

# **Guidance Document for Dry Cleaners' Toxics Use Reduction Plans**

***Step-by-step guidance with examples  
for use with the  
Dry Cleaning TUR Plan Template***

***December 2011***



# **Toxics Use Reduction Plan Guidance for Dry Cleaners**

## **Table of Contents**

Facility-Wide Information .....	1
Statement of Management Policy .....	1
Employee Notification .....	2
Scope of Plan .....	3
Predicted Reductions .....	4
Production Unit Information.....	5
Identification of Potential TUR Techniques .....	9
Technical Evaluation .....	10
TUR Options Matrix – Example.....	11
Financial Evaluation .....	13
Summary & Schedule of Implementation.....	15
Plan Certification .....	16
TUR Planner Certification .....	16
Senior Management Official Certification.....	16
Appendix A – Plan Summary .....	17
Appendix B – Calculations Associated with Reporting Perc Use, and Generation of Byproducts and Emissions of Perc .....	18
Appendix C – Dry Cleaners Toxics Use Reduction Opportunities .....	23



# Facility-Wide Information<sup>1</sup>

## Statement of Management Policy<sup>2</sup>

Below is an example of a statement of management policy. The facility management should complete their own Statement of Management Policy according to their specific commitments and approach to toxics use reduction.

### Example Management Policy

***(Dry Cleaner Facility Name)***

\_\_\_\_\_ *(Dry Cleaner Facility Name)* is committed to reducing the use of toxic chemicals in our processes. In support of this commitment, our facility plans to:

- Conduct continual research and improvement of dry cleaning operations with an eye towards toxic chemical use reduction, worker safety, and energy efficiency.
- Involve both employees and facility management in toxics use reduction (TUR) research and modifications to the extent practical.
- Implement, monitor, and maintain technically feasible and cost effective TUR options.

Through this commitment, \_\_\_\_\_ *(Dry Cleaner Facility Name)* will continue to produce quality products that we can take pride in and add value for our customers while striving for a healthier and safer workplace, community, and environment.

\_\_\_\_\_  
*(Signature of facility Owner/Management)*

<sup>1</sup> 310 CMR 50.43 provides information required for each plan, including statement of management policy, statement of the scope of the plan, expected change in the use of perc and associated byproduct generation, which must be projected over two- and five-year periods.

<sup>2</sup> 310 CMR 50.43(1) – The Statement of Management Policy represents the mission of the facility regarding toxics use reduction. This is an opportunity to present the management philosophy and to clarify the commitment of the facility to environmental protection.

## **Employee Notification<sup>3</sup>**

Cleaners should specify within their plan how they reach out to employees to solicit input on TUR. An example statement is: We place our employee notification memos on our main bulletin board, and have personal conversations with all employees to assure that they understand the purpose of our facility's TUR plan, and have the opportunity to share any ideas they may have for TUR opportunities.

### **Example Employee Notification Memo**

**TO:** All facility employees  
**FROM:** \_\_\_\_\_ (*Facility Owner/Operator*)  
**SUBJECT:** **Toxics Use Reduction Plan – Employee Notification**  
**DATE:** \_\_\_\_\_ (*Date*)

The Massachusetts Toxics Use Reduction Plan (the Plan) for \_\_\_\_\_ (*Dry Cleaner Facility Name*) is required to be completed by July 1, 2012 (pursuant to M.G.L. c21I, s. 11D). This memorandum serves to comply with the Employee Notification requirement to:

- Notify all employees of the requirements for the Plan;
- Identify toxic chemicals and production units included in the Plan;
- Make available the regulations for Toxic Use Reduction Plans; and
- Solicit comments and suggestions from employees on Toxic Use Reduction options.

In 2011, \_\_\_\_\_ (*Dry Cleaner Facility Name*) exceeded the 1,000 lb. per year use on perchloroethylene (perc), used for cleaning garments. Among the options we will consider in the Plan are alternative process chemicals, process improvements, and improved housekeeping.

A copy of the Toxic Use Reduction Act regulations is available for review at:

\_\_\_\_\_  
(*suggest either the front counter of the facility or a main office if it is accessible by the staff*)

The management of this facility welcomes the opportunity to consider any suggestions you might have in the area of toxics use reduction, specifically alternative process chemicals, process improvements, or improved housekeeping as related to reducing our use of perc. Please contact \_\_\_\_\_ (*Name of Owner/Operator*) with your ideas.

Thank you for continued efforts and cooperation towards improving our work environment.

<sup>3</sup> 310 CMR 50.42(5) – Employee notification must be posted six months prior to the required date of completion of the Plan (i.e. by January 1 of the planning year). The purpose is to inform workers of the requirements of the TUR plan and its progress and to solicit their ideas and viewpoints on TUR options.

Facilities should make this notification available in all applicable languages for the staff of the facility to maximize participation in the TUR planning process.

## Scope of Plan<sup>4</sup>

\_\_\_\_\_ (*Dry Cleaner Facility Name*)

\_\_\_\_\_ (*Address Location*)

This location of \_\_\_\_\_ (*Dry Cleaner Facility Name*) cleans garments using the following technologies in the percentages noted here:

Solvent	% of Garments Cleaned Using this Method
Perc	
Other ( <i>please identify</i> )	

*Provide a description of your process, including production unit identification, toxic chemical used, purpose of the chemical, and unit of product:* We consider our entire facility as one production unit, Production Unit #1. The processes associated with Production Unit #1 include dry cleaning, shirt laundering and garment pretreatment using several products. The toxic chemical covered in this plan is perchloroethylene, or perc, CAS # 127-18-4, which is used at the facility to clean garments in dry cleaning equipment. Perc is also used in spotting agents as identified above for particularly difficult garment stains. Our unit of product is pounds of cleaned garments.

*If your facility chooses more than one production unit, the types of information in the descriptive paragraph and table should be provided for each production unit.*

Below is a detailed table describing all equipment and materials using or containing perc at the facility (Production Unit #1):

Equipment or Materials	Amount of % of perc
<i>(i.e. one 55-pound perc machine)</i>	<i>(i.e. contains 75 gallons of perc when full)</i>
<i>(i.e. one 35-pound perc machine)</i>	<i>(i.e. contains 45 gallons of perc when full)</i>
<i>(i.e. POG xyz used in pre-spotting)</i>	<i>(i.e. 15%-25% based on MSDS)</i>

*The cleaner should modify this list according to their specific process for identifying viable alternatives to perc for their facility.*

<sup>4</sup> 310 CMR 50.43(2) – The Scope describes what the Plan encompasses and provides an overview of the planning process and the procedures used to identify TUR options. This section must, at a minimum, include a description of each production unit included in the Plan, including its assigned number, associated processes, products produced, the chemicals used, a summary of the process used to identify TUR options, and a brief description of options identified.

The processes we used for identifying TUR options include:

- Brainstorming with workers
- Conformance with ERP Best Practices described in the “Dry Cleaners Environmental Certification Workbook” to assure operations and maintenance practices are met
- Discussion with peers and attendance at pertinent process demonstrations at their garment cleaning facilities
- Direct contact with our vendors and manufacturers of equipment and alternative materials
- Review of trade literature and research, including TURI’s *Assessment of Alternatives to Perchloroethylene for the Professional Garment Care Industry*, 2011
- Periodic outreach to the Massachusetts Office of Technical Assistance (OTA) to identify specific new opportunities not previously considered.
- Other

The checklist included in the TUR Opportunity Matrix (Appendix C) is used to assist us in monitoring our TUR options identification process.

Based on our TUR options identification activities during this planning cycle, \_\_\_\_\_ (*dry cleaner name*) has identified the following TUR Options for implementation: *(Include here if the review of the TUR options has led to the identification of feasible alternatives – examples are:*

- *Purchased \_\_\_\_\_ new equipment using \_\_\_\_\_ solvent.*
- *Changed pre-spotting and other treatment products to products that do not contain perc.*
- *Modified percentages of garments cleaned in various machines (e.g., we now clean 70% of garments in professional wet cleaning equipment as opposed to 30%)*
- *Implemented additional operational and maintenance control on existing equipment (see Appendix C)*
- *Other*

## **Predicted Reductions<sup>5</sup>**

*This section is required as part of the facility-wide information, and is completed after all TUR planning activities have been accomplished. The following is suggested language:*

In 2011, \_\_\_\_\_ (*pounds of perc<sup>6</sup>*) was used at this facility. All perc was then generated as byproduct – in hazardous waste, fugitive air emissions, and residual amounts on the cleaned clothes.

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<sup>5</sup> 310 CMR 50.43(3 & 4) – This section covers the expected change in the use of each covered toxic chemical and in the amount of each covered toxic chemical generated as byproduct. The expected increase/decrease in perc must be projected over two and five year periods. The 2-year reduction should be for the calendar year after the plan is due, and the 5-year reduction should be for the calendar year that is four years after the calendar year the plan is due.

<sup>6</sup> Pounds of Perc = Gals of Perc x 13.5.

As a result of the complete analysis (described later), a TUR option was chosen that would reduce the use of perc at the facility. Our two-year projection for 2012 is that the use of perc will be reduced by \_\_\_\_\_ % (*estimated % reduction in perc use projected for 2012 – refer to the TUR Opportunity Matrix – Appendix C – to help make this estimate*). This is the equivalent of reducing the use of perc by \_\_\_\_\_ (*pounds of perc*).

As all perc is generated as a byproduct in the cleaning process, the generation of perc byproducts (waste, air, residuals on clothes) is the same as the amount of perc used.

During the next several years, \_\_\_\_\_ (*Dry Cleaner Facility Name*) will work towards implementing additional toxics use reduction measures. Research will continue so as to learn about additional TUR options applicable to perc usage at the facility.

*Consider what additional perc reduction activities are likely or possible for the next five year period and make your best estimate of what additional reductions you could reasonably expect if you can implement these changes.* At this point, our five-year projection for 2016 is that the use of perc will be reduced by \_\_\_\_\_ %.

## ***Production Unit Information***<sup>7</sup>

**Production Unit #1:** Perc Dry Cleaning.

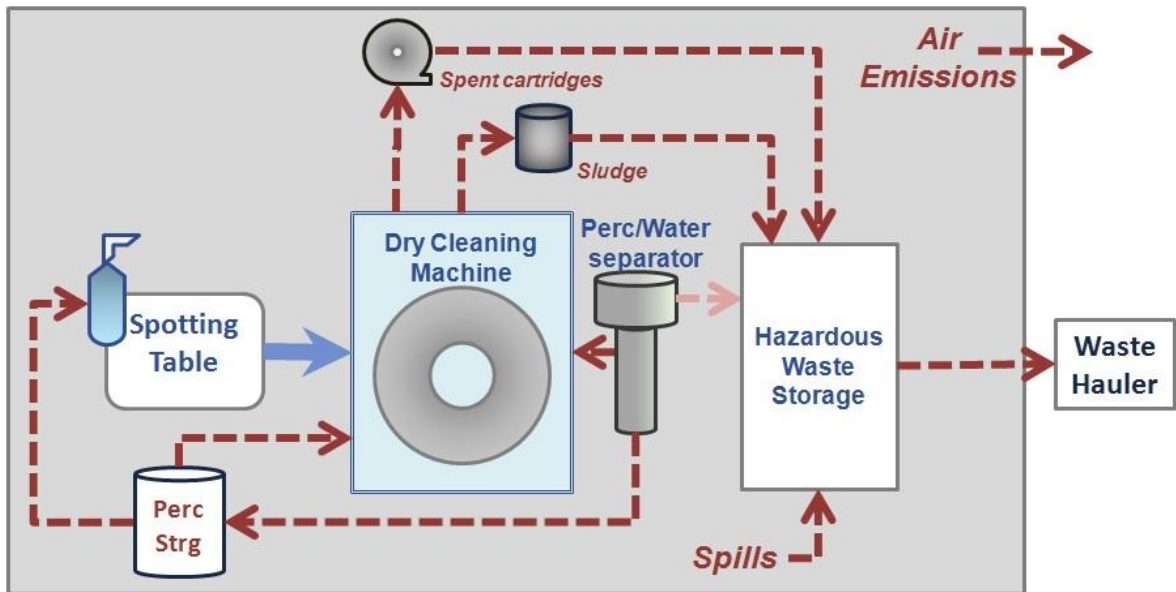
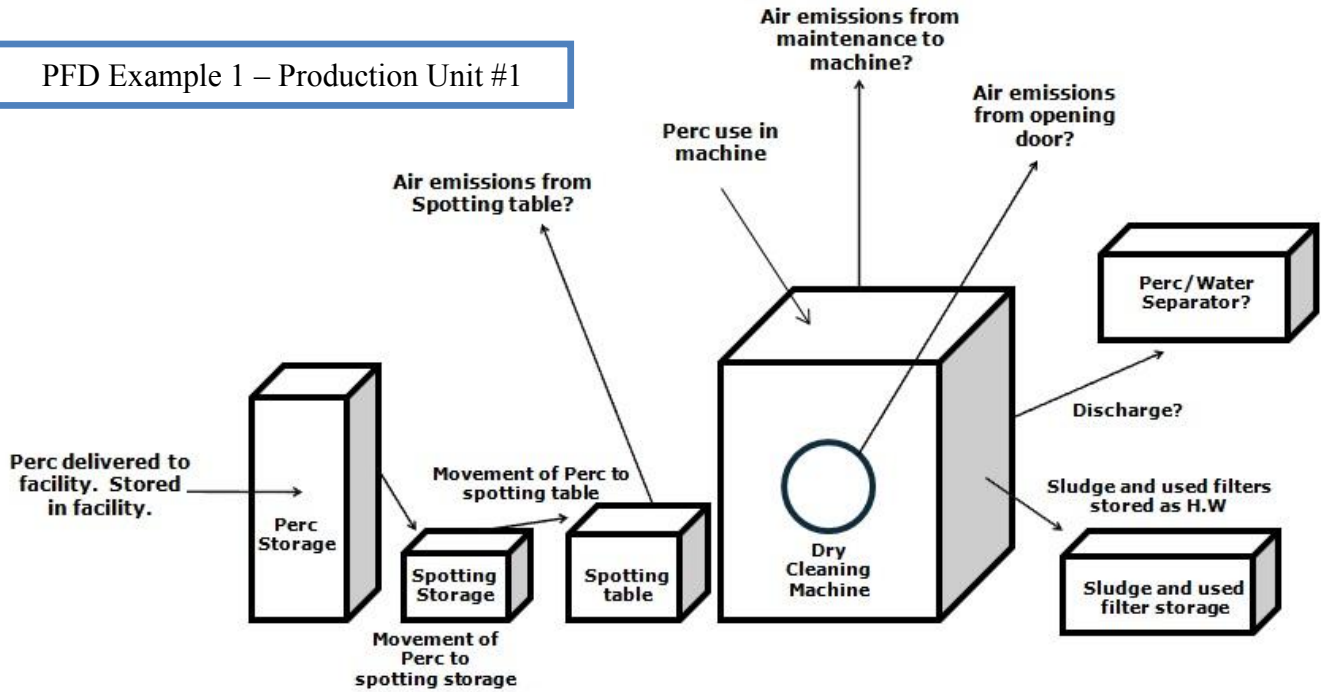
The following process flow diagram (PFD)<sup>8</sup> illustrates the movement of perc throughout this production unit. (*The following two diagrams are examples of process flow diagrams. Your facility's PFD can be drawn by hand or computer generated, and should accurately reflect the flow of perc throughout your production unit and including all spotting locations and dry cleaning machines using perc at the facility.*)

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<sup>7</sup> 310 CMR 50.44 – 50.46 – For each production unit at the facility, specific information shall be included as detailed on the pages in this section.

<sup>8</sup> 310 CMR 50.44(1) – The process flow diagram must be a visual representation of the movement of perc through the process within the production unit, including perc flowing in and out of the process as byproducts, products, fugitive on-site emissions and off-site emissions.

PFD Example 1 – Production Unit #1



Perc pathway Garments

PFD Example 2 – Production Unit #1

Purpose of Chemical: Perc is used at the facility to clean garments in dry cleaning equipment. Perc is also used in spotting agents, as identified previously, for particularly difficult garment stains.



Unit of Product: pounds of garments cleaned (*this can be modified by the facility if they would prefer a different Unit of Product such as number of pieces cleaned, sales, etc.*)

Use of Perc and Generation of Byproduct and Emissions:

*Companies are required to maintain records of their use of toxic chemicals and associated byproduct generation. We have provided a place for these records as Attachment C of the Sample TUR Plan. We maintain our records of perc use, which can be found in Attachment C.*

*Appendix B presents the methodology for calculating use and generation of byproducts and emissions associated with your use of perc. Facilities are required to provide information on their use of perc and generation of byproduct and emissions associate with perc use on a per unit of product basis.*

For the year 2011, the following is the amount **per unit of product** of perc used at the facility and its fate.

**Calculation Worksheet for Per Unit of Product Values**

Unit of product (lb cleaned in 2011)	Perc used per unit of product	Perc generated as byproduct per unit of product	Perc released or transferred off-site per unit of product
<i>65,000 lb clothes</i>	<i>5,469/65,000 = 0.08</i>	<i>2,340/65,000 = 0.04</i>	<i>5,469/65,000 = 0.08</i>

Byproduct = On-Site Releases (Section 5 of Form S) + Transfers Off-Site (Section 6 of Form S)  
Air emissions = Total Use – Transfers Off-Site

*Use the tables in Appendix B for assistance with calculating Perc Byproducts and Emissions, and for completing the following table.*

Row ID	Byproducts and Emissions	Calculation Elements	Form R and/or Form S Report Location	Value for Reporting Year
<b>A</b>	Total Perc usage for the year	Beginning inventory + Purchased amount – End inventory	<b>Form S, Sec. 1e</b>	
<b>B</b>	Treated on site	We do not treat any perc waste on site	<b>Form S, Sec. 8.6</b>	0
<b>C</b>	Treated off-site	= amount in waste sludge + amount in spent filters + amount spilled + separator wastewater (typically this wastestream is incinerated) <i>See Appendix B for help</i>	<b>Form R, Sec. 6.2</b> <b>Form S, Sec. 8.1c</b>	

Row ID	Byproducts and Emissions	Calculation Elements	Form R and/or Form S Report Location	Value for Reporting Year
D		= amount in separator wastewater sent to municipal POTW (i.e., not included in hazardous waste amount)	Form R, Sec 6.1A	0
E	Total Treated Off-Site	= C + D	Form S, Sec. 8.7	
F	Recycled On-Site	(other than integral recycling within our machines, we do not recycle perc waste on site)	Form S, Sec. 8.4	0
G	Recycled Off-Site	<i>Unless your hazardous waste treatment facility recycles perc waste, assume this is zero</i>	Form S, Sec. 8.5	0
H	Disposed On-Site	No on site disposal occurs	Form R, Sec. 5.4 and Sec. 5.5	0
I	Disposed Off-Site	No off site disposal occurs	Form S, Sec. 8.1c	0
J	Total Byproduct Released	= E + K <i>If your facility has any values for rows B, F, G, H or I, then these must also be included in this value</i>	Form S, Sec. 8.7	
K	Emissions released to the environment on-site (= fugitive air emissions)	= A - E	Form R, Sec. 5.1	
L	Air emissions (stack or point source)	We do not have point source emissions	Form R, Sec. 5.2	0
M	Total on-site releases	= K	Form R, Sec. 5.1	
N	Total Emissions	= total used (A)	Form S, Sec 1f	

*Please consult with your waste hauler to determine how your waste perc is managed. If your waste perc is incinerated (i.e., “treated”), then all of your perc is byproduct shipped off-site, and would go in Row C. If your waste perc is refined from the waste taken by your hauler and recycled, then include that amount in Row G, and add it into Row J (=E+K+G).*

## Identification of Potential TUR Techniques<sup>9</sup>

*Facilities are required to describe their process for identifying potential TUR options, including identification of people involved in the planning activities, sources used, options identified and alternatives considered for implementation.*

The following people comprise the facility TUR Team, which conducted the planning activities associated with identifying feasible alternatives to perc:

- *Team member 1:*
- *Team member 2:*
- *Etc...*

The following sources were used by the TUR Team to help in identifying TUR Techniques that are options for this facility:

- Process demonstrations at other dry cleaning facilities
- Vendors and manufacturers of equipment and alternative materials
- Trade literature and research

The following technologies, procedures, and programs were identified as potentially achieving TUR at the facility:

- *Purchase of new equipment using an alternative solvent. (process change)*
- *Increase of percentage of garments cleaned in alternative solvents. (process modification)*
- *Implementation of additional operational and maintenance control on existing equipment. (O&M)*

The following alternative solvents were considered for implementation at the facility:

- Professional Wet Cleaning
- Carbon Dioxide
- High Flash Hydrocarbons (EcoSolv, PureDry, Shell Sol 140HT, D40, Mineral Spirits, DF-2000)
- Acetals (SolvonK4)
- Siloxanes (GreenEarth)
- Propylene Glycol Ethers (Rynex, Impress, Solvair)

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<sup>9</sup> 310 CMR 50.45 – 50.46 – All technologies, procedures, and training programs identified as potentially achieving TUR and the procedures used to identify TUR options shall be included here. Also to include: list of personnel involved, description of information sources, and description of information gathering techniques.

*The following two sections are the key components for the Toxics Use Reduction Plan. Each facility will have differing TUR options that will or will not work for them. This is your opportunity to identify pros and cons for each type of TUR for your facility and determine what makes sense to implement. The TURI Assessment of Alternatives to Perchloroethylene for the Professional Garment Care Industry, 2011, forthcoming, can be used as a substantial resource for these sections and the matrix provided under the Technical Evaluation section guides you through the TUR options.*

### **Technical Evaluation<sup>10</sup>**

*This section should include a description of and evaluation of the technical feasibility of each TUR option. For those not chosen, the reason should be included. For those chosen, include anticipated costs and savings and expected byproduct reductions. A worksheet matrix is provided on the following page and an example of a complete matrix follows.*

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<sup>10</sup> 310 CMR 50.46

## TUR Options Matrix – Example

In this example we assumed that some improved O&M could take place, professional wet cleaning at the shop could be increased from 20% to 70% of all garments processed, and a small hydrocarbon machine would be purchased to process an additional 15% of the garments.

Type of TUR	Description	Resources Used	Feasible? (yes/no)	Explanation	Estimate of Perc Use Reduction	Estimated Costs/Savings
Improved Operations and Maintenance	Additional O&M control on existing equipment and container management: <ul style="list-style-type: none"> <li>leak detection;</li> <li>replace gaskets;</li> <li>shorten time the door is open;</li> <li>shorten time for filters change and transition to the drum;</li> <li>keep muck, lint, used rags in tightly enclosed container;</li> <li>drain filters before removal;</li> <li>use better refrigeration maintenance procedure;</li> <li>more frequent to constant distillation</li> </ul>	<i>ERP container management checklist; equipment vendor</i>	<i>Yes</i>	<i>We will replace all gaskets and keep all containers tightly closed</i>	<i>1%-5%</i>	<i>\$50/year savings</i>
In-Process Recycling and Reuse	Use better filtering system to complete more cycles before disposal.	<i>Equipment vendor</i>	<i>No</i>	<i>We already maximize our use of perc with in-process recycling</i>	<i>0</i>	<i>0</i>
Process Modification or Redesign	<ul style="list-style-type: none"> <li>Increase of percentage of garments cleaned in alternative solvents;</li> <li>Use as little perc as possible;</li> <li>Use non perc spotting agent</li> </ul>	<i>TURI wet cleaning case study; Wet cleaning demonstration events; Detergent provider</i>	<i>Yes</i>	<i>We will clean an additional 50% of garments in our existing professional wet cleaning equipment (increasing wet cleaning from 20% to 70%)</i>	<i>50%</i>	<i>\$2,000/year savings</i>
Process modernization	Buy higher generation of dry cleaning machines	<i>Equipment vendor</i>	<i>No</i>	<i>We can not afford a newer perc machine and are already maximizing efficiency of our existing machine</i>	<i>0</i>	<i>0</i>

Type of TUR	Examples	Resources Used	Feasible? (yes/no)	Explanation	Estimate of Perc Use Reduction	Estimated Costs/Savings
Input Substitution (Perc alternatives)	Carbon Dioxide	<i>TURI Perc Alternatives Assessment; Equipment vendor; Solvent provider; other dry cleaning shops</i>	<i>No</i>	<i>Too expensive to install</i>		
	n-Propyl Bromide		<i>No</i>	<i>Also on TURA list, therefore not considered to be a safer alternative</i>		
	Propylene Glycol Ethers		<i>No</i>	<i>Not enough room in my shop</i>		
	High Flash Hydrocarbons		<i>Yes</i>	<i>Will add one small hydrocarbon machine to our shop to clean an additional 15% of garments in</i>	<i>15%</i>	<i>\$500/year savings in solvent and disposal costs; potentially also TURA fees</i>
	Siloxanes		<i>No</i>	<i>Not interested in licensing fee</i>		
	Acetals		<i>No</i>	<i>New equipment too expensive</i>		
	Professional Wet Cleaning		<i>Yes</i>	<i>See above</i>	<i>(see above)</i>	<i>(see above)</i>
Product Reformulation	Not applicable		<i>No</i>	<i>Not Applicable</i>		
<b>Total (to go in the "Predicted Reductions Section")</b>					<b><i>70%</i></b>	<b><i>\$2,550/year</i></b>

## Financial Evaluation<sup>11</sup>

In this section the user must show an evaluation of the economic feasibility for each TUR options identified as being technically feasible. This information must be compared to perc, so consider the following layout for your evaluation. Add rows for additional cost items you incur that are not included here and add columns for additional alternatives (techniques, changes, materials...) you consider. You should only include those financial aspects that are relevant to a comparison; thus, this table probably contains several items that may not apply for you (for example, if none of your TUR options involves purchasing new equipment, you could disregard that line of the table.)

In addition, you may want to include intangible costs and benefits as you consider alternatives. These may include:

- Improved air quality
- Future compliance costs
- Relationships with customers, workers, community and regulators
- etc.

Cost Item	Perc	Alternative #1	Alternative #2	Alternative #3
Material Purchase (solvent, detergent, spotting agents, etc.)				
New Equipment Purchase				
Filters				
Disposal				
Electricity Use				
Natural Gas Use				
Oil Use				
Water Use				
Machine Maintenance				
Labor				
Regulatory Costs (time and fees)				
Health & Safety Issues				
Insurance Issues				
Other, as relevant for comparison				

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<sup>11</sup> 310 CMR 50.46A

Note that you do not have to have exact dollar amounts for each of these items, but can instead compare them to the use of perc. See the following example, in which the data are estimated using TURI wet cleaning versus perc case studies for illustrative purposes only:

### Example Financial Evaluation

Cost Item	Perc	Alternative #1: Input Substitution Wet Cleaning
Material Purchase (solvent, detergent, spotting agents, etc.)	<i>Purchase of perc and spotting agents about \$1,500/year</i>	<i>Purchase of detergents and spotting agents about \$2,000/year</i>
New Equipment Purchased	<i>0</i>	<i>Purchase of new washer and finishing equipment = \$60,000 (note – this was partially off-set by receipt of grants from Massachusetts agencies)</i>
Filters	<i>\$300/year</i>	<i>0</i>
Disposal	<i>\$2,000/year</i>	<i>0</i>
Electricity Use	<i>30,000 kWh/year</i>	<i>20% lower projected</i>
Natural Gas Use	<i>9,000 therms/year</i>	<i>14% lower projected</i>
Oil Use	<i>N/A</i>	<i>N/A</i>
Water Use	<i>250,000 gallons/year</i>	<i>3% lower projected</i>
Machine Maintenance	<i>\$3,000/year</i>	<i>0</i>
Labor	<i>Facility employees 11 FTEs</i>	<i>Perc and wet cleaning about the same once technology is mastered – less on spotting board, more on finishing</i>
Regulatory Costs (time and fees)	<i>\$2,500</i>	<i>0</i>
Health & Safety Issues	<i>Skin and respiratory irritation, headaches, staff sick time, potential long term cancer and other health risks.</i>	<i>None</i>
Insurance/Landlord Issues	<i>Historical contamination issues – less desirable to insurance companies and landlords</i>	<i>Favorable to insurers and landlords</i>
Other, as relevant for comparison	<i>Air quality complaints from workers and customers</i>	<i>No air quality complaints – potential increase in business</i>



## Summary & Schedule of Implementation<sup>12</sup>

*Include a discussion about the TUR planning process and your facility's schedule for implementation of all TUR options identified.*

There are currently many alternatives to perc available in the marketplace. As demand for these alternatives in dry cleaning increases, manufacturers continue to innovate and improve the equipment and chemistries necessary to use these alternatives to address many of the issues, such as longer cleaning cycles, limited soil removal and garment compatibility.

Overall the alternative solvents discussed in this Plan are less persistent in the environment than perc and most of the alternatives are preferable or equivalent to perc from a human health perspective.

The major concern that exists for many of the alternatives is flammability. Only wet cleaning is equivalent to perc in this regard. The other alternatives are rated as combustible, thus requiring specialized equipment to protect against fire or explosion.

Therefore, \_\_\_\_\_ (*Dry Cleaner Facility Name*) has chosen the following TUR measures for this facility:

<i>TUR Option</i>	<i>Schedule of Implementation</i>

TUR Options Requiring Further Evaluation: We are interested in the following additional technologies and/or processes and/or modifications:

- *Include a list of other technologies, solvents, or process changes you are interested in, but might require more information or more of a financial investment than you are able to support at this time.*

TUR Options Rejected As Inappropriate: The following toxics use reduction options do not work for our facility:

- *Include a summary list of toxics use reduction options that do not currently work for your facility, and how you made the determination that this is true.*

<sup>12</sup> 310 CMR 50.46 – The schedule for implementation for each TUR option selected will be laid out.

## Plan Certification<sup>13</sup>

### ***TUR Planner Certification***

Based on my independent professional judgment as a toxics use reduction planner, I certify under penalty of law that the following is true:

- (a) I have examined and am familiar with this toxics use reduction plan;
- (b) the plan satisfies the requirements of 310 CMR 50.40; and
- (c) the plan demonstrates a good faith and reasonable effort to identify and evaluate toxics use reduction options.

Toxics Use Reduction Planner: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

### ***Senior Management Official Certification***

I certify under penalty of law that the following is true:

- (a) I have personally examined and am familiar with this toxics use reduction plan;
- (b) I am satisfied that any supporting documentation used in the development of the plan exists and is consistent with the plan;
- (c) Based on my inquiry of those individuals immediately responsible for the development of this plan, I believe that the information in the plan and any supporting documentation used in the development of the plan is true, accurate, and complete;
- (d) The plan, to the best of my knowledge and belief, meets the requirements of 310 CMR 50.40;
- (e) I am aware that there are penalties for submitting false information, including possible fines and imprisonment.

Senior Management Official: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

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<sup>13</sup> 310 CMR 50.42(3) and (4) – The statements of certification by the TUR Planner and senior management must be included with this wording.

## Appendix A – Plan Summary<sup>14</sup>

**Chemical Name:** Perchloroethylene or perc  
CAS #: 127-18-4

**Two-year Projected Changes (Total lbs.):**

Use: \_\_\_\_\_

Byproduct: \_\_\_\_\_

**Five-year Projected Changes (Total lbs.):**

Use: \_\_\_\_\_

Byproduct: \_\_\_\_\_

**Options Considered:**

- **Input Substitution:** \_\_\_\_\_  
\_\_\_\_\_
- **Improved Operation & Maintenance:** \_\_\_\_\_  
\_\_\_\_\_
- **Process Modification:** \_\_\_\_\_  
\_\_\_\_\_
- **Other:** \_\_\_\_\_  
\_\_\_\_\_

**Options Selected:**

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

**Additional information:** *(include information about your TUR Plan and/or progress that would be beneficial for MassDEP or the public)*

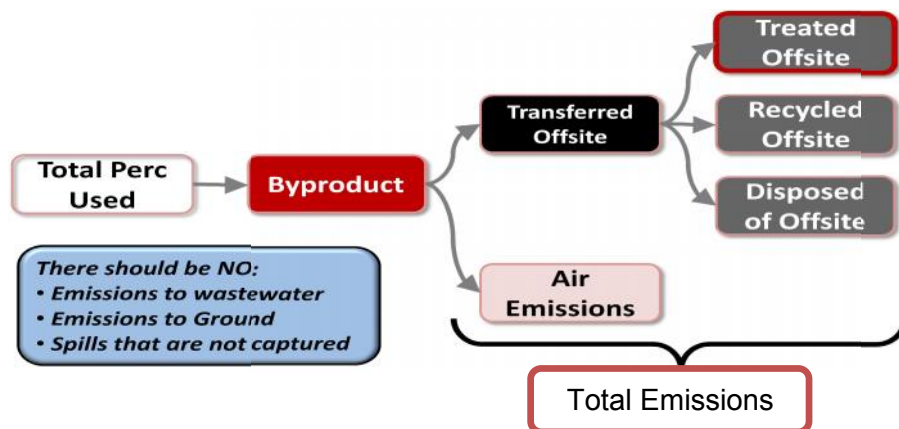
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

*The TUR Planner Certification and Senior Management Official Certification must also be submitted on the MassDEP Plan Summary Form*

<sup>14</sup> 310 CMR 50.47 - The Plan Summary is the only portion that is actually submitted to the DEP on July 1 of a planning year – the facility will fill out the relevant information, listed above, on a form published by Mass DEP during the planning year.

## Appendix B – Calculations Associated with Reporting Perc Use, and Generation of Byproducts and Emissions of Perc

The following figure illustrates the relationship between chemical use, generation of byproducts and generation of emissions. Perc used in dry cleaners all becomes byproduct, which in turn all becomes emissions.



Perc used in dry cleaning **all** becomes byproduct, which in turn **all** becomes emissions. The following calculations thus are simply to determine the amounts of perc in different byproduct and emissions categories for reporting purposes.

Referring to the figure above, byproduct at dry cleaning facilities consists primarily of hazardous waste that is transferred and treated off-site. Spills should be captured and managed as hazardous waste. Wastewater from perc dry cleaners (i.e., from separator water) is typically not permitted to municipal wastewater treatment facilities, and is expressly prohibited from discharge to any septic system in Massachusetts. Thus, if you cannot discharge your separator wastewater, you must ship it along with your other hazardous waste.

Hazardous waste is typically incinerated, which is classified as “treatment off site” under TURA.

TURA also defines air emissions from dry cleaners as byproducts. Air emissions include air emissions from the in-shop cleaning process, plus subsequent emissions of perc from cleaned clothes returned to customers. Since all the perc used becomes some type of byproduct, the amount of perc air emissions is the difference between the total perc used and the byproduct that is treated offsite.

Total emissions from the facility are hazardous waste byproduct treated offsite plus air emissions.

Note that the definition of ‘emissions’ is somewhat different under TURA and other regulations like TRI and the Clean Air Act

**Calculating Use:**

To calculate the amount of perc used, simply add the amount of perc in inventory (i.e., present in your machine, any in storage, and the amounts in pretreatment (spotting) agents) on January 1 to the amount purchased during the calendar year. Then subtract from that number the amount of perc in inventory on December 31. If your records are in gallons, convert to lb using the factor 13.5 lb perc per gallon.

**Table 1 – Calculation Worksheet for Amount of Perc Used Annually**

Inventory on January 1	Purchased			Inventory on December 31
	Product	% Perc in Product	Amount of Perc Purchased	
<i>1012.5 lb (75 gal)</i>	<i>Machine 1</i>	<i>100%</i>	<i>2,700 lb (200 gal)</i>	<i>675 lb (50 gal)</i>
<i>607.5 lb (45gal)</i>	<i>Machine 2</i>	<i>100%</i>		<i>472.5 lb (35 gal)</i>
	<i>POGxyz (24 16 oz cans)</i>	<i>5%</i>	<i>24 x 1 lb x 0.05 = 1.2 lb</i>	
<b><i>1,620 lb</i></b>			<b><i>2,701 lb</i></b>	<b><i>1,148 lb</i></b>
<b>Total Amount of Perc Used</b>				<b><i>5,469 lb perc</i></b>

**Calculating Byproduct and Emissions:**

The California Air Resources Board commissioned an in depth study of the emissions from dry cleaning operations, and developed guidance on estimating the amount of perc in the primary waste products from these operations, including still bottoms (sludge), used cartridge filters and separator water. These are the waste streams that are considered to be byproduct shipped off site for treatment (typically incineration).

*To determine the amount of byproduct generated at your facility, it is best to gather direct records. However, most hazardous waste haulers do not break down the amount of perc present in the waste they transport off-site from your facility.*

According to the California study, the average amount of perc in separator water transported off site for treatment is approximately 1.2 lb/year from a primary machine.

The following tables provide guidance on estimating the amount of perc present in hazardous waste, based on the amount (in pounds) of clothes processed annually:

**Table 2 – Estimates for Amount of Perc in Sludge Annually**

Machine Type	% of Perc Use Shipped as Hazardous Waste Sludge
Converted	19.5%
Primary (Spin Disk Only)	53.0%
Primary (Cartridge Only)	30.2%
Primary (Combo)	44.4%
Secondary (Spin Disk Only)	63.7%
Secondary (Cartridge Only)	51.4%
Secondary (Combo)	66.3%

The following is an example of estimating the amount of perc present in spent filters from one machine, which in this example is a secondary machine that uses a combination of cartridge and spin disk filtration methods, for a facility which used 250 gallons over the course of the year:

$$100 \text{ gal} \times (13.5 \text{ lb perc/gal}) \times 0.663 = 895 \text{ lb perc in waste sludge}$$

**Table 3 – Estimates for Amount of Perc in Spent Filters Annually**

Machine Type	# Filters used per 100,000 lbs clothes	Gallons of Perc used per 100,000 lbs clothes
Converted	47	230
Primary (Cartridge Only)	39	210
Primary (Combo)	30	170
Secondary (Cartridge Only)	21	130
Secondary (Combo)	13	130

The California study determined that, on average, the amount of perc remaining on spent filters is 10.98 lb/filter, or approximately 11 lb. There are two options for estimating the amount of perc remaining on spent filters that are managed as hazardous waste.

**Option 1:** Count the number of filters used per year, then multiply by 11 to determine the amount of perc (lb) in spent filters per year.

$$\begin{aligned}
 &65,000 \text{ lb clothes processed in secondary combo machine} \\
 &\text{Look at table for estimated number of filters per 100,000 lb clothes} \\
 &\quad (13 \text{ filters}/100,000 \text{ lb}) \times (65,000 \text{ lb}) = 9 \text{ filters} \\
 &\quad 9 \text{ filters} \times 11 \text{ lb perc/filter} = 99 \text{ lb perc in spent filters}
 \end{aligned}$$

**Option 2:** If no information on the number of filters used is available, use table above to estimate amount of perc in spent filters.

*100 gal perc used annually in secondary combo machine*  
*Look at table for ratio of gal perc used per 100,000 lb clothes for this machine*  
 $130 \text{ gal}/100,000 \text{ lb clothes} = 0.0013 \text{ gal/lb}$   
 $100 \text{ gal}/0.0013 \text{ gal/lb} = 77,000 \text{ lb clothes/year}$   
 $(13 \text{ filters}/100,000 \text{ lb}) \times 77,000 \text{ lb} = 10 \text{ filters}$   
 $10 \times 11 = 110 \text{ lb perc in spent filters}$

Based on these estimates, cleaners can estimate the amount of perc that they ship off site annually, using the following worksheet:

**Table 4 – Calculation Worksheet for Amount of Perc in Hazardous Waste Byproduct Annually**

Hazardous Waste Byproduct	Amount of Perc Generated as Byproduct
Sludge	<i>2,240</i>
Spent Filters	<i>99</i>
Separator Water	<i>1.2</i>
Spills	<i>0</i>
<b>Total</b>	<b><i>2,340</i></b>

**Calculating Emissions:**

Emissions from dry cleaners are byproduct generated and air emissions that are not captured or contained. The best way to estimate total air emissions from your facility is simply to determine the difference between the amount used (according to your records) and the amount generated as byproduct (as estimated above).

**Table 5 – Calculation Worksheet for Amount of Perc Air Emissions Generated Annually**

Perc Used	Perc in ByProduct	Perc in Air Emissions
<i>5,469 lb</i>	<i>2,340 lb</i>	<i>5469 – 2340 = 3,129 lb</i>

The California study references a 2000 study that estimates that, for a facility that cleans 52,000 lb of clothes annually, approximately 0.3 gal (just over 4 lb) of perc remains on clothes returned to customers after processing. This translates to approximately  $8 \times 10^{-5}$  lb perc per pound of clothes. Cleaners can use this conversion factor to estimate the amount of perc remaining in clothes.

$$77,000 \text{ lb clothes/year} \times 0.00008 \text{ lb perc/lb clothes} = \mathbf{6 \text{ lb perc in clothes that leave the shop}}$$



**Appendix C – Dry Cleaners Toxics Use Reduction  
Opportunities**  
(developed by MassDEP)