TOXICS USE REDUCTION PLAN AND PLAN UPDATE GUIDANCE

V: 12/23/2019

Published in accordance with MGL 21I and 310 CMR 50.00

Developed in collaboration with:
Office of Technical Assistance for Toxics Use Reduction
Toxics Use Reduction Institute

Commonwealth of Massachusetts
Charles D. Baker, Governor

Executive Office of Energy and Environmental Affairs
Kathleen A. Theoharides, Secretary

Department of Environmental Protection
Martin Suuberg, Commissioner
1 INTRODUCTION .................................................................................................................. 4

2 OVERVIEW OF TOXICS USE REDUCTION PLANNING ............................................................ 6
   2.1 THE PURPOSE OF TUR PLANNING .................................................................................... 6
   2.2 WHAT IS ’TOXICS USE REDUCTION’? ................................................................................ 6
   2.3 REQUIREMENTS OF THE TUR PLANNING PROCESS ....................................................... 7

3 GENERAL TUR PLANNING GUIDANCE ................................................................................. 8
   3.1 BASIC REQUIREMENTS......................................................................................................... 8
   3.2 WHERE THE COMPLETED PLAN IS KEPT / RECORDKEEPING REQUIREMENTS .......... 9
   3.3 EXCEPTIONS TO THE PLANNING REQUIREMENT ............................................................ 10
       3.3.1 General Exceptions ..................................................................................................... 10
       3.3.1.1 Planning is not required when the planning year is the first year in which an annual Form S report will be required for the covered toxic substance ........................................... 10
       3.3.1.2 Planning is not required when chemical use has been eliminated or reduced below the reporting threshold in the planning year .................................................................. 10
       3.3.1.3 Planning is not required when the facility is scheduled to close ................................ 10
       3.3.2 Partial Exceptions: Only Facility-Wide Planning is Required .................................... 11
       3.3.2.1 Waste treatment chemicals ....................................................................................... 11
       3.3.2.2 Pilot plants .................................................................................................................. 11
       3.3.2.3 Startup production units ............................................................................................ 11
       3.3.3 Chemicals Used in Laboratories .................................................................................... 11
   3.4 IS IMPLEMENTATION OF TUR OPTIONS MANDATORY? .............................................. 12
   3.5 THE PHYSICAL TUR PLAN ............................................................................................... 12
   3.6 THE TUR PLANNING PROCESS ....................................................................................... 12
   3.7 TUR PLAN DEVELOPMENT STANDARDS ...................................................................... 14
   3.8 HOW A TUR PLAN UPDATE DIFFERS FROM THE INITIAL TUR PLAN ...................... 15
       3.8.1 What a TUR Plan Update Involves ................................................................................ 15
       3.8.2 The Level of Effort of a TUR Plan Update .................................................................... 15
   3.9 ROLE OF THE SENIOR MANAGING OFFICIAL AND THE TUR PLANNER ..................... 16
       3.9.1 The Role of the Senior Manager .................................................................................. 16
       3.9.1.1 Who can sign as the ’senior manager’ ....................................................................... 16
       3.9.1.2 What the senior manager is attesting to by signing the certification statement ......... 16
       3.9.1.3 How the senior manager assures that the certification is accurate ............................. 16
       3.9.2 The Role of the TUR Planner ....................................................................................... 17
       3.9.2.1 How the TUR Planner certifies a TUR Plan ............................................................... 17

4 THE REQUIRED TUR PLAN ELEMENTS ........................................................................... 18
   4.1 INITIAL FACILITY-WIDE REQUIREMENTS ...................................................................... 18
       4.1.1 Employee Notification On or Before January 1 [310 CMR 50.42(5)] ............................. 18
       4.1.2 Management Policy [310 CMR 50.43(1)] .................................................................. 19
   4.2 PRODUCTION UNIT LEVEL REQUIREMENTS ................................................................. 20
       4.2.1 Purpose Characterization [310 CMR 50.44] ................................................................. 20
         4.2.1.1 Purpose of the Chemical .......................................................................................... 20
         4.2.1.2 Unit of Product ......................................................................................................... 20
         4.2.1.3 Process Flow Diagram ............................................................................................ 21
         4.2.1.4 Material Use, Byproduct, Transfer and Release Accounting .................................. 22
         4.2.1.5 Cost of Toxics .......................................................................................................... 24
4.2.2 Options Identification [310 CMR 50.45]............................................................................25
4.2.2.1 Technical Evaluation (310 CMR 50.46)...........................................................................27
4.2.2.2 Economic Evaluation [310 CMR 50.46A].........................................................................30
4.2.2.3 Other Specific Requirements .........................................................................................33
4.2.3 TUR Options Selection and Implementation Planning [310 CMR 50.46(4)]...........................34
4.3 Facility-Wide Requirements (Post Production Unit Level Planning) .........................................34
4.3.1 Plan Scope [310 CMR 50.43(2)]......................................................................................34
4.3.2 Plan Summary [310 CMR 50.47]........................................................................................35
4.3.3 Certification Requirements [310 CMR 50.42(3) and (4)]..................................................36
4.3.4 Submission to MassDEP ....................................................................................................36
5 TUR PLANNING UNDER SPECIAL CIRCUMSTANCES .......................................................38
5.1 Updating a TUR Plan When a Facility Has No New TUR Options ..........................................38
5.2 A Facility Has More Options Than it Could Reasonably Implement in a Given Planning Cycle. .39
5.3 A Facility Has Fully Incorporated TUR Planning into Its Ongoing Operations ......................39
5.4 A Facility Cannot Complete the Evaluation or Implement an Option by the Plan Due Date........40
6 ALTERNATIVE PLANNING PROCESSES ........................................................................41

Figure 1 Elements and Sequence of TUR Plan ..........................................................................13
Figure 2 Determining if Option is Technically Feasible .................................................................28
Figure 3 Determining if Technically Feasible Option is Economically Feasible..............................31

APPENDIX ..................................................................................................................................I

Exhibit 1 - Checklist of Items in the Physical Plan ........................................................................I
Exhibit 2 - Process Flow Diagram Exemplar: Trichloroethylene (TCE) Use in Production Unit 001 . . VI
Exhibit 3 - Optional Form that can be used for Materials Accounting Purposes ............................VII
Exhibit 4 - Optional Cost of Toxics Form ......................................................................................VIII
Exhibit 5 - Optional New TUR Options Identification and Technical Feasibility Documentation . . XII
Exhibit 6 - Optional Chart: Evaluation of Technically Feasible Options .....................................XIII
Exhibit 7 – Optional Form for Required Economic Evaluation of Technically Feasible Options (Includes Cost of Toxics) .................................................................XIV
1 INTRODUCTION

The Toxics Use Reduction Act (TURA, MGL c. 21I) and its regulations at 310 CMR 50.00 establish toxics use reduction as a central component in the Commonwealth’s efforts to protect public health and the environment while promoting the competitive advantage of Massachusetts businesses through encouraging efficient materials use and management.

TURA requires Large Quantity Toxics Users – facilities that manufacture, process, or otherwise use chemicals included on the Toxics Use Reduction list in amounts that exceed specified thresholds – to file annual Toxics Use Reduction (TUR) reports detailing their use and waste of these "covered toxics."

On every even calendar year, TURA also requires these facilities to complete a Toxics Use Reduction (TUR) Plan, which includes a Plan Update:

- Evaluating how and why they use the toxic substances;
- Quantifying the pounds of covered toxics used, generated as byproduct, treated, released onsite and transferred to offsite waste management facilities in the making of each product;
- Evaluating the cost of using the covered toxics to make each product;
- Identifying opportunities for reducing the use of covered toxics in their production processes and/or products;
- Determining the technical and economic feasibility of implementing these identified opportunities, and
- Making a decision about which options to implement, and which options require further evaluation before implementation.

There are alternatives to Toxics Use Reduction Planning. Companies that have completed their initial TUR Plan and have submitted TUR Plan Updates for two consecutive planning cycles have the option of completing one of the following planning processes:

- Resource Conservation (RC) Planning applies the principles of TUR planning to:
  - covered toxics that are used below the reporting threshold;
  - the reduction of toxic substances that are not covered toxics;
  - water conservation;
  - energy conservation; or
  - reduction of materials that contribute to solid waste.

RC Plans must also be certified by a TUR Planner approved to review RC Plans, and may be used in lieu of TUR Plans no more frequently than every other planning cycle.

- TURA Environmental Management Systems (EMS) incorporate TUR planning principles into a facility's existing EMS. These require certification by a TUR Planner approved by MassDEP to review EMS Plans and can be prepared in lieu of a TUR Plan in every planning cycle thereafter.

TURA Reporting Instructions can be found at https://www.mass.gov/media/1422011
Case studies on successful implementation of TUR can be found on both Toxics Use Reduction Institute (TURI) and Office of Technical Assistance and Technology (OTA) websites at:

- [https://www.turi.org/TURI_Publications/Case_Studies](https://www.turi.org/TURI_Publications/Case_Studies); and
- [https://www.mass.gov/business-environmental-achievement-case-studies](https://www.mass.gov/business-environmental-achievement-case-studies)

Guidance on the requirements for Resource Conservation Plans and TURA Environmental Management Systems can be found at:
[http://www.mass.gov/eea/agencies/massdep/toxics/regulations/policies-and-guidance.html](http://www.mass.gov/eea/agencies/massdep/toxics/regulations/policies-and-guidance.html)
2  OVERVIEW OF TOXICS USE REDUCTION PLANNING

2.1  The Purpose of TUR Planning

TUR Planning is an alternative approach to environmental protection. It is designed to reduce the amount of toxic chemicals used and generated as waste (byproduct) in the production process that are treated on site, transferred off site, or released as pollution. TUR planning helps a company identify measures that are cost-effective.

While completing a TUR plan is mandatory, the decision whether or not to implement an identified TUR option is solely up to the facility.

Over the years, facilities have documented significant cost savings, improved materials tracking, decreased energy and water use, and improved manufacturing efficiency and product quality through TUR planning. Facilities have also identified substantial improvements in the health and safety of their workers as the result of implementing TUR options. Thus, it has provided companies with both a competitive advantage and improved management awareness of environmental issues.

Some facilities have reduced the need for MassDEP permits and costly pollution control devices as a result of their TUR efforts, while others have used TUR planning as the foundation for environmental management systems and programs leading to better pollution prevention.

2.2  What is "Toxics Use Reduction"?

The Toxics Use Reduction Act defines "toxics use reduction" (TUR) as "in-plant changes in production processes or raw materials that reducing, avoid or eliminate the use of a toxic or hazardous substances or generation of hazardous byproducts per unit of product produced without substituting a more toxic chemical or shifting risks to workers, consumers, or parts of the environment."¹ TUR involves changes in the ways chemicals are manufactured, processed, or otherwise used in the production process, or in the types or amounts of byproducts generated.

---

¹ MGL21I Section 2 Definitions

Experience proves that TUR planning works

The Act specifies six categories of TUR:

1. Input substitution
2. Product reformulation
3. Production unit modification
4. Production unit modernization
5. Improved operations and maintenance
6. In-process (integral) recycling or reuse

As defined in 310 CMR 50.10
TUR can be accomplished through any of six defined techniques, which can be summed up in two ways:

1. **Switching to a less toxic substance in the process (input substitution)** or to make the product (product reformulation) – for example changing the formula of a coating to use water rather than an organic solvent.

2. Using the toxic substance more efficiently or not at all. This can be accomplished through production unit modification (changing the process to accommodate TUR) or modernization (providing more control over an existing process to facilitate better efficiency), improved operations and maintenance (such as with routine preventive maintenance of equipment or housekeeping methods), or integral recycling (conducted within the control of the process and its operators to minimize the potential for spills, leaks or exposures) – for example changing painting methods to reduce overspray and increase transfer efficiency so that less of the paint ends up as hazardous waste.

Note that reducing production levels would not be considered TUR, and neither the law nor the regulations require Massachusetts industries to take such a step. Further, there is no requirement in the TURA statute mandating companies to eliminate or reduce the use of a covered toxic.

### 2.3 Requirements of the TUR Planning Process

TUR planning has three aspects:

1. The required activities: actions and analyses companies must undertake and decisions they must make;
2. The physical TUR Plan itself: the description of the planning process used, the calculations, assumptions and supporting documentation associated with planning efforts, the results of the feasibility analyses conducted, and the decisions made and their rationale; and
3. The necessary documentation that planning and Plan updates were conducted in good faith: a description of how the information is collected, analyses are completed, decisions are made, and results are documented.

The law and regulations found in 310 CMR 50 specify the required actions, analyses and decisions, and the required contents of the Plan. How the work is done is entirely up to the facility; however, adequate documentation must be available to MassDEP upon request.
3 GENERAL TUR PLANNING GUIDANCE

3.1 Basic Requirements

As described in 310 CMR 50, there are specific factors that dictate how and when TUR Plans are completed. Large quantity toxics users (LQTUs) of TURA chemicals are required to develop biennial Toxics Use Reduction Plans that evaluate whether technically and economically feasible toxics use reduction opportunities are available to the facility. A facility is an LQTU (i.e., a TURA filer and subject to TURA regulations) if it meets all three of the following criteria:

1. Conducts any of the business activities described by Standard Industrial Classification (SIC) codes (or its NAICS equivalent) 10 - 14, 20 - 39, 40, 44 - 51, 72, 73, 75 and 76;
2. Employs the equivalent of at least 10 full-time employees (FTEs); and
3. Manufactures, processes, or otherwise uses a TURA-listed toxic substance in excess of the applicable reporting threshold.

The TUR Plan Summary being submitted on July 1 of the planning year must include:

- Each covered toxic that the company is required to submit a Form S and Form R; AND
- Each covered toxic that was also reported at least once in any year prior to the current planning year.

If a facility is reporting on the chemical for the first time in the planning year, no plan is required for that chemical.

While the TUR Plans must be completed and certified by July 1 of the planning year, the identification, evaluation and implementation of TUR options may not fit into the standard two-year planning cycle. For example, some product or production process modifications may require several years of work, while others may be identified, analyzed and put in place very quickly.

- It often will not be possible to complete implementation of a selected TUR technique until after the Plan due date. The Plan, therefore, is required to include an implementation schedule so that companies can keep the implementation process on track.
- It may be impossible to complete a full technical evaluation (and by extension, economic evaluation) of a TUR technique identified in the current Plan by the Plan Summary due date. If this is the case, the Plan must include a schedule for completing the evaluation and reaching a decision about whether or not to implement the technique.
- Facilities may have identified and evaluated and/or implemented "new" TUR techniques at any time in the period between the completion of their prior Plan and the start of the current planning cycle. These options must be described and included in the TUR Plan/Plan Summary.
The Plan Summary and TUR Planner and Senior Manager Certification statements are submitted with the annual toxics use report (Form S) covering toxics used in the prior calendar year. For example, on or before July 1, 2020, a facility subject to TURA must:

- Prepare and submit its annual TUR Form S report on covered toxic chemical use in calendar year 2019;
- Complete its 2020 TUR Plan including the Senior Manager’s certification;
- Obtain a certification statement from a TUR Planner approving the Plan; and
- Submit its 2020 Plan Summary and TUR Planner certification to MassDEP.

Note that each of these are submitted simultaneously using the eDEP website at https://www.mass.gov/how-to/toxics-use-reduction-tur-online-reporting.

3.2 Where the Completed Plan is Kept / Recordkeeping Requirements

Plans must be kept at the facility as either a paper document or in an electronic format. The referenced supporting documentation need not be kept together or even with the TUR Plan itself, as long as the Plan references the supporting documentation and states where it is located with sufficient specificity to allow the TUR Planner or another individual reviewing or updating the Plan to access it readily. TUR Plans must be made readily available for review by a MassDEP inspector or the TUR Planner.

Note that Plan Updates involve reviewing decisions made in prior planning years, particularly the decisions regarding the technical and economic feasibility of potential TUR options. Supporting documentation describing how conclusions were reached must be retained for as long as the technique is still deemed possible. This means that techniques fitting this description must continue to be included in the Plan in future years until they are determined to not be possible. See Section 4 (The Required TUR Plan Elements) for a more in-depth discussion.

While the TUR Plans are not public information, MassDEP has the authority to review the TUR Plan. This review may be performed on site by an inspector or following a formal "Request for Information" by MassDEP for the facility to submit the plan for a compliance review. Inspectors have received special training in confidentiality and therefore must be allowed to review the TUR Plans and supporting documentation in their entirety.

The Plan Summary, which consists of the options reviewed, the options selected for implementation or that require further analysis, and the projected changes in use and byproduct generation, must be submitted to MassDEP with the annual Form S report. Although the Plan Summary is public information, portions may be claimed confidential, in which case a "sanitized" version (one that does not contain confidential information) will be available for public review. (See MassDEP’s confidentiality regulations at 310 CMR 3.00.)
3.3  Exceptions to the Planning Requirement

3.3.1  General Exceptions

Note: Although the following circumstances exempt facilities from planning for certain chemicals, these facilities are still required to report that these exemptions apply on the "Plan Submittal Selection Form" that must be submitted with the annual Form S report.

TUR planning is not required for a given chemical under the following circumstances:

3.3.1.1  Planning is not required when the planning year is the first year in which an annual Form S report will be required for the covered toxic substance.

Planning is only required on chemicals that have been reported in a year prior to the planning year. If the facility is only reporting on chemicals that have never been reportable in any prior year, it is not required to prepare a TUR Plan in that planning year.

3.3.1.2  Planning is not required when chemical use has been eliminated or reduced below the reporting threshold in the planning year.

If a facility knows that it will not exceed the reporting threshold for a chemical in the planning year (and by extension will not have to submit an annual report for the chemical on July 1 of the year following the planning year) it does not have to include that chemical in its TUR Plan for that planning year and must certify that the chemical use will be below the reporting threshold.

For example, a company that otherwise used more than 10,000 pounds of toluene in CY 2018 and in CY 2019 but had adopted TUR methods that would reduce total use below 10,000 pounds in CY 2020 would not be required to complete a 2020 TUR Plan for toluene, even though the facility included toluene in its Reporting Year 2019 Annual Form S Report due to MassDEP by July 1, 2020.

Caution: Use this exemption carefully. Companies are subject to enforcement for failing to complete a TUR Plan if the TUR is not as successful as expected, resulting in the result actual use for the calendar year in which the Plan was due exceeding the reporting threshold annual report.

3.3.1.3  Planning is not required when the facility is scheduled to close

If a facility is scheduled to shut down during the planning year, planning is not required. Note that TUR Plans and annual reports are conducted for a single facility. Therefore, if a company is scheduled to move its production operations to a separate facility that is still in Massachusetts, this would also eliminate the need for planning for that specific facility.

Caution: Use this exemption carefully. Companies are subject to enforcement for failing to complete a Plan, if the facility does NOT close in the planning year.
3.3.2 Partial Exceptions: Only Facility-Wide Planning is Required

As is true with annual Form S reports, some portions of the Plan are done for the facility as a whole, and others apply to the individual production units. Whenever reporting for a chemical is limited to the facility-wide information – for example, when the reportable substance is only used in waste treatment operations at the facility – then planning for that chemical is similarly limited. Sections 4.1 and 4.3 describe the facility-wide requirements.

*Note:* Although the following circumstances exempt facilities from planning for certain chemicals, these facilities are still required to report that these exemptions apply on the "Plan Submittal Selection Form" that must be submitted with the annual Form S report.

Only Facility-Wide Planning is required for toxic chemicals used in the following situations:

3.3.2.1 Waste treatment chemicals

If a chemical is used solely for the purpose of waste treatment, production unit level reporting is not required on that chemical, and only the facility-wide portions of the Plan must be completed. However, if the chemical is also used in other processes such as cleaning, production unit level planning is required for the cleaning process and all non-waste treatment processes in which the chemical is used.

3.3.2.2 Pilot plants

A pilot plant is a pre-commercial production system that employs new production technology and/or produces small volumes of new technology-based products, mainly for the purpose of learning about the new technology. As with chemicals used in waste treatment, chemicals used solely in pilot plants need not be included in production unit level reporting unless also used in other processes.

3.3.2.3 Startup production units

The planning exemption for chemicals used in waste treatment and pilot plants also applies to chemicals used in startup production units. Note however that the exemption for production unit level reporting and planning only applies to the time it takes to get the production working at the desired efficiency or two years from initial operation, whichever is shorter.

3.3.3 Chemicals Used in Laboratories

Chemicals used in laboratories under the direction of a technically qualified individual as defined under the federal EPCRA program are not counted toward facility-wide use of those chemicals. Therefore the TUR Plans (and annual Form S reports) do not need to cover the use of a chemical in a laboratory that meets this condition.

*Caution:* The laboratory exemption does NOT apply to Specialty Chemical Production or to the manufacture, processing or use of toxic substances in pilot plant scale operations, or activities conducted outside of the laboratory.

---

2 40 CFR Part 720.3(ee)
3.4 Is Implementation of TUR Options Mandatory?

While planning is mandatory, facilities are not required to implement any identified techniques, although they must explain why they have chosen not to implement those that are technically and economically feasible. Similarly, facilities that have selected TUR options to implement will not face enforcement activities from the MassDEP if they can demonstrate good faith in efforts to meet their self-determined implementation schedules or project milestones. Changing market conditions or new information may cause a company to reassess its Plan. If a facility decides to alter or abandon an implementation schedule, the decision must be explained in the subsequent TUR Plan and Plan Summary submitted to MassDEP.

3.5 The Physical TUR Plan

The physical TUR Plan is the compilation of documents that describe:

- The actions undertaken;
- The analyses conducted, along with the calculations, assumptions, and methodologies used;
- The decisions made; and
- Explanation of the decisions.

References to (including the location of) other supporting documentation that informed the analyses, calculations, assumptions and decisions are also part of the physical TUR Plan.

Exhibit 1 of the Appendix provides a checklist for the physical Plan that should be used by the TUR Planner and the Senior Manager to review the Plan and ensure that it meets the regulatory requirements. Refer to Section 4 for a more in depth explanation of each of the items on the checklist.

3.6 The TUR Planning Process

Figure 1 presents an overview of the TUR planning process. Decisions and analyses need to be documented throughout the process. While not required by the regulations, many companies find it to their advantage to think of it as such and to measure progress and identify and evaluate TUR options on a continuous basis. The Plan then becomes a mechanism to report back on the various options considered and evaluated since completion of the prior Plan.
Considerations relative to the planning process in Figure 1 include:

1. **The options identification, evaluation, and decision making process is not likely to occur in a linear fashion**

   The chart presents a stylized version of the planning process. During the process new techniques will be brought to light and evaluated, while others will drop out as soon as it is determined that they are not TUR, would violate other environmental regulations, or are technically or economically infeasible. Evaluating one approach may give rise to new ideas. Some may take extensive research or testing to determine if they are feasible, which may take longer than the planning cycle. Finally, it is unlikely that all of the techniques will be in the same phase of the process at the same time.

2. **The options identification, evaluation, and decision making process need not occur entirely within the six-month planning period from employee notification on or before January 1 through July 1 of the planning year**

   Some options may have been identified, evaluated, and/or implemented in the 24 months since the last Plan was completed. Others may take several years to fully evaluate or implement. For options that were implemented since the last Plan, whatever analysis (with a rough estimate of costs) leads the company to decide to implement the option suffices for the Plan. An implementation schedule of whatever length of time is appropriate suffices for options being implemented. However, options requiring a more lengthy evaluation need an implementation plan that describes what will be evaluated and an explanation of why the additional time is needed.

3. **The technical and economic evaluations are "complete" and can be stopped as soon as the company has enough information to determine that the evaluation has been done in "good faith"**
A technical evaluation of an option is complete when the TUR Planner deems in good faith that further evaluation may not improve the option’s value to the process. For example, a participant in the planning process might note that the proposed substitute chemical or process change poses greater health and safety risks than the chemical under evaluation. Another example would be if someone on the team knows that the chemical and/or technique was tried previously but could not be implemented due to product quality issues. In other situations, the facility may need to do additional research into the effects on product quality or customer acceptance before it can assess the option’s technical feasibility.

As with the technical evaluation, the economic evaluation may involve extensive research or analysis, or it may be relatively simple. For example, a technique could be deemed "clearly" economically infeasible based on a rough "back of the envelope" estimate that showed the annual cost of implementing the change would exceed by orders of magnitude the total annual current costs of using the toxic. The economic analysis would be complete with the calculation of the current cost of using the technique and the rough (but good faith) estimate of the cost of implementing the new technique. In other situations, the facility may need to do some research into the operating or capital costs before it can determine economic feasibility.

3.7 TUR Plan Development Standards

The TURA planning regulations are flexible, leaving companies free to use whatever process and format works best for them as long as the essential elements are included in the Plan. The process is designed to complement a facility's existing management, planning and decision-making processes as much as possible. Decisions made during toxics use reduction planning and implementation are consistent with standard business decision-making practices.

There are five standards to which companies must adhere in preparing a TUR Plan or Plan Update:

1. Use good engineering practices;
2. Use standard accounting practices;
3. Develop sufficient information to complete the Plan in good faith;
4. Demonstrate a good faith and reasonable effort to identify and evaluate TUR options; and
5. Use economic feasibility assessment practices that are consistent with the facility's "current economic decision-making practices," unless the company chooses to modify its practices in order to adopt an identified TUR technique.

The amount of economic analysis required will vary depending on the TUR option under consideration. The rule of thumb is that the analysis must be sufficient to make informed business decisions, in accordance with existing company decision-making practice. Analyses and calculations that are developed for a Plan may be presented in the Plan in a variety of ways. The analyses can be included in the Plan in their original form, whether handwritten, a formal consultant's report, a computer printout, etc. As long as the information is legible, it can be included.
3.8 How a TUR Plan Update Differs From the Initial TUR Plan

After the initial Plan is prepared, it must be updated in every subsequent planning year for which a Plan is due for one or more covered toxic chemicals. The TURA statute and regulations include the same requirements for Plan Updates as for Plans. The difference is that the basic structure and much, but not all, of the information included in the first Plan will still remain valid and evaluated in subsequent Plans.

3.8.1 What a TUR Plan Update Involves

Updating the Plan involves reviewing each portion of the Plan and revising it as necessary to ensure that it is current and up to date. For example:

- Changes in corporate policy or recognition that a change in the language might lead to a more comprehensive embrace of TUR throughout engineering, research and development, accounting, and production staff may necessitate changes in the "Management Policy";
- Any significant alterations in the production lines or production processes affecting use and byproduct generation or the availability of TUR options will need to be noted;
- Chemical use and waste information will need to be updated to reflect the prior calendar year production levels and chemical use;
- The list of potential TUR options will need to be updated;
- New (and carryover) options must be evaluated; and
- The technical and economic assumptions and calculated "cost of toxics" in the evaluation of options rejected in prior years need to be reviewed and updated if necessary

Updating the Plan does not involve rewriting the document. It is acceptable to add notations indicating that sections were reviewed, and add updated information as addenda.

3.8.2 The Level of Effort of a TUR Plan Update

The level of effort of a TUR Plan Update depends on the specific situation at the facility. For example,

- The Plan Update may require a limited amount of work for companies whose production processes have not changed, for stable industries with limited technological change in the industry, or for operations with few TUR options.
- The Plan Update may require more extensive work for facilities in rapidly evolving industries, or those that have made extensive changes to their products or production processes or have added new chemicals since the last Plan was developed.
- For facilities that are continually evaluating and modifying their production processes to minimize chemical use and waste, the Plan is a compilation of the work and analyses and changes made at the facility since the last Plan. A separate planning process is not necessary as long as the TUR Planner can certify that the planning requirements were met.
3.9 Role of the Senior Management Official and the TUR Planner

3.9.1 The Role of the Senior Manager
It is up to the senior manager at the facility to ensure that the Plan is a true reflection of a facility’s current and future operations, and they are required to sign a certification statement to that effect, under the penalty of the law.

3.9.1.1 Who can sign as the "senior manager"
The senior manager must have management responsibility for the person or persons completing the Plan and must have authority to act as an agent for the toxics user (i.e., the company).

3.9.1.2 What the senior manager is attesting to by signing the certification statement
The senior manager is attesting that "the information in the Plan and supporting documentation is true, accurate and complete," including:

- The employee notification occurred as described;
- The management policy is in place at the location;
- The process flow diagrams are correct;
- The covered toxics used above the threshold and subject to planning have all been identified;
- The amounts of the toxics used, generated as byproduct, and the amount of the byproduct treated onsite, transferred offsite, and released to air, water and land onsite and offsite are accurate for each production unit in which they are used and fully supported by documentation;
- The cost of toxics is correctly calculated and fully supported by documentation;
- The procedure used to identify options for potentially achieving toxics use reduction was done in good faith, as supported by documentation, and was implemented as described;
- The economic and technical evaluations were done in good faith, using the company's standard economic evaluation procedures, and are supported by documentation; and
- Options selected for implementation or identified as requiring further analysis, and the associated schedules for these actions, are accurate.

3.9.1.3 How the senior manager assures that the certification is accurate
In order to attest that the Plan is true, accurate and complete, the senior manager must:

- Personally examine the Plan;
- Be familiar with the Plan and the planning process;
- Conduct an inquiry of the individuals immediately responsible for developing the Plan in sufficient depth to assure that the contents are accurate and the documentation is true, accurate and complete; and
- Have sufficient understanding of the planning requirements to be able to assert that, to the best of his/her knowledge, the Plan meets the regulatory requirements.
3.9.2 The Role of the TUR Planner

The statute delegates the review and approval of Toxics Use Reduction Plans to MassDEP-approved TUR Planners. Their job is to evaluate the Plan, much as a MassDEP inspector would do, to determine that the Plan:

- Complies with the requirements included in the TUR planning regulations found at 310 CMR 50.40; and
- Demonstrates a good faith and reasonable effort to identify and evaluate toxics use reduction options.

3.9.2.1 How the TUR Planner certifies a TUR Plan

The TUR Planner must:

- Examine the Plan;
- Be familiar with the contents of the Plan;
- Have sufficient understanding of the planning process to assert that it contains each required section of the Plan, including:
  - Management policy
  - Employee notification
  - Plan scope (including the description of the options identification process)
  - Production unit characterizations for each production unit in which a covered toxic is used, including process flow, materials accounting, qualitative or quantitative cost of toxics, purpose of the toxic chemical in the production unit, and unit of product
  - Options identified
  - Technical and economic evaluation of each appropriate options
  - Decisions on each appropriate option
  - Required implementation/continued evaluation plans
  - Plan summary
- Have sufficient understanding of the planning process to assert that each section meets the standards for planning:
  - Has the required contents, including descriptions, calculations, and assumptions
  - Is supported by documentation
  - Was completed in good faith
4 THE REQUIRED TUR PLAN ELEMENTS

The Plan elements are discussed below in the general order in which they are likely to be worked on. However, because the planning process is iterative, it may not be possible to complete some portions of an element until subsequent work is done.

4.1 Initial Facility-Wide Requirements

4.1.1 Employee Notification On or Before January 1 [310 CMR 50.42(5)]
Facilities are required to notify all employees that a TUR Plan or Plan Update will be developed and solicit their ideas to eliminate or reduce the use and waste of covered toxics in the production processes. The notification must occur no later than January 1 of the Planning Year. The notification can be delivered by any means considered effective.

PURPOSE: The Employee Notification notice serves to alert company workers to the upcoming planning process. It will likely involve those individuals throughout the organization and particularly those on the production line. Experience has shown that production line workers often have considerable insight into reducing chemical use and waste. In addition, the planning process itself requires expertise from facility personnel in various fields such as engineering, environmental compliance, marketing, finance, purchasing, sales, production, management, quality control, legal, health and safety, materials control, and research and development.

Some facilities offer incentives to individuals who have suggestions for reducing toxic chemical use or waste. The notification may be used to announce these kinds of incentives.

PLAN UPDATE: Employees must be notified of the planning process each Planning Year. Facilities may choose to change the notification process if it did not result in the desired participation. The Plan Update should either note that the notification process was not changed, or if it was, include the revised description. Evaluating and changing a notification process that previously did not generate any feedback from employees may be an example of a good faith effort to solicit employee input.

WHAT MUST BE IN THE PHYSICAL PLAN: The Plan must include a description of the steps (contents, date and means of distribution) taken to notify employees. If the notification was done in writing, a copy of the notification and the date and means of distribution would suffice. If done orally, a transcript of the meeting(s) along with the time and place and how the company ensured that all employees received it is required.

Facilities whose covered toxics are used solely for
- treating waste, wastewater or air emissions,
- use in a pilot plant, or
- use in a startup production unit for the first two years of production

need only complete the Facility-wide portion of the TUR Plan. However, the Plan must be certified by both the Senior Manager and a Toxics Use Reduction Planner and a Plan Summary must be submitted to MassDEP with the Annual Form S Report due on July 1 of the Planning Year.
4.1.2 Management Policy [310 CMR 50.43(1)]

The facility must identify its policies regarding toxics use reduction in a statement of management policy that applies to that location.

CONTENT: The policy must include, at a minimum, descriptions of:

- The ways in which the company encourages toxics use reduction; and
- Company policies that EITHER encourage OR discourage toxics use reduction. These policies could be in the areas of:
  - Research and development,
  - Financial or capital investments, and
  - Hiring promotions, bonuses, or other incentives for company employees.

Caution: It would not be acceptable to have a management statement dealing only with pollution control, waste minimization or recycling. The management statement must describe the company’s policy toward reducing the use of toxic chemicals and their generation as byproduct.

PURPOSE: The purpose of the Management Policy is to focus attention on ways the company currently promotes toxics use reduction, and what if anything, it does that discourages toxics use reduction. This review and compilation of policies affecting the adoption of TUR is intended to lead companies to either develop new policies or change existing policies in ways that both encourage toxics use reduction and eliminate barriers to its adoption. The Policy is also intended to communicate the company’s approach to TUR.

Strong management commitment is central to successful development and implementation of toxics use reduction programs. Since toxics use reduction planning encompasses many facets of facility operations, such as process engineering, environmental management, research and development, and purchasing and finance, it is essential that support and coordination occur at the management level. For example, some companies have used the management policy to ensure that the principles of toxics use reduction are incorporated into all research and development activities, so that it is built into all product and process design and modernization decisions. The management policy also serves to communicate the importance of TUR to all levels of the organization.

PLAN UPDATE: The management policy must be reviewed to determine if any adjustments are required due to changes in other corporate policies or procedures, changes in company management, or to improve its effectiveness. If no changes are made, it is sufficient to note the date of the review and decision to leave it unchanged. If it is changed, the new policy must be included in the Plan.

WHAT MUST BE IN THE PHYSICAL PLAN: The written management policy with the written approvals required for any other corporate-wide policy, along with the policy adoption date, serves as the required documentation. Management policies may be in a variety of written formats, including:

- Narrative statement
- Concise bullet points
- Logo with a statement of philosophy
4.2 Production Unit Level Requirements

TUR options must be identified and evaluated for each reportable toxic in each production unit where it is used. The Production Unit in the Plan must be consistent with the production unit description, including the process steps provided on the annual Form S reports. Facilities may choose to redefine their production units over the course of the planning process. If so, the Form S reports submitted in the planning year must also reflect the changes made. The following five sections of the Plan must be completed for each production unit where the covered toxic is used.

4.2.1 Process Characterization [310 CMR 50.44]

The process characterization lays out the ways in which covered toxics are used in each production unit; in what amounts they are used; their function; where they are incorporated into product or how they are lost as byproduct and emissions, releases, or offsite transfers; and the amounts of those losses.

4.2.1.1 Purpose of the Chemical

CONTENT: The Plan must include an explanation of the specific purpose the chemical serves in the production unit.

PURPOSE: An understanding of why the particular substance is used is needed to evaluate whether it can be eliminated or used in a lesser amount, or if a less toxic alternative can be used in its place.

WHAT MUST BE IN THE PHYSICAL PLAN: The process characterization must include a written explanation for each covered toxic used in the production unit.

PLAN UPDATE: It is unlikely that the purpose a chemical serves will change. However, if the company has new information about the reasons why the particular chemical is or is not necessary, this should be included in the written explanation.

4.2.1.2 Unit of Product

CONTENT: The product and the metric for measuring the amount produced have already been identified in the annual Form S report. In the course of developing TUR Plans, facilities may decide to change their unit of product. This is acceptable, provided that the same unit of product is used on the annual Form S report submitted with the Plan Summary.

PURPOSE: An accurate unit of product allows a facility to assess the effectiveness of its TUR planning, normalizing data (i.e., the amount of a covered toxic used per unit of product, the costs of using it per unit of product, and the costs and savings) to account for natural fluctuations in production.

WHAT MUST BE IN THE PHYSICAL PLAN: The unit of product must be stated in the TUR Plan for each reported chemical used in the production unit. No further documentation is required.

PLAN UPDATE: If the unit of product has not changed since the prior TUR Plan, simply annotate the Plan previous TUR plan with the date it was reviewed. If the unit of product has been changed, include the new
description in the Plan with the date it was changed. Make sure it is also changed on the applicable annual Form S reports submitted with the Plan Summary as well.

4.2.1.3 Process Flow Diagram

Each production unit requires its own process flow diagram. The process flow diagram is a visual representation of the movement of the covered toxic through the processes within a production unit. These diagrams identify and communicate the processing steps used in the production unit, where and how the reportable chemical enters and is used in the production process, and where it leaves the production unit as product or byproduct.

CONTENT: The process flow diagram must show:

- The number assigned to the production unit, and reported on the applicable Form S report;
- Each manufacturing or processing step, including raw material receipt, storage, and transfer to the production unit, and transfer and storage of the product up to the point it is shipped offsite. The manufacturing steps have been identified on the Form S report submitted in prior reporting years. The process flow diagram must be at least as detailed and have the same steps as included on the Form S reports;
- Non integral recycling;
- Waste treatment;
- Waste transfer and storage until it is shipped offsite;
- The movement of the "covered toxic" through the production unit, including the location where the covered toxic:
  - Enters the production unit
  - Leaves the production unit as byproduct or product
  - Is released as byproduct to the air or water, disposed of to land onsite, destroyed through onsite treatment, or transferred off site as a solid or hazardous waste or wastewater; and
- The date of the revision of the diagram.

Note: Because the production facility includes all aspects of production from the receipt of raw material through the shipment of finished product, facilities with more than one production unit may have steps that are common to all of the production units.

PURPOSE: By identifying the points in the process where the covered toxic leaves the production unit as byproduct, this diagram reveals the production process steps that could be changed to reduce or eliminate that raw material loss.

WHAT MUST BE IN THE PHYSICAL PLAN: The process flow diagram with the date it was prepared/last updated must be included in the TUR Plan. Exhibit 2 in the Appendix is an example of a process flow diagram that contains all the elements that must be included in the Plan. If more than one covered toxic is used in a production unit, the Plan can either include all of the chemical movement information on the same process flow diagram or separate process flow diagrams can be developed for each covered toxic. No further documentation is required.
PLAN UPDATE: If the production process has not changed since the prior TUR Plan, the prior process flow diagram may be used, provided it has been annotated with the date it was reviewed for the current TUR Plan. If the production process has changed, then prepare and date a new process flow diagram.

4.2.1.4 Material Use, Byproduct, Transfer and Release Accounting

Detailed materials accounting describes total input and outputs of the "covered toxics" in the production unit for the year on which the plan is based. The input is the quantity of chemical used in the production unit. Outputs are the losses as byproduct, including the ultimate fate of that byproduct (e.g., onsite recycling, treatment or release, or transfer offsite for recycling, wastewater treatment or hazardous or solid waste treatment or disposal).

CONTENT: The use and waste accounting includes the total amount, and the amount per unit of product, of each covered toxic that is:

- Manufactured, processed or otherwise used;
- Generated as byproduct; or
- Released from the facility as emissions.

The materials accounting must also state, for each covered toxic used in the production unit:

- The total amount of the byproduct that is:
  - Treated (destroyed/converted into another chemical) on-site
  - Treated offsite
  - Recycled onsite
  - Recycled offsite
  - Disposed of onsite
  - Disposed of offsite

Byproduct must be tracked to its ultimate disposal by calculating:

- The amount being released onsite (including any amounts that remains in the waste stream following treatment) to:
  - Air
  - Water
  - Land

- The amount transferred offsite as:
  - Solid or hazardous waste
  - Wastewater

- The amount treated offsite as:
  - Solid or hazardous waste
  - Wastewater

- The amount recycled offsite

- The amount disposed of offsite (the ultimate fate of materials transferred offsite that were not destroyed through treatment) to:
  - Land
  - Water
The estimation methods used to determine each of these amounts must also be described.

These analyses for each production unit must include byproduct and emissions from all portions of materials handling (receipt, storage, and transfer) from the production unit, use in the production unit, and transfer and storage of the final product. Byproduct generated through facility-wide activities must be allocated among production units if a covered toxic is used in more than one production unit.

Measurements, estimations or engineering calculations are all acceptable approaches for obtaining byproduct and emissions amounts. Methods of quantification will differ from company to company, and may differ within a company for each chemical or production unit. In addition, facilities may choose to refine their calculations later in the planning process when they are trying to decide whether or not to implement a particular TUR technique.

All of the following methods fall within the criteria of "standard engineering practices" and can be used for determining byproducts and emissions. These are the same methods that are used for preparing the facility-wide chemical use and waste information submitted on the annual TUR reports. Note that other methods may also be appropriate, such as:

- EPA published or facility determined emissions factors;
- Continuous monitoring;
- Extrapolations from periodic monitoring;
- Design calculations (e.g., estimating yield for a chemical manufacturing operation);
- Mass balance calculations such as the assumption that the amount otherwise used equals byproduct (e.g., no direct measurement of emissions);
- Engineering calculations using physical and chemical property data found on safety data sheets or other sources; and
- Laboratory results (e.g., solvent content of coated product).

**PURPOSE:** Materials accounting reveals the quantity of each covered toxic used and lost as byproduct in the production process, and the management of the byproduct – onsite release, treatment or recycling, or transfer offsite for treatment and/or disposal. This exercise provides data needed to quantify the full cost of using the chemical and makes it possible to calculate the full costs of using the substance and therefore the potential savings from reducing or eliminating the byproduct that must be managed in accordance with environmental regulations. In addition, this process is the basis for measuring the success of the TUR changes implemented. If the TUR was successful, use and byproduct will decrease per unit of product produced.

**PLAN UPDATE:** Because the amount of the covered toxic used and generated as byproduct and released onsite or transferred offsite changes from one year to the next, the materials accounting must be redone each planning cycle. It may change substantially if TUR has been implemented since the last planning cycle.

**WHAT MUST BE IN THE PHYSICAL PLAN:** The materials accounting as well as the calculations, assumptions and estimation methods must be included in the Plan. The source of the data used (e.g., consultant reports, monitoring data) in the calculations must be referenced and available for review by MassDEP for five years following the TUR Plan due date, but does not need to be included with the Plan.
To the extent that the calculations and reference documents used to support the Form S and Form R calculations meet the planning requirements, they can be used in the Plan. However, the information required for the Plan is at the production unit level: If a chemical is used in more than one production unit, the Form S and Form R calculations and associated documentation will not be sufficient to document the amount used in each individual production unit.

The calculations do not have to be typed. Exhibit 3 in the Appendix shows an optional format that can be used for the materials accounting.

4.2.1.5 Cost of Toxics

**CONTENT:** A qualitative or quantitative cost of toxics determination must be made for each covered toxic in each production unit in which it is used.

The evaluation can be *qualitative* if there are no technically feasible options for TUR for the chemical in the production unit. A qualitative analysis involves identifying which cost elements are relevant – those that would change if the covered toxic chemical use changed or was eliminated – and stating whether the cost would increase or decrease with use, and the relative magnitude of the change.

The evaluation must be *quantitative* if one or more technically feasible TUR options have been identified. A quantitative analysis involves calculating the total annual cost and cost per unit of product for each of the cost elements that are relevant to that chemical in that production unit. The impact of costs that cannot be quantified must also be stated.

Potentially relevant cost elements include:

a) indirect and direct labor and materials costs (which shall be stated in the Plan);
b) purchase or manufacturing cost of the toxic and its alternative chemical;
c) capital and equipment costs;
d) storage, accumulation, treatment, disposal, and handling costs associated with toxics and byproducts;
e) costs associated with activities required to comply with local, state, or federal laws or regulations, including but not limited to, fees, taxes, and costs associated with treatment, disposal, reporting and labeling;
f) worker health or safety costs associated with the toxic and its alternative chemical, including but not limited to, protective equipment, and lost employee time due to accidents or routine exposure to the toxic;
g) insurance;
h) potential liability costs that may arise from intentional, unintentional, or accidental activities or occurrences;
i) loss of community goodwill and product sales lost to competing non-toxic products; and
j) other cost items that are relevant.

The cost of toxics must affirmatively state whether or not each of these cost elements is relevant and whether or not it is quantifiable. Only relevant costs must be considered, although the analysis must state why cost elements were not considered relevant.
It is particularly important for facilities to determine if any indirect or overhead costs such as storage, or insurance or regulatory compliance costs, that are not usually associated with the production unit, are relevant. Experience has shown that when carefully examined, these costs can significantly affect the economic feasibility analysis.

Capital costs of existing equipment are typically only relevant if the company’s existing production equipment will need to be replaced within the company’s fiscal planning horizon. However the operating costs of that equipment may be affected by the quantity of the toxic chemical used or wasted.

The analysis must be based on the costs of using the covered toxic in the calendar year prior to the Planning Year (the calendar year covered by the Annual TUR Report being submitted with the Plan Summary).

Assumptions must be clearly articulated in the analysis to indicate how costs of using the covered toxic were allocated to the production unit, and this allocation must be "as accurate to the extent possible."³

**PURPOSE:** The purpose of the "Cost of Toxics" analysis is to ensure there is a comprehensive analysis of all the costs, those that are obvious, such as the purchase cost, and those that are less clear, such as environmental compliance costs. This information is the basis of the evaluation of economic feasibility, and will also allow for a quick screening of many options. If, for example, the cost of implementing a TUR option is many times the maximum possible savings if the substance was eliminated entirely, it could be considered clearly economically infeasible.

**PLAN UPDATE:** The plan update involves reviewing the estimates to see if they are still valid given the current costs of doing business, and updating them as necessary.

**WHAT MUST BE IN THE PHYSICAL PLAN:** For covered toxics for which one or more technically feasible TUR options have been identified, the Plan must include the quantitative calculations with references to the supporting documentation, and the specific location of that supporting documentation for each covered toxic in each production unit in which it is used. The Plan must also include a qualitative cost evaluation for those covered toxics in production units for which no technically feasible options have been identified. Each analysis must address each of the cost elements identified in 310 CMR 50.46A.

Exhibit 4 in the Appendix is an optional form that may be used to state the qualitative or quantitative costs of toxics. Facilities can use this format, or provide the information in a format of their choice. To be in compliance, the format needs to affirmatively address each of the cost elements listed above.

### 4.2.2 Options Identification [310 CMR 50.45]

Facilities are required to go through a process to identify all technologies, procedures or training programs that could potentially achieve toxics use reduction.

**PURPOSE:** This step is meant to be a comprehensive survey of options that the facility could use to achieve TUR. The intent is to look at chemical input substitution or product redesign as well as production changes that would

---

³ 310 CMR50.46A(4)
minimize the amount of the raw material that ends up as byproduct and must be released to the environment, treated onsite or transferred to offsite waste management facilities.

**CONTENTS:** The facilities must consider the six types of toxic use reduction identified in the statute and 310 CMR 50.10. The Plan must include a written description of the procedure used and its results including:

- Personnel involved, including their names and roles in the companies;
- Meeting dates and participants, agendas and minutes;
- Description of information sources consulted;
- Description of information gathering techniques; and
- List of technologies, procedures or training programs identified.

Because it must be a comprehensive analysis, the "good faith and reasonable effort to identify and evaluate TUR options" must include representatives with a variety of responsibilities and expertise in the company, including production, engineering, research and development, environmental health and safety, and financial staff. In addition, a good faith effort involves more than simple brainstorming, and should include literature review, working with vendors and suppliers, and other research techniques, such as working with the Toxics Use Reduction Institute (TURI) or the Massachusetts Office of Technical Assistance (OTA).

The identification process also includes all options identified in previous planning cycles that meet the definition of TUR. Laws, regulatory requirements, technology, and economics change over time, making it possible for options initially deemed illegal, not likely to result in TUR, or technically or economically infeasible to become viable and economically feasible in the future.

**FORMAT:** Exhibit 5 in the Appendix presents an optional format for listing the options identified and the procedures and personnel used in the identification process. This chart also has fields for reporting the results of the technical analyses discussed in the next section.

**PLAN UPDATE:** Any options identified and not implemented in a previous planning cycle must be included in the plan update. In addition, the facility must make a good faith effort to identify new TUR options. The list developed for the prior TUR Plan may be used as long as the facility notes the date that each option was first
identified, and new TUR options, along with the date and procedures used to identify them, are appended to the list.

**WHAT MUST BE IN THE PHYSICAL PLAN:** The list and procedures used to identify each technique must be included in the TUR Plan. Meeting notes with dates, articles, vendor information etc. must be kept and their location identified to serve as supporting documentation of a “good faith and reasonable effort” to identify and evaluate the TUR options. The written description of the procedure is included in the Scope section of the document.

The technical evaluation involves examining the technical aspects of each potential TUR option to determine if it is TUR and if it is technically feasible, and to collect enough information to estimate the costs and savings associated with its implementation.

4.2.2.1 *Technical Evaluation (310 CMR 50.46)*

**CONTENTS:** Figure 2 illustrates the general flow of the technical analysis. The Technical Evaluation must determine the "appropriate" TUR option based on whether it is:

- TUR – whether it meets the technical definition of a TUR technique (for example, a recycling option that is not designed to be integral to the production unit is not considered TUR), and does not involve substituting a chemical that poses greater risk to workers or the environment than the covered toxic under consideration;
- Likely to result in a reduction of use or byproduct per unit of product produced (some techniques meet the definition of TUR but might not accomplish any reductions for various reasons);
- Legal – whether there are laws or regulations that prohibit its adoption; and
- Technically feasible – whether the production process would yield the necessary product quality, there is sufficient physical room for the equipment, the technology can work at production scale, the required technology exists, worker skills are adequate or training is feasible, or whether any other technical issues would limit feasibility.

If the TUR option is found to be inappropriate for one of the above reasons, the technical evaluation is complete.

If the technique is found to be "appropriate," then the technical evaluation must be continued to calculate the expected reduction in chemical use and byproduct in total pounds and pounds per unit of product. The total pounds reduced is calculated as the difference between the amount used and generated in the reporting year covered by the annual Form S reports submitted with the Plan Summary (i.e., the calendar year prior to the planning year) and for the reporting year following the planning year (i.e., the calendar year following the planning year).

Once a TUR option has been identified as technically feasible, the technical evaluation is completed by conducting the following:

- Collecting the information needed to make a "good faith and reasonable" determination of the economic feasibility of the option; and
- Drafting an implementation timeline for options that may be selected by the facility.

*Note:* Economic considerations are NOT a factor in the technical feasibility analysis.
Figure 2: Determining if Option is Technically Feasible

(310 CMR 50.46(1))

Questions to Consider

- Will implementation of option violate any other law/regulation?
- Is it one of 6 TUR techniques?
- Is the substitute less toxic?
- Does it avoid shifting the risk?
- Is it likely to reduce use or byproduct per unit of product?
- Do you have enough information to complete the evaluation?
- Does technology exist?
- Is it reliable and stable?
- Does it work at production scale?
- Will it impact product quality?
- Can specifications be met?
- Is there sufficient physical space?
- Are worker skills adequate?
- Is training required and possible?
- Are there other limiting technical issues?

Regulatory Citations

310 CMR 50.46 (1)(c)
310 CMR 50.10 and MGL c 21I, §2
310 CMR 50.46 (2)
310 CMR 50.46 (3)
310 CMR 50.46 (5)
310 CMR 50.46A (7)
310 CMR 50.46A (3)
310 CMR 50.46 (4)
310 CMR 50.46 (1)(b) 1-4

Is Option Legal?

No

Is Option Technically Feasible?

No

Yes

Is Option TUR?

No

Yes

Is Option Legal?

Yes

Questions to Consider

Document:
- The option/technique
- Reason to not implement OR
- Steps and schedule planned to further evaluate option and explanation of why evaluation could not be completed by Plan due date
- Qualitative assessment of costs of toxics currently used ONLY if NO technically feasible options identified
- Anticipated costs and savings
- Expected reductions in amount of toxics used and byproduct generated with option implementation
- Option implementation schedule

Document:
- The option/technique
- Reason to not implement OR
- Steps and schedule planned to further evaluate option and explanation of why evaluation could not be completed by Plan due date
- Qualitative assessment of costs of toxics currently used ONLY if NO technically feasible options identified

Determine quantitative costs of toxics currently used during the calendar year preceding the Plan due date

Proceed to Economic Feasibility Evaluation of Options

- Will implementation of option violate any other law/regulation?
There are no explicit criteria for a technical evaluation. Facilities may choose any evaluation process, as long as they do the analysis in good faith, use good engineering practices, and document the assumptions and work performed in the analysis.

**When is the evaluation complete?** The evaluation is complete and may be stopped as soon as the TUR planning team has enough information to determine that the technique is clearly technically infeasible, is not legal, and/or does not constitute toxics use reduction. Otherwise, it is complete when there is enough information to move on to the economic evaluation stage (including expected reductions in the amount of the covered toxic that would be used and generated as byproduct if the option was implemented), and to develop a realistic implementation plan.

**What if the evaluation cannot be completed by the Plan due date?** There may be instances in which it is not possible to complete the technical evaluation of the technique prior to the due date for the Plan. For example, bench scale testing may be required to determine impacts on product quality or to figure out whether the technique actually works. Or, some test marketing may be required to evaluate customer acceptance. These are all valid reasons to extend the evaluation completion date.

If the facility must do additional research before it can evaluate the technical feasibility of a technique, the facility must:

- Develop a brief explanation of why the research cannot be completed by the due date of Plan completion, and
- Identify the additional research steps to be taken and an implementation schedule for those steps.

**PURPOSE:** The purpose of this evaluation is to obtain enough information about each TUR option to be able to make a good business decision about whether or not to adopt the technique. This decision involves either eliminating it as "inappropriate" because it is not TUR, is illegal, or is technically infeasible, or if it is "appropriate" for further consideration, collecting the technical information needed to determine the chemical reductions and costs and savings and associated with implementing it.

**PLAN UPDATE:** The Plan Update must include the analyses of new techniques, as well as any updated information for techniques considered but rejected in earlier Plans. The TUR options rejected as technically or economically infeasible in earlier planning cycles need to be reevaluated in light of changes in technology, customer base, rules and regulations, worker competency, chemical use, etc. TUR options that were not practical two years ago may now be feasible. The results of the technical evaluation developed for the prior TUR Plan may be used as long as the facility:

- Updates the use and reduction projections;
- Notes the date that each option was reevaluated and the results of that reevaluation; and
• Appends the results of the evaluation of any new TUR options identified during the current planning process.

**WHAT MUST BE IN THE PHYSICAL PLAN:** The Plan must state the results of the technical analysis for each option, and for each "inappropriate" option the reason(s) why it is either not TUR, not legal, or not technically feasible. For technically feasible options the TUR Plan must show the projected reduction in use and byproduct as total pounds and per unit of product, and include any assumptions and calculations used to determine those amounts.

Exhibit 6 in the Appendix presents an optional chart for identifying new TUR options and determining if they are technically feasible. It includes a section for summarizing the results of the technical analysis.

The work done, research conducted, and memos written to support the decision about technical feasibility need to be referenced in the plan, and must remain available for five years to document that the analysis met the planning standards enumerated in the regulations.

### 4.2.2.2 Economic Evaluation [310 CMR 50.46A]

In this step, the company determines the costs and savings associated with implementing each "appropriate" TUR option, and the economic feasibility of doing so.

**CONTENT:** Figure 3 graphically depicts the economic evaluation process. In order to complete the economic evaluation, facilities must calculate the costs and savings (total and per unit of product) associated with the implementation of each "appropriate" TUR option and determine if it meets the company's current investment criteria.

---

**Important Note:** The technique may be declared economically feasible even if it does not meet the company’s current investment criteria, but it MUST be deemed economically feasible if it DOES meet the criteria.

---

The analysis is complete and can stop as soon as there is enough information about the estimated costs and savings associated with implementing the TUR option:
Figure 3: Determining if Technically Feasible Option is Economically Feasible
(310 CMR 50.46A)

**Regulatory Citations**
- 310 CMR 50.46A (1)(a) – (i)
- 310 CMR 50.46A (2)
- 310 CMR 50.46A (5)
- 310 CMR 50.46A (3)
- 310 CMR 50.46A (4)
- 310 CMR 50.46A (6)
- 310 CMR 50.46 (4)
- 310 CMR 50.46 (1)(b) 1-

**Considerations**
- Must consider if items (1) (a)-(i) are relevant
- Explain why any of these costs are not relevant or cannot be reliably quantified.
- Must consider and describe other costs and savings that are relevant if not listed in items (1) (a)-(i)

- This should have been completed after technically feasible option(s) identified
- Determine total cost per year and cost per unit of product
- Calculate based on preceding calendar year information

- Must consider allocation method
- Allocation shall be accurate to the extent possible

- State the investment criteria used in each analysis
- Assure that factors used are consistent with current capital budgeting procedures
- Determine if modifying procedures to promote adoption of an option is appropriate

- The option/technique
- Anticipated costs and savings
- Expected reductions in amount of toxics used and byproduct generated with option implementation
- Option implementation schedule

- Modify costs/savings, expected reductions and implementation schedule completed after technically feasible option(s) identified as appropriate
EITHER the TUR option is clearly economically infeasible:

- As with the technical analysis, the economic analysis is complete and can be stopped as soon as there is enough information to make "a good faith and reasonable" business decision that the technique is clearly economically infeasible.
- Determining that a technique is clearly economically infeasible may be a very simple comparison between the maximum possible savings from eliminating the chemical entirely and a rough estimate of the implementation costs of the TUR option that shows that the maximum potential savings are far less than the cost of implementation. In other situations, the facility may need to do a more detailed analysis.

OR the TUR option is economically feasible.

If an option is deemed economically feasible, the company must also determine if it is going to implement it and, if so, there is enough economic information to develop a realistic implementation schedule. The regulations establish specific required parameters for determining the costs and savings associated with the implementation of the TUR option, and determining its economic feasibility.

The economic analysis of each "appropriate" TUR option must consider each of the following cost elements in the calculation of the costs and savings associated with the TUR option:

- Indirect and direct labor and materials costs;
- Purchase or manufacturing cost of the toxic and its alternative chemical;
- Capital and equipment costs; and
- Storage, accumulation, treatment, disposal, and handling costs associated with toxics and byproducts.

As discussed in Section 4.2.1.5, changes in costs are relevant if they change in a meaningful way, should the TUR option be implemented. The cost of implementing certain TUR options may be so small as to be irrelevant: for example, adding information on ways to minimize the amount of waste covered toxic to ongoing worker training. However, the savings associated with the reductions in chemical purchase and waste management costs would need to be quantified.

Cost elements such as the impact of "going green" on a customer base, or avoided future liability, are often not quantifiable but can influence a company’s choices about TUR. If a cost element is unquantifiable, the analysis must include an explanation of why and describe its overall impact – positive or negative – on the costs and savings associated with implementing the TUR option.

Costs that were not relevant in the cost of toxics analysis may be relevant when calculating the costs of implementing a particular TUR option. For example, capital costs would probably be relevant if the TUR option involved new production equipment.

A particular cost element could be irrelevant if the company made the decision to implement the TUR option regardless of its cost. In this case, it would be acceptable to limit the analysis of costs to whatever cost elements the company needed to consider in order to develop its implementation strategy.

If a cost element is unquantifiable, the analysis must include an explanation of why that is, and describe its overall impact – positive or negative – on the costs and savings associated with implementing the TUR option.
4.2.2.3 Other Specific Requirements

The analysis must be based on the costs of using the covered toxic in the calendar year prior to the planning year. If a facility has decided to implement a technique without any economic analysis, or has already implemented the technique, they only need to provide a rough estimate of the net costs of implementation. The analysis must clearly indicate:

- How costs of using the covered toxic were allocated to the production unit, and this allocation must be "as accurate as the extent possible"; and
- The discount rate, cost of capital, depreciation rate, or payback period, if any, used in the analysis.

While the regulations do not specify the methodology for evaluating the costs and savings, they do require the facility to use the same depreciation rate, cost of capital, and economic performance criteria (e.g., payback period, internal rate of return, net present value) it would normally use for capital budgeting, assuming the facility typically considers these factors in capital budgeting decisions. However, the facility does not need to base its decision to implement an option on factors that are as stringent as it normally uses. It might, for example, allow a longer payback period or lower rate of return for a technique that reduces byproduct from a chemical that has a high potential for liability.

PURPOSE: This analysis is designed to provide the facility with the economic information needed to make a "good faith and reasonable" decision whether or not to implement a TUR option and to develop a realistic implementation schedule for the selected TUR options. By comparing implementation costs with expected savings from reducing the use of the covered toxic, the facility can determine if it would be in its economic interest to adopt the TUR technique.

PLAN UPDATE: The Plan Update must include an economic evaluation of any newly identified technically feasible options, and a review of the economic analysis of technically feasible options identified in prior plans that were not implemented. Facilities need to evaluate whether there are any changes in the costs of using the covered toxic or the costs of implementing the TUR option that would make the technique economically feasible.

Economic analyses from the prior Plan may be used, as long as the analyses have been reviewed to determine if there are any significant changes in the costs or savings that would affect the economic feasibility determination. If there were no changes, the date of the review must be noted on the economic analysis from the prior TUR year. The analysis must be updated if there were changes to the costs or savings that would affect economic feasibility. In either case, the review date needs to be noted.

WHAT MUST BE IN THE PHYSICAL PLAN: The Plan must include the economic analysis outlined above for each "appropriate" TUR option. Reference and retain the supporting documentation such as vendor quotes, memos or notes from company fiscal or engineering staff used to develop the cost and savings estimates in order to demonstrate that the facility demonstrated a "good faith and reasonable effort" to evaluate the TUR option.

---

4 310 CMR50.46A(4)
4.2.3 TUR Options Selection and Implementation Planning [310 CMR 50.46(4)]

After completing the options identification and technical/economic evaluation, companies must:

- Decide which, if any, "new" (not previously adopted) TUR options they choose to implement;
- Which, if any, require additional evaluation;
- Explain why they are not implementing any "appropriate" TUR option;
- Develop an implementation schedule for each "new" TUR option being implemented; and
- Develop an explanation and evaluation schedule for which if any TUR options require further evaluation.

**WHAT MUST BE IN THE PHYSICAL PLAN:** The plan must include the information listed above. Exhibit 7 in the Appendix provides an example of a chart that can be used to capture the results of the economic analysis and implementation decision.

4.3 Facility-Wide Requirements (Post Production Unit Level Planning)

This section explains the facility-wide planning requirements that can only be completed after the production unit level work is done. All facilities that are subject to the planning requirement, including those exempted from the production unit level planning requirement, must complete a Plan Scope and Plan Summary. These facilities must also obtain the required certifications and submit the applicable portions of the Plan Summary form to MassDEP.

4.3.1 Plan Scope [310 CMR 50.43(2)]

The Scope is a summary of the planning process and plan results. It cannot be created until the planning process has been completed.

**CONTENT:** The Plan Scope describes each production unit included in the Form S report(s) submitted when the Plan Summary is due. The description needs to contain the following information:

- The identifying number the facility assigned to the production unit;
- Process and product description;
- Unit of product;
- Chemical name and CAS number of each TURA reported chemical used in the production unit;
- The procedures used to identify potential TUR techniques;
- Each TUR option identified and whether it:
  - Will be implemented,
  - Will not be implemented, OR
  - Is still under evaluation; and
• The projected reduction in pounds of use and byproduct for each covered toxic for which one or more TUR options will be implemented.

PURPOSE: The Plan Scope serves as an executive summary of the Plan.

PLAN UPDATE: Because the Plan Scope is a summary of the current year planning activities, a new one must be prepared for each Planning Year.

WHAT MUST BE IN THE PHYSICAL PLAN: The written Plan Scope itself, coupled with the other Plan sections and their supporting documentation, suffices as the required documentation.

Because the Plan Scope covers all production units and chemicals, it must be created as a stand-alone section. However, charts and lists developed for other parts of the TUR Plan and TURA Plan Summary can also be used for the Scope. The following must be included in the Plan Scope:

• Descriptions of the Production Units included in the Form S reports;
• The description of the options identification process;
• The list of TUR options identified, and whether or not they will be implemented or are still under evaluation; and
• The projected reduction (in pounds) of use and byproduct for each covered toxic, summed for each TUR option.

The Plan Summary form (see Section 4.3.2, below) can provide the required information for the last two bullet points, provided the options still under evaluation are also included on that form.

4.3.2 Plan Summary [310 CMR 50.47]

Companies are required to submit a summary of the Plan. The Plan Summary is due on July 1 of the planning year. It is submitted with the annual Form S report due on July 1 of the planning year.

CONTENT: The Plan Summary includes:

• Projected facility-wide changes in the total quantities of each listed toxic chemical used and generated as byproduct. This is measured as the difference between the amount that is projected to be reported on the annual Form S report due with the next Plan Summary and the amount reported on the annual Form S report submitted with the current Plan Summary.

For example, the 2020 Plan Summary projected change in use can be calculated as:

\[
\text{[the amount projected to be used in CY 2021]} - \text{[the amount used in CY 2019]}
\]

The [amount used in CY 2019] is included on the annual Form S report due on July 1, 2020, and submitted with the 2020 Plan Summary.

The [amount projected to be used in CY 2021] is the amount the company anticipates using in CY 2021 given their plans to implement the selected TUR options.

• ALL TUR options considered during the current planning cycle.
• The new TUR options the company plans to further evaluate or implement as a result of the current Plan. Companies may also choose to include TUR options implemented as a result of prior years’ Plans. However, if they choose to do so, they must indicate the year in which these previously adopted techniques were put into place.

• Any TUR options the company said would be implemented in the previous Plan Summary that were not implemented, and a brief explanation of why they were not adopted, or a schedule change for an evaluation that could not be completed in the prior plan.

• Any other information the company believes would be beneficial for MassDEP or the public to review.

• The required senior management and TUR Planner certification statements.

**Note:** If the facility is projecting to reduce use or byproduct, the difference is reported as a negative number. Projected increases in chemical use over the two year period are reported as a positive number.

**PLAN UPDATE:** The Plan Summary will be different each year, so must be filled out each planning cycle and submitted with the annual Form S report.

**WHAT MUST BE IN THE PHYSICAL PLAN:** Include a copy of the completed Plan Summary form with the Plan. The Plan Summary is submitted on a form provided with the reporting package.

**Note:** Only management and TUR Planner certification statements are required if the facility was exempt from doing production unit level reporting for a chemical (i.e., because the chemical was used only in waste treatment, a startup production unit, or a pilot plant).

**4.3.3 Certification Requirements [310 CMR 50.42(3) and (4)]**

Once the Plan has been developed, it must be certified by the senior plant manager and a MassDEP certified Toxics Use Reduction Planner. A senior manager is an official who has management responsibility for the persons or team completing the Plan, and who has authority to act as an agent for the toxics user. The senior manager certifies the accuracy of the statements in the Plan and the information used in it, based on the manager’s inquiry of persons immediately responsible for developing the Plan. The TUR Planner certifies that he or she has reviewed the Plan and that, in his or her professional judgment, the planning process and the Plan conform to MassDEP regulations. The certification form is included with the Annual TUR Reporting package.

**4.3.4 Submission to MassDEP**

The Plan Summary and certifications are submitted to MassDEP through the Plan Summary Form Package, which has three parts:

1. The Plan Submittal Selection Form, on which the facility indicates what kind of Plan – TUR, or one of the allowed alternatives (Resource Conservation or TURA EMS Planning) – the facility is doing.
2. An indication of:
   - Whether the facility has either of the following exemptions to the planning process:
     - A covered toxic (and its associated CAS number) has been reduced below the reporting threshold for the current calendar year, and will not have to be included in annual Form S report due on July 1 of the next year, or
     - The facility has already closed or will close during the current calendar year (indicating the closure date); and
   - Whether the facility completed an RC Plan in the prior planning cycle. In this case the facility will submit a RC progress report form.

3. The TUR Plan Certification Form, which includes the statements that must be signed by both the facility manager and the MassDEP-approved TUR Planner.
5 TUR PLANNING UNDER SPECIAL CIRCUMSTANCES

This section describes the requirements and options available to facilities under special circumstances.

5.1 Updating a TUR Plan When a Facility has No New TUR Options

At its most fundamental, a Plan is designed to ensure that a facility has a comprehensive understanding of:

- How and why it uses toxic chemicals;
- How and why they end up as waste;
- How much is used and wasted; and
- Whether there are options available to reduce their use of toxic chemicals.

And, in order to determine whether or not implementing any of the options would be advantageous to the company, the Plan should address:

- The cost of the use and waste; and
- The costs of those options.

Accordingly, a Plan Update involves checking to see that:

- There are no new potential TUR opportunities; and
- The data, costs, and assumptions used to review technically feasible options in prior years are still valid.

When no new TUR options are identified for any of the six TUR techniques during the Plan Update process, the TUR Plan Update process would involve:

- Updating the materials accounting for each production unit/toxic chemical combination to reflect actual operations – an activity that must be completed in any event to submit the required annual Form S and Form R reports;
- Documenting that a good faith effort to identify additional potential TUR options was made by consulting with production workers, engineers, research and development staff, and quality assurance staff inside the facility as well as clients, vendors, trade organizations, and other sources, including TURI and OTA;
- Verifying that the management policy, production unit description, cost of toxics and prior economic and technical evaluations are still valid;
- Notifying employees, and describing the current year employee notification procedure for the prior year descriptions in the prior year scope of the Plan;
- Preparing the Plan Summary, indicating that no new options were evaluated or selected for implementation, and projecting the anticipated change in chemical use and byproduct for the next year; and

...
• Submitting the Plan Update for review and certification by senior management and a certified Toxics Use Reduction Planner.

5.2 A Facility Has More Options than it could Reasonably Implement in a Given Planning Cycle

If there are many technically feasible options (including those from prior years), these should be prioritized for further analysis. An analysis of economic impact and the expected reductions for each options must be made to facilitate prioritization of the feasible options identified.

• Options that are clearly economically infeasible require nothing more than the limited evaluation that was done to reach that conclusion (see Section 4.2.2.2 for more information).

• Options that are potentially economically feasible should be prioritized on the basis of available resources, rough cost estimates, the difficulty of implementation, expected benefits, and resources available for implementation. The rough economic evaluations (quantifiable and qualitative) used to do this prioritization and the rationale for the prioritization need to be documented. (Note that available labor resources, available capital, etc. are all legitimate "costs" of implementing an option.)

• The highest priority options get as much additional economic evaluation as is needed to make the decision of whether or not they are economically feasible.

  o If none of the highest priority options turn out to be economically feasible, the others need to undergo a more thorough evaluation to assess their economic feasibility.

Note that this procedure only applies if there are more economically feasible options than could be implemented in a given time planning cycle. The facility will not be considered in "good faith" if it merely claims to not have the "bandwidth" to evaluate or implement a TUR option.

5.3 A Facility Has Fully Incorporated TUR Planning Into Its Ongoing Operations

Some facilities have been able to incorporate TUR planning into their regular business decision processes on an ongoing manner. This is ideal and is encouraged by MassDEP. In this instance, the following should still be completed:

• Notify all employees of the planning process and solicit input by January 1 of the planning year;

• Update chemical use, waste treatment/transfer and release numbers (needed for the annual Form S and Form R reports);

• Update the cost of toxics for each covered toxic chemical/production unit combination;

The rationale for decisions on prioritization of TUR option implementation needs to be documented.
• Provide a description of the ongoing options identification process;
• Capture the options identified and evaluated, and the ongoing results of the evaluations. This should serve as a running list of each option identified, evaluated, and the outcome, including why options were rejected or adopted. Reference supporting documentation and where it can be found;
• Include a description of the calculations required to determine the expected (or, if implemented, actual) reductions;
• For those options that have been adopted, include any analysis that was done in making the decision to adopt, referencing supporting documentation and where it can be found;
• Estimate projected reductions in use and generation of hazardous byproduct; and
• Update the Plan Summary with the list of technically feasible TUR options considered and selected, showing relevant calculations and assumptions employed in this assessment, and referencing the type and location of supporting documentation.

5.4 A Facility Cannot Complete the Evaluation or Implement an Option by the Plan Due Date

The TURA planning regulations recognize that the identification, evaluation and implementation of TUR options are not necessarily tied to a two-year (or six months from the January 1 employee notification deadline) cycle. Evaluations that extend beyond July 1 of the planning year are addressed by including in the Plan:

• An explanation of the reasons why the evaluation warrants additional time; and
• An evaluation schedule.

Similarly, facilities are free to develop any implementation schedule for their selected options. There is no limitation in time required to implement or evaluate an option, as long as the schedule is developed in "good faith" and reflects the actual needs of the facility. Some options may require several years to fully evaluate, test and/or obtain the resources to implement.
6 ALTERNATIVE PLANNING PROCESSES

Once a facility has completed a Plan and two Plan Updates it has the option of:

- Incorporating TUR into an Environmental Management System, and obtaining the certification of a certified EMS professional (go to https://www.mass.gov/media/1143646 for more information).

- Preparing a Resource Conservation (RC) Plan that brings TUR planning approaches to minimizing energy use, water use, solid waste generation, or the use of "non-covered toxics" (i.e., TURA-listed substances used below reporting threshold or toxic substances that are not TURA listed). Go to https://www.mass.gov/media/1127896 for more information. RC Plans can only be substituted for traditional TUR Plans every other planning cycle thereafter.

While RC plans that address energy, water, or solid waste generation must be certified by an approved TUR Planner, RC Plans that address "non-covered toxics" can be approved by any TUR Planner.

For more information about Toxics Use Reduction Planning, go to:

- Massachusetts Department of Environmental Protection Toxics Use Reduction Program: https://www.mass.gov/guides/massdep-toxics-use-reduction-program
- Toxics Use Reduction Institute: https://www.turi.org/Our_Work/Training/Toxics_Use_Reduction_Planning
### EXHIBIT 1 - Checklist of Items in the Physical Plan

Note that this does not include information on the TUR team members (names and titles, assignments) or meeting notes, which are important parts of TUR Plan documentation.

<table>
<thead>
<tr>
<th>✓</th>
<th>An organized compilation of TUR Plan documents/sets of documents&lt;br&gt;(Check off all elements that have been incorporated into your physical TUR Plan)</th>
<th>Regulatory Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Written Toxics Use Reduction Management Policy with the following minimum elements:</td>
<td>310 CMR 50.43 (1)</td>
</tr>
<tr>
<td></td>
<td>Date during this planning cycle policy was either revised or reviewed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Description of how facility encourages TUR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Description of policies that encourage or discourage TUR</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Written description of the employee notification procedure that includes:</td>
<td>310 CMR 50.42 (5)</td>
</tr>
<tr>
<td></td>
<td>Date employees notified (must be by January 1 of the Planning Year)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Notification method</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Written Description of the Contents of the Notification (or a copy of the notification or the prepared remarks) that includes:</td>
<td>310 CMR 50.42 (5)</td>
</tr>
<tr>
<td></td>
<td>Toxic Substances and Production Units covered by the plan</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plan Requirements</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Solicitation of suggestions for toxics use reduction</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Description of each production unit in which a covered toxic is used that includes:</td>
<td>310 CMR 50.44</td>
</tr>
<tr>
<td></td>
<td>Process Flow Diagram, a visual representation of the movement of covered toxics into and out of the production unit and into and out of the facility that includes:</td>
<td>310 CMR 50.44(1)</td>
</tr>
<tr>
<td></td>
<td>• For First plans: date it was prepared</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• For Plan Updates with production process changes: date it was updated</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• For Plan Updates without production process changes: date it was reviewed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The number assigned to the production unit in the Form S(s) submitted with the plan summary</td>
<td>310 CMR 50.44(1)(b)</td>
</tr>
<tr>
<td></td>
<td>• Each step in the manufacturing processes within the production unit and including waste treatment and recycling that is not integral to the production unit. The specific production steps must be consistent with the list of processes included in the Form S(s) submitted with the Plan Summary, it can be more detailed. (Note the production unit includes material storage prior to use and product storage prior to shipment.)</td>
<td>310 CMR 50.44(1)(a)</td>
</tr>
</tbody>
</table>
| ✓ | **An organized compilation of TUR Plan documents/sets of documents**  
* (Check off all elements that have been incorporated into your physical TUR Plan) | **Regulatory Citation** |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• The steps in the process where each covered toxic enters the production unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The steps in the process where each covered toxic leaves the production unit as byproduct</td>
<td>310 CMR 50.44(1)(c)</td>
<td></td>
</tr>
<tr>
<td>• The steps in the process where each covered toxic leaves the production unit as product</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The steps in the process or outside the production unit where byproduct becomes an emission released to the environment or transferred offsite</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The points in the process where each covered toxic leaves the production unit as product</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Description of the product and the unit of product as listed on the Form S(s) submitted with the plan summary</td>
<td>310 CMR 50.44 (3)</td>
<td></td>
</tr>
<tr>
<td>The purpose served by each covered toxic used in the production process</td>
<td>310 CMR 50.44 (4)</td>
<td></td>
</tr>
</tbody>
</table>

For each covered toxic used in the production unit the following amounts and the calculations, assumptions and estimation methods and the location of the supporting documentation used to determine them.
(Note: this is the information required on the Form S allocated to each production unit)

<table>
<thead>
<tr>
<th></th>
<th><strong>Regulatory Citation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Pounds and pounds per unit of product manufactured, processed and otherwise used in the prior calendar year</td>
<td>310 CMR 50.44 (2)</td>
</tr>
<tr>
<td>Total pounds and pounds per unit of product generated as byproduct in the prior calendar year</td>
<td></td>
</tr>
<tr>
<td>Total pounds and pounds per unit of product of &quot;emissions&quot; (waste covered toxic) released or disposed onsite and the total pounds and pounds per unit of product transferred offsite in the prior calendar year</td>
<td></td>
</tr>
</tbody>
</table>

For each emission of each covered toxic used in the production unit the following amounts and the calculations, assumptions and estimation methods and the location of the supporting documentation used to determine them.
(Note this is the information reported on the Form R, allocated to the production unit)

<table>
<thead>
<tr>
<th></th>
<th><strong>Regulatory Citation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Released or disposed onsite to air, to water and to land in the prior calendar year</td>
<td>310 CMR 50.44 (6)</td>
</tr>
<tr>
<td>Transferred to offsite treatment for ultimate disposal, to offsite recycling and to offsite disposal and the amount ultimately released to air, to land and to water in the prior calendar year</td>
<td></td>
</tr>
</tbody>
</table>
- An organized compilation of TUR Plan documents/sets of documents
  *(Check off all elements that have been incorporated into your physical TUR Plan)*

<table>
<thead>
<tr>
<th>Regulatory Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>310 CMR 50.44 (7) and 310 CMR 50.46a</td>
</tr>
</tbody>
</table>

- A "Cost of Toxics" calculation for each covered toxic used in the production unit

  For covered toxics for which no technically feasible TUR options were identified, the evaluation is "Qualitative" – it identifies which of the following costs are relevant to the production unit and explains why the remainder are not.

  For covered toxics for which a technically feasible TUR option was identified, the qualitative evaluation is expanded to quantify relevant costs and calculate total annual costs and costs per unit of product for the prior calendar year. The method used to allocate facility wide costs to the production unit and the impact of non-quantifiable costs must be explained.

  For plan updates that include technically feasible options add the date during the current planning cycle in which the prior "cost of toxics" calculation was reviewed and any necessary updates.

- Consider the following costs in conducting the cost of toxics analysis:
  - indirect and direct labor and materials costs (which shall be stated in the plan)
  - purchase or manufacturing cost of the toxic and its alternative chemical
  - capital and equipment costs
  - storage, accumulation, treatment, disposal, and handling costs associated with toxics and byproducts
  - costs associated with activities required to comply with local, state, or federal laws or regulations, including but not limited to, fees, taxes, and costs associated with treatment, disposal, reporting and labeling
  - worker health or safety costs associated with the toxic and its alternative chemical, including but not limited to, protective equipment, and lost employee time due to accidents or routine exposure to the toxic
  - insurance
  - potential liability costs that may arise from intentional, unintentional, or accidental activities or occurrences
  - loss of community and product sales lost to competing non-toxic products.
  - Other relevant costs

- **Alternatives Screening:** A list of all technologies, procedures, training programs newly identified in this planning cycle as potentially achieving toxics use reduction and whether or not they were technically feasible – would work, would result in toxics use reduction, complied with applicable regulatory requirements, and would result in the desired product.

  For Plan updates also include previously identified technically feasible options that were not implemented.

<table>
<thead>
<tr>
<th>Regulatory Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>310 CMR 50.45 (2)</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7</th>
<th>Scope of Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Description of the option identification procedures used in the Plan including dates and participants and sources of information</td>
</tr>
<tr>
<td></td>
<td>Description of each production unit, in which a covered toxic, including the CAS of each covered toxic, included in the Plan is manufactured, processed or otherwise used. Description of the unit of product, and a listing of process codes consistent with what is entered on the Form S report.</td>
</tr>
</tbody>
</table>

Plan Summary Form for each chemical
| ✓ | **An organized compilation of TUR Plan documents/sets of documents**  
* (Check off all elements that have been incorporated into your physical TUR Plan) | **Regulatory Citation** |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>List of new Technically Feasible Options Identified (Options Considered on the Plan Summary form)</td>
<td>310 CMR 50.43(2)(c)</td>
</tr>
<tr>
<td></td>
<td>List of Options selected for implementation</td>
<td>310 CMR 50.43(2)(c)</td>
</tr>
<tr>
<td></td>
<td>List of Options selected for implementation in the prior Plan that were not implemented, with explanation of why they were not implemented</td>
<td>310 CMR 50.43(2)(c)</td>
</tr>
<tr>
<td></td>
<td>Projected change in Use and Byproduct generation in the calendar year following the Plan</td>
<td>310 CMR 50.46(4)(c)</td>
</tr>
<tr>
<td></td>
<td>Signed TURP certification statement (in the Plan summary, but only one signature needed)</td>
<td>310 CMR 50.42(3)</td>
</tr>
<tr>
<td></td>
<td>Signed Management certification statement</td>
<td>310 CMR 50.42(4)</td>
</tr>
</tbody>
</table>
## EXHIBIT 3 - Optional Form that can be used for Materials Accounting Purposes

### OPTIONAL TABLE FOR REQUIRED COVERED TOXIC USE BYPRODUCT AND ON AND OFFSITE EMISSIONS/RELEASES

**CALCULATION FOR PRIOR CALENDAR YEAR**

Complies with 310 CMR 50.44 (2), (5) & (6)

COMPLETE ONE PER PRODUCTION UNIT, INCLUDE ALL COVERED TOXICS

APPEND CALCULATIONS AND STATEMENT OF ESTIMATION METHODS AND LOCATION OF SUPPORTING DOCUMENTATION

<table>
<thead>
<tr>
<th>Date Prepared:</th>
<th>Production Unit #:</th>
<th>Unit of Product:</th>
<th>Location of Supporting Documentation:</th>
</tr>
</thead>
</table>

### Covered Toxic

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS #</th>
<th>Purpose of Chemical</th>
</tr>
</thead>
</table>

### Pounds

<table>
<thead>
<tr>
<th>1. USE</th>
<th>Total</th>
<th>Per unit of product</th>
<th>Total</th>
<th>Per unit of product</th>
<th>Total</th>
<th>Per unit of product</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Manufactured</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Processed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Otherwise Used</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. TOTAL (sum of a-c)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Byproduct</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. Released as or disposed of as &quot;Emissions&quot;*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Byproduct disposed of or released onsite or transferred offsite</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 2. EMISSIONS MANAGEMENT (BYPRODUCT FATE)

<table>
<thead>
<tr>
<th>Total Pounds</th>
<th>Total Pounds</th>
<th>Total Pounds</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>2a. MANAGEMENT OF BYPRODUCT ONSITE</th>
<th>Total</th>
<th>Per unit of product</th>
<th>Total</th>
<th>Per unit of product</th>
<th>Total</th>
<th>Per unit of product</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Recycled</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Treated (destroyed) in a wastewater treatment system</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Treated (destroyed) in a solid or hazardous waste treatment system</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Treated (destroyed) in an air pollution control device</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Disposed of to Land</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. Total Amount Released to Air</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. Total Amount Released to Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h. Total Amount Released to Land</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. TOTAL AMOUNT MANAGED ONSITE (sum of a - h)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
EXHIBIT 4 - Optional Cost of Toxics Form

<table>
<thead>
<tr>
<th>Production Unit #</th>
<th>Date Prepared/Reviewed/Updated</th>
<th># of Products per Year</th>
<th>Location of Supporting Documentation</th>
<th>Covered Toxic Name(s) and CAS No.</th>
<th>Allocation of costs to Production Unit</th>
</tr>
</thead>
</table>

**NOTE:** Economic evaluation of technically feasible options must be quantitative

Create a separate form for each production unit for which there are no technically feasible options. Economic evaluation of technically feasible options must be quantitative.

<table>
<thead>
<tr>
<th>COST ELEMENT (from 310 CMR 50.46a (1) (a-g) and (2))</th>
<th>Is the Cost Element Relevant to the Production Unit (Y/N)</th>
<th>If No, explain</th>
<th>If relevant, is it quantifiable? (Y/N) Explain.</th>
<th>IF THERE IS A TECHNICALLY FEASIBLE OPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Annual Cost/Savings ($/yr)</td>
</tr>
</tbody>
</table>

**Manufacturing Costs**

- (a) direct labor
- (a) indirect labor
- (a) materials
- (b) purchase of covered toxic or its precursors
- (c) equipment (including cost of capital if relevant)

**Materials and Waste Management Costs**

- Raw Material Storage Costs
  - (a) direct labor
  - (a) indirect labor
  - (a) materials
  - (c) equipment (including cost of capital if relevant)

- Product Accumulation and Storage Costs
  - (a) direct labor
  - (a) indirect labor
  - (a) materials

5 The cost associated with this element would change if use of the covered toxic declined or was eliminated.
<table>
<thead>
<tr>
<th>COST ELEMENT</th>
<th>Is the Cost Element Relevant to the Production Unit (Y/N)</th>
<th>If No, explain</th>
<th>If relevant, is it quantifiable? (Y/N) Explain.</th>
<th>IF THERE IS A TECHNICALLY FEASIBLE OPTION:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Annual Cost/Savings ($/yr) $ / Unit of Product</td>
</tr>
<tr>
<td>(c) equipment (including cost of capital if relevant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Byproduct Accumulation and Storage Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) direct labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) indirect labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) equipment (including cost of capital if relevant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onsite Air Pollution Control Treatment Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) direct labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) indirect labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) equipment (including cost of capital if relevant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onsite Wastewater Treatment Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) direct labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) indirect labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) equipment (including cost of capital if relevant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onsite Energy Recovery Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) direct labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) indirect labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) equipment (including cost of capital if relevant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onsite Recycling Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) direct labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) indirect labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6 The cost associated with this element would change if use of the covered toxic declined or was eliminated.
<table>
<thead>
<tr>
<th>COST ELEMENT</th>
<th>Is the Cost Element Relevant to the Production Unit (Y/N)</th>
<th>If No, explain</th>
<th>If relevant, is it quantifiable? (Y/N) Explain.</th>
<th>IF THERE IS A TECHNICALLY FEASIBLE OPTION:</th>
<th>Annual Cost/Savings ($/yr)</th>
<th>$ / Unit of Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) equipment (including cost of capital if relevant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Onsite Solid or Hazardous Waste Disposal Costs

- (a) direct labor
- (a) indirect labor
- (a) materials
- (c) equipment (including cost of capital if relevant)

Offsite Wastewater Treatment Costs

Offsite Hazardous Waste Management Costs

Offsite Solid Waste Management Costs

Offsite Recycling Costs

Offsite Energy Recovery Costs

Offsite Energy Recovery Costs

(e) Costs associated with activities required to comply with local, state, or federal laws or regulations, including but not limited to fees, taxes, and costs associated with treatment, disposal, reporting and labeling (Costs of treatment are in (b) above)

Fees and Taxes

Compliance Activities (record keeping, reporting, labelling, inspections, measurements, monitoring, training etc.)

- (a) direct labor
- (a) indirect labor
- (a) materials
- (c) equipment (including cost of capital if relevant)

Permitting /Plan Approvals/Registrations

- (a) direct labor

---

7 The cost associated with this element would change if use of the covered toxic declined or was eliminated.
<table>
<thead>
<tr>
<th>COST ELEMENT (from 310 CMR 50.46a (1) (a-g) and (2))</th>
<th>Is the Cost Element <em>Relevant</em> to the Production Unit (Y/N)</th>
<th>If No, explain</th>
<th>If relevant, is it quantifiable? (Y/N) Explain.</th>
<th>IF THERE IS A TECHNICALLY FEASIBLE OPTION:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Annual Cost/Savings ($/yr)</td>
</tr>
<tr>
<td>(a) indirect labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) equipment (including cost of capital if relevant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(f) <strong>Worker health or safety costs</strong> associated with the toxic and its alternative chemical, including but not limited to, protective equipment, and lost employee time due to accidents or routine exposure to the toxic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) lost labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) direct labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) indirect labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) equipment (including cost of capital if relevant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(g) <strong>Insurance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(h) <strong>Potential liability costs</strong> that may arise from intentional, unintentional, or accidental activities or occurrences</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i) <strong>Loss of community and product sales lost to competing non-toxic products.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50.46a (2) <strong>Other relevant costs (list)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8 The cost associated with this element would change if use of the covered toxic declined or was eliminated.
## EXHIBIT 5 - Optional New TUR Options Identification and Technical Feasibility Documentation

<table>
<thead>
<tr>
<th>Technique 1 Description</th>
<th>PLANNING YEAR</th>
<th>Date Identified</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TUR Type (Circle)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Substitution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product Reformulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Unit Modernization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved Operation and Maintenance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integral Recycling</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Covered Toxic(s) Addressed (List)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is it Legal?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Does it meet the definition of TUR?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Is it likely to result in the reduction of use or byproduct per unit of product?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Is it Technically Feasible?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Identification Procedure (describe)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technique 2 Description</th>
<th>Date Identified</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TUR Type (Circle)</strong></td>
<td></td>
</tr>
<tr>
<td>Input Substitution</td>
<td></td>
</tr>
<tr>
<td>Product Reformulation</td>
<td></td>
</tr>
<tr>
<td>Production Unit</td>
<td></td>
</tr>
<tr>
<td>Modification</td>
<td></td>
</tr>
<tr>
<td>Production Unit Modernization</td>
<td></td>
</tr>
<tr>
<td>Improved Operation and Maintenance</td>
<td></td>
</tr>
<tr>
<td>Integral Recycling</td>
<td></td>
</tr>
<tr>
<td><strong>Covered Toxic(s) Addressed (List)</strong></td>
<td></td>
</tr>
<tr>
<td>Is it Legal?</td>
<td>Yes</td>
</tr>
<tr>
<td>Does it meet the definition of TUR?</td>
<td>Yes</td>
</tr>
<tr>
<td>Is it likely to result in the reduction of use or byproduct per unit of product?</td>
<td>Yes</td>
</tr>
<tr>
<td>Is it Technically Feasible?</td>
<td>Yes</td>
</tr>
<tr>
<td>Identification Procedure (describe)</td>
<td></td>
</tr>
</tbody>
</table>
## EXHIBIT 6 - Optional Chart: Evaluation of Technically Feasible Options

<table>
<thead>
<tr>
<th>PRODUCTION UNIT:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Technique Description</td>
<td>Date Identified</td>
</tr>
<tr>
<td>TUR Type</td>
<td>Input Substitution</td>
</tr>
<tr>
<td>Covered Toxic(s)</td>
<td></td>
</tr>
<tr>
<td>Projected Reductions in Use and Byproduct (append calculations with location of supporting documentation)</td>
<td>Projected Reduction (when fully implemented)</td>
</tr>
<tr>
<td>Use</td>
<td></td>
</tr>
<tr>
<td>Byproduct</td>
<td></td>
</tr>
<tr>
<td>Is it Clearly Economically Infeasible</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>If Yes, show economic rationale:</td>
</tr>
<tr>
<td></td>
<td>Estimated Cost of Implementation:</td>
</tr>
<tr>
<td></td>
<td>Maximum Possible Savings from Eliminating Chemical Use (from cost of toxics and projected reductions in use and byproduct):</td>
</tr>
<tr>
<td>Has the company already implemented it or decided to implement it without a full economic analysis?</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Estimated cost of implementation: (attach calculations and supporting documentation if any)</td>
</tr>
<tr>
<td></td>
<td>Estimated savings (from the cost of toxics and projected reductions in use and byproduct)</td>
</tr>
<tr>
<td>Is it Economically feasible?</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Attach Economic Evaluation</td>
</tr>
<tr>
<td>Is additional time needed for evaluation</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>If Yes, explain why and provide an implementation schedule</td>
</tr>
<tr>
<td>Will it be Implemented?</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>If No, explain why not; or If Yes provide and implementation schedule</td>
</tr>
</tbody>
</table>
EXHIBIT 7 – Optional Form for Required Economic Evaluation of Technically Feasible Options *(Includes Cost Of Toxics)*

Attach Additional Calculations, Assumptions etc.

<table>
<thead>
<tr>
<th>Location of Supporting Documentation:</th>
<th>Option Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Unit #</td>
<td># of Products per Year</td>
</tr>
<tr>
<td>Allocation of shared costs to Production Unit/Chem:</td>
<td>Date</td>
</tr>
<tr>
<td>Covered Toxic Name and CAS:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CURRENT COST OF TOXICS</th>
<th>COST OF IMPLEMENTING TECHNICALLY FEASIBLE OPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>COST ELEMENT</td>
<td>Comments</td>
</tr>
<tr>
<td>(from 310 CMR 50.46a (1) (a-g) and (2))</td>
<td>Is the cost element relevant (and quantifiable)? If No, explain</td>
</tr>
<tr>
<td>Manufacturing Costs</td>
<td></td>
</tr>
<tr>
<td>(a) direct labor</td>
<td></td>
</tr>
<tr>
<td>(a) indirect labor</td>
<td></td>
</tr>
<tr>
<td>(b) purchase of covered toxic or its precursors</td>
<td></td>
</tr>
<tr>
<td>(a) materials</td>
<td></td>
</tr>
<tr>
<td>(c) equipment</td>
<td></td>
</tr>
<tr>
<td>(including cost of capital if relevant)</td>
<td></td>
</tr>
<tr>
<td>(d) Storage, accumulation, treatment, disposal, and handling costs associated with toxics and byproducts</td>
<td></td>
</tr>
<tr>
<td>Raw Material Storage Costs</td>
<td></td>
</tr>
<tr>
<td>(a) direct labor</td>
<td></td>
</tr>
<tr>
<td>(a) indirect labor</td>
<td></td>
</tr>
</tbody>
</table>

| $ Consider Cost of Implementation and Reduced Chemical Costs |

TURA PLANNING GUIDANCE APPENDIX v. TUR Planning Guidance – 12-23-19 Page xiv of xviii
<table>
<thead>
<tr>
<th>COST ELEMENT</th>
<th>Comments</th>
<th>Is the cost element relevant (and quantifiable)? If No, explain</th>
<th>Annual $</th>
<th>$ / Unit of Product</th>
<th>Is the cost element relevant? If No explain</th>
<th>One Time $</th>
<th>Annual $</th>
<th>$ / Unit of Product</th>
<th>Net Savings or Expense from Option$</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) equipment (including cost of capital if relevant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product accumulation and storage costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) direct labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) indirect labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) equipment (including cost of capital if relevant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Byproduct accumulation and storage costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) direct labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) indirect labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) equipment (including cost of capital if relevant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onsite Air Pollution Control Treatment costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) direct labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) indirect labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) equipment (including cost of capital if relevant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onsite Wastewater Treatment costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) direct labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COST ELEMENT</td>
<td>CURRENT COST OF TOXICS</td>
<td>COST OF IMPLEMENTING TECHNICALLY FEASIBLE OPTION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>------------------------</td>
<td>-----------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) indirect labor</td>
<td>Is the cost element relevant?</td>
<td>Is the cost element relevant?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) indirect labor</td>
<td>and quantifiable? If No, explain</td>
<td>and quantifiable? If No explain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) materials</td>
<td>Annual $</td>
<td>One Time $</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) materials</td>
<td>$ / Unit of Product</td>
<td>Annual $</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) equipment</td>
<td>Net Savings or Expense from Option³</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(including cost of capital if relevant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onsite energy recovery costs (or savings)</td>
<td>(a) direct labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) indirect labor</td>
<td>(a) indirect labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) materials</td>
<td>(a) materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) equipment</td>
<td>(c) equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(including cost of capital if relevant)</td>
<td>(including cost of capital if relevant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onsite recycling costs</td>
<td>(a) direct labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) indirect labor</td>
<td>(a) indirect labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) materials</td>
<td>(a) materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) equipment</td>
<td>(c) equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(including cost of capital if relevant)</td>
<td>(including cost of capital if relevant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onsite solid or hazardous waste disposal costs</td>
<td>(a) direct labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) indirect labor</td>
<td>(a) indirect labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) materials</td>
<td>(a) materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) equipment</td>
<td>(c) equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(including cost of capital if relevant)</td>
<td>(including cost of capital if relevant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offsite Wastewater Treatment Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COST ELEMENT</td>
<td>Comments</td>
<td>Is the cost element relevant (and quantifiable)? If No, explain</td>
<td>Annual $</td>
<td>$ / Unit of Product</td>
<td>Is the cost element relevant? If No explain</td>
<td>One Time $</td>
<td>Annual $</td>
<td>$ / Unit of Product</td>
<td>Net Savings or Expense from Option³</td>
</tr>
<tr>
<td>--------------</td>
<td>----------</td>
<td>-------------------------------------------------------------</td>
<td>----------</td>
<td>------------------</td>
<td>------------------------------------------</td>
<td>------------</td>
<td>----------</td>
<td>------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Offsite Hazardous Waste Management Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offsite Solid Waste Management Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offsite Recycling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offsite Energy Recovery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offsite Energy Recovery Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**e) Costs associated with activities required to comply with local, state, or federal laws or regulations**, including but not limited to, fees, taxes, and costs associated with treatment, disposal, reporting and labeling (Costs of treatment are in (b) above)

Fees and Taxes

Compliance Activities (record keeping, reporting, labelling, inspections, measurements, monitoring, training etc.)

(a) direct labor

(a) indirect labor

(a) materials

(c) equipment (including cost of capital if relevant)

Permitting / Plan Approvals /Registrations

(a) direct labor

(a) indirect labor

(a) materials


<table>
<thead>
<tr>
<th>COST ELEMENT</th>
<th>Comments</th>
<th>Is the cost element relevant (and quantifiable)? If No, explain</th>
<th>Annual $</th>
<th>$ / Unit of Product</th>
<th>Is the cost element relevant? If No explain</th>
<th>One Time $</th>
<th>Annual $</th>
<th>$ / Unit of Product</th>
<th>Net Savings or Expense from Option³</th>
</tr>
</thead>
<tbody>
<tr>
<td>(c) equipment (including cost of capital if relevant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(f) Worker health or safety costs associated with the toxic and its alternative chemical, including but not limited to, protective equipment, and lost employee time due to accidents or routine exposure to the toxic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Lost labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) direct labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) indirect labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) equipment (including cost of capital if relevant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(g) Insurance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(h) Potential liability costs that may arise from intentional, unintentional, or accidental activities or occurrences</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i) Loss of community and product sales lost to competing non-toxic products.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50.46a (2) Other relevant costs (list)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>