemical Safety & Climate Change Resiliency Program Assessment: Opportunities for Collaborating and Moving Forward to Prevent Industrial Accidents," Boston, MA, October 10, 2018.

Appendix V: Selected Press Coverage

TURA Program Press Coverage

This list includes mainly external coverage of the TURA program's work during Fiscal Year 2019.

Fiscal Year 2019 Press Coverage

- ♦ "Canadian Company Launches A New, Safer Paint Stripper, Featured in Mother Jones and CBS News," Cision/NewsWire (Canada), January 14, 2019. Available at <https://www.newswire.ca/news-releases/canadian-company-launches-a-new-safer-paint-stripper-featured-in-mother-jones-and-cbs-news-801397956.html>
- ♦ "Chemical Safety & Climate Change Workshop Provides Resources to Community to Protect Public Safety," Barnstable County, December 13, 2018. Available at <https://www.barnstablecounty.org/2018/12/13/chemical-safety-climate-change-workshop-offers-resources-to-community-to-protect-public-safety/>
- ♦ "Environmental Champions Honored by Toxics Use Reduction Institute," Autobody News, June 17, 2019. Available at <https://www.autobodynews.com/index.php/northeastern/item/17855-environmental-champions-honored-by-toxics-use-reduction-institute-ne.html?start=0>
- ♦ "EPA Still Hasn't Acted Nearly Two Years After Proposing Ban on Deadly Chemical Methylene Chloride," CBS News, December 27, 2018. Available at <https://www.cbsnews.com/news/epa-still-hasnt-acted-2-years-after-proposing-ban-on-deadly-chemical-methylene-chloride/>
- ♦ "Get Out the Word on Grass Grant," Vineyard Gazette, August 9, 2018. Available at <https://vineyardgazette.com/news/2018/08/09/get-out-word-grass-grant>
- ♦ "How to Protect Gymnasts from Hazardous Chemicals at Gym Facilities," Scienmag Science Magazine, March 26, 2019. Available at <https://scienmag.com/how-to-protect-gymnasts-from-hazardous-chemicals-at-gym-facilities/>
- ♦ "Local Businesses Lauded for Reducing Use of Toxins," Lowell Sun, July 10, 2018. Available at <https://www.lowellsun.com/2018/07/10/local-businesses-lauded-for-reducing-use-of-toxins/>
- ♦ "Occupational Disease Site Offers Insights on Exposure and Prevention," Workers Health & Safety Centre (Canada), April 1, 2019. Available at <https://www.whsc.on.ca/What-s-new/News-Archive/Occupational-disease-site-offers-insights-on-exposure-and-prevention>
- ♦ Angelo, K., "Reusable Bags are Green, but are They Clean? Students Test Safer Cleaning Solutions for Senior Capstone Project," UMass Lowell News, February 4, 2019. Available at <https://www.uml.edu/news/stories/2019/cleanbags.aspx>
- ♦ Dickman, J., "A New Resource: Safer Paint Strippers for Consumers and Workers," Safer Chemicals - Healthy Families, April 1, 2019. Available at <https://saferchemicals.org/2019/04/01/a-new-resource-safer-paint-strippers-for-consumers-and-workers/>
- ♦ Dobbins, E., "UMass Lowell Toxics Use Reduction Institute Develops Product Without Toxins," Lowell Sun, October 21, 2018. Available at <https://www.lowellsun.com/2018/10/21/umass-lowell-toxics-use-reduction-institute-develops-product-without-toxins/>
- ♦ Doyle, M., Slavin, D., and Thomson, R., "Awards, Like Grass, Are Growing," Martha's Vineyard Times, June 25, 2019. Available at <https://www.mvtimes.com/2019/06/25/awards-like-grass-growing/>
- ♦ Dravis, S., "Mount Greylock Committee Hears Concerns About Turf Field Plan," iBerkshires, June 19, 2019. Available at <https://www.iberkshires.com/story/60181/Mount-Greylock-Committee-Hears-Concerns-About-Turf-Field-Plan.html>
- ♦ Dravis, S., "Williamstown Pollinator Campaign Celebrates Successful Educational Effort," iBerkshires, July 17, 2018. Available at <https://www.iberkshires.com/story/57881/Williamstown-Pollinator-Campaign-Celebrates-Successful-Educational-Effort.html>
- ♦ Hersher, R., "Retailers Plan To Clear Deadly Paint Removers From Shelves, As EPA Delays Ban," National Public Radio, November 12, 2018. Available at <https://www.npr.org/sections/health-shots/2018/11/12/657856033/retailers-plan-to-clear-deadly-paint-removers-from-shelves-as-epa-delays-ban>
- ♦ Hopkins, J., "Retailers Have Vowed to Stop Selling These Deadly Paint Strippers. Why Hasn't the EPA Done Anything?," Mother Jones, December 14, 2018. Available at <https://www.motherjones.com/environment/2018/12/retailers-have-vowed-to-stop-selling-these-deadly-paint-strippers-why-hasnt-the-epa-done-anything/>

- ◆ Hopkins, J., "Some Paint Strippers Are Killing People. The EPA Promised to Act—But Hasn't," The Center for Public Integrity, December 14, 2018. Available at <https://publicintegrity.org/inequality-poverty-opportunity/workers-rights/worker-health-and-safety/unequal-risk/these-paint-strippers-are-killing-people-the-epa-promised-to-act-but-hasnt/>
- ◆ Hopkins, J., "The Government Isn't Regulating a Deadly Paint Stripper, so Retailers Are Instead," Slate, December 14, 2018. Available at <https://slate.com/technology/2018/12/methylene-chloride-deadly-paint-stripper-epa-regulation.html>
- ◆ Myles, M., "Guest Commentary: Keep Moratorium in Place," WickedLocal Concord, March 29, 2019. Available at <https://concord.wickedlocal.com/news/20190329/guest-commentaryppkeep-moratorium-in-place>
- ◆ Nanos, J., "A Burlington Startup Lets You Make Your Own Nontoxic Cleaners at Home," Boston Globe, June 20, 2019. Available at <https://www.bostonglobe.com/magazine/2019/06/20/burlington-startup-lets-you-make-your-own-nontoxic-cleaners-home/aUcwi7jw85SrnWcTCqAxRO/story.html>
- ◆ Pirani, F., "Retailers are Taking These Common Paint Removers With Deadly Chemicals Off the Shelves," Atlanta Journal-Constitution, November 12, 2018. Available at <https://www.ajc.com/news/retailers-remove-common-paint-removers-with-deadly-chemicals-from-shelves/5EC4C4gW1vugiw4Le6NQ8I/>
- ◆ Schultz, J., "Earth Matters: How do we Build and Live in Toxin-free Buildings?," Daily Hampshire Gazette, February 22, 2019. Available at <https://www.gazettenet.com/Earth-Matters-23669904>
- ◆ Silent Spring Institute, "How to Protect Gymnasts from Hazardous Chemicals at Gym Facilities," Phys.org, March 26, 2019. Available at <https://phys.org/news/2019-03-gymnasts-hazardous-chemicals-gym-facilities.html>
- ◆ Stringer, L., "Three More US Companies Join Methylene Chloride Phase Out," ChemicalWatch, October 18, 2018. Available at <https://chemicalwatch.com/71134/three-more-us-companies-join-methylene-chloride-phase-out>
- ◆ Tong, S., "The EPA Says TCE Causes Cancer, So Why Hasn't it Been Banned?" Minnesota Public Radio, July 26, 2018. Available at <https://www.marketplace.org/2018/07/26/epa-says-tce-causes-cancer-so-whys-proposed-ban-been-delayed/>
- ◆ Venkataraman, L., "How to Protect Gymnasts From Dangerous Chemicals at the Gym," Medindia, March 26, 2019. Available at <https://www.medindia.net/news/healthinfocus/how-to-protect-gymnasts-from-dangerous-chemicals-at-the-gym-186850-1.htm>
- ◆ Whittaker, S., and Pedersen, A., "It's Time to Get Toxic Chemicals Out of Dry Cleaning," Environmental Health News, December 13, 2018. Available at <https://www.ehn.org/dry-cleaning-chemical-replacements-2622967905.html>

Appendix VI: TURA Program Revenue and Expenditures

Fiscal Year 2019 Revenues

TURA annual fees:	\$2,864,110
TURA statutory late fees:	\$29,745
TUR Planner fees:	\$7,225
Total revenues:	\$2,901,080

Fiscal Year 2019 Expenditures

OTA

Personnel costs:	\$621,784
Administrative costs:	\$9,718
Total:	\$631,503

DEP

Personnel costs:	\$472,500
Administrative costs:	\$10,000
Total:	\$482,500

TURI

Personnel (staff and students) ¹ :	\$1,139,400
Education and training events ² :	\$62,500
University research and laboratory support:	\$58,800
Grants to businesses, community groups, and municipalities:	\$166,700
Administrative costs:	\$31,900
Library and information support:	\$17,200
Communications, printing, website and educational outreach:	\$132,400
Total:	\$1,608,900

Total expenditures:.....	\$2,722,903
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¹ Personnel expenditures include \$88,000 for research assistants working on industry grant and laboratory projects.

² TURI also collected \$40,300 in training registration fees, which goes to support staff salaries and operating expenses.

