Session F:
Newly Regulated Sectors
Focus on Dry Cleaners

Presenters:
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Marina Gayl, OTA

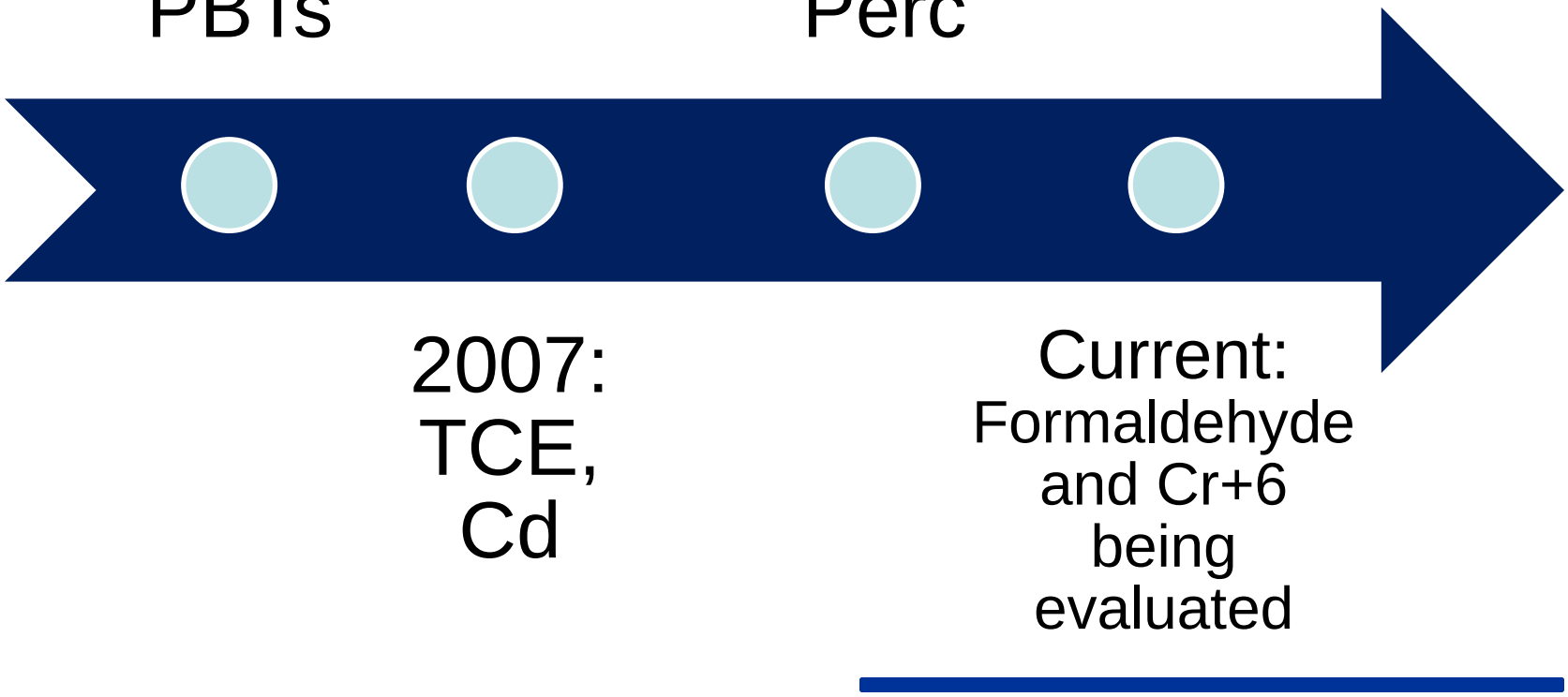
April 14, 2010

Session Agenda

Today you will learn about:

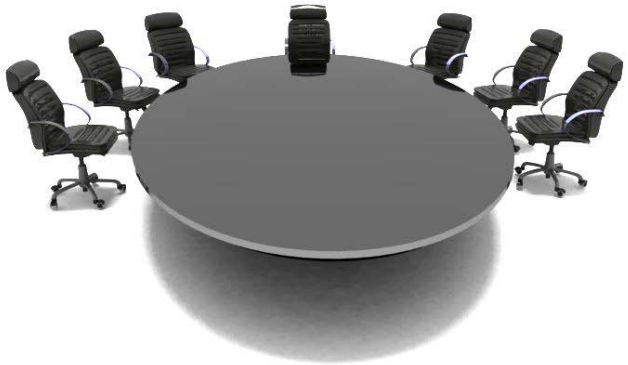
- How High Hazard Substances Designation Impacts New Industries
- Focus on Dry Cleaners
- Reporting and Planning for Dry Cleaners
- Alternatives to Perc in Dry Cleaning

Higher Hazard Substances



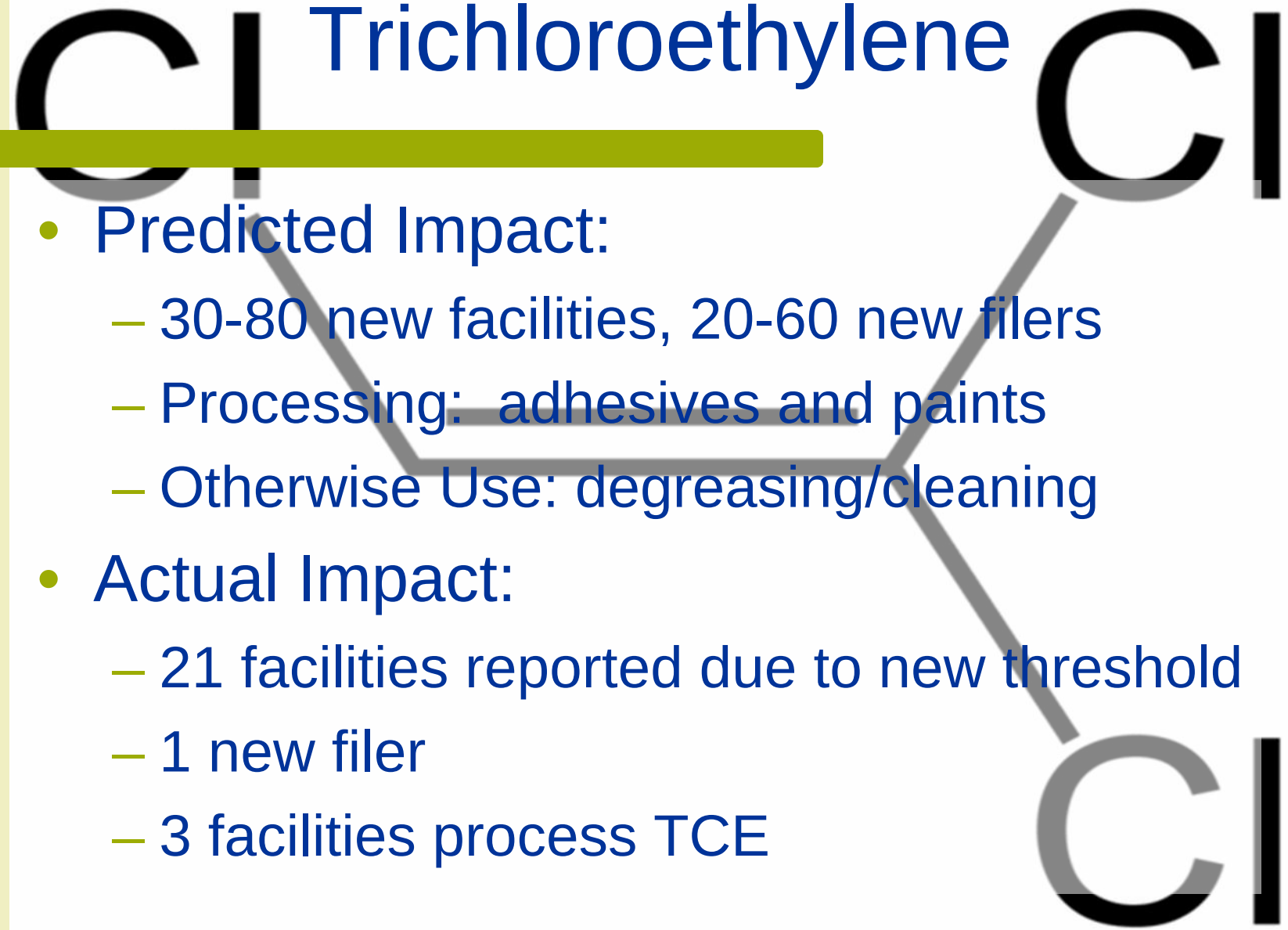
Policy Analyses

- TURI conducts analyses of chemicals recommended for consideration by the Science Advisory Board
- Analysis includes:
  - State of the Science
  - Number of Facilities Affected
  - Opportunities for New Filers
  - Regulatory Context
  - Implications for the TUR Program



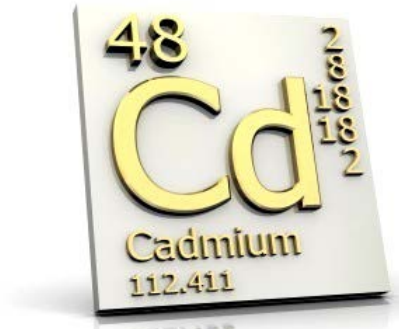
http://www.turi.org/policy/science_advisory_board/science_advisory_board/sab_work/higher_and_lower_hazard_substances

Trichloroethylene



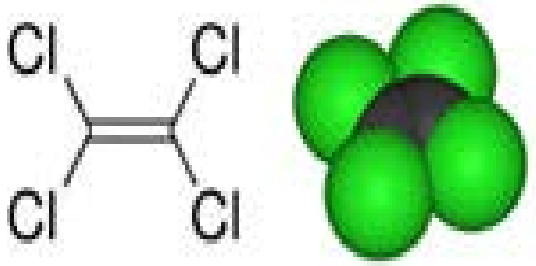
- Predicted Impact:
  - 30-80 new facilities, 20-60 new filers
  - Processing: adhesives and paints
  - Otherwise Use: degreasing/cleaning
- Actual Impact:
  - 21 facilities reported due to new threshold
  - 1 new filer
  - 3 facilities process TCE

Cadmium and Cadmium Compounds



- Predicted Impact:
  - 30 new facilities
  - Primarily production of colorants, resins and plastics
- Actual Impact:
  - 11 facilities now report due to new threshold
  - 1 new filer
  - 5 companies are platers, 2 companies in polymers and plastics

Perc Designation



- Predicted Impact:
  - Dry cleaning industry most likely to be impacted
  - Estimate 40 to 100 dry cleaners will need to report and plan
  - 7 to15 new filers possible in adhesives/ sealants and plastic film/sheet sectors

Summary of Dry Cleaning Industry

- Over 550 dry cleaners in Mass use perc
- Use >970,000 pounds perc
- Generate >600,000 lb perc waste
- Dry cleaners range from
  - Drop off locations – take dry cleaning off site
  - Small cleaners (~40,000 lb garments/year)
  - Large cleaners (>100,000 lb garments/year)
  - Specialty shops (e.g., restoration)

Do You Use a Dry Cleaner?

Alternatives

Alternative	Common Product Name *(italics)* /Composition	Estimated usage (2009)
Carbon Dioxide	Liquid carbon dioxide	2%
Glycol Ethers	*Rynex 3™ and Gen-X™*: Substituted aliphatic glycol ethers	14%
	Solvair™: Dipropylene glycol n-butyl ether and liquid CO2	
Hydrocarbons	*D5*: Isoparaffin Hydrocarbon	33%
nPB	*DrySolv™*: n-Propyl bromide	2%
Siloxanes	*Green Earth™*: Volatile methyl siloxane	11%
Wet Cleaning	Aqueous based with various detergents	2%

Source: *Only Half of Drycleaners Now Use Perc, Survey Says*, American Drycleaner, October 15, 2009

Alternatives

- CO_2 – Expensive but relatively benign; liquid CO_2 + detergents
- Glycol Ethers – Organic solvent; dipropylene glycol t-butyl ether + detergents (Rynex or Gen-X); dipropylene glycol n-butyl ether + CO_2 (Solvair)
- Hydrocarbons – Various petroleum based options (DF-2000, PureDry, EcoSolv, stoddard solvent); fire safety concerns

Alternatives (continued)

- nPB – considered drop in substitute for perc (DrySolv); some equipment compatibility concerns
- Siloxanes – often marketed as “green” alternative; volatile methyl siloxanes (GreenEarth)
- Wet Cleaning – computerized aqueous system with detergents; virtually no EHS concerns

Summary of Alternatives – Technical Criteria

Assessment Criteria	PCE	Carbon Dioxide	Glycol Ethers *(Rynex and Gen-X)*	Glycol Ethers + CO_2 *(Solvair)*	Hydrocarbons	nPropyl Bromide	Siloxanes	Wet Cleaning
Cycle time (min)	45	35 - 45	>45	>45	45 - 60	45	45 - 60	20 - 40
Load capacity (pounds)	50	45	43	<30	70	50	56	50
Cleaning capability	Aggressive	Gentle	Aggressive	Aggressive	Gentle	Aggressive	Gentle	Aggressive
Difficult clothing types	Leather, Suedes, Beads, Delicates	Triacetates, specially dyed acetates				unknown		Leather, Suedes, Linens
Spotting requirements	Medium	High	Low	Low	Medium	Medium	High	Medium
Special Equipment Requirements	None	High pressure	Requires vapor recovery	High pressure	Requires vapor recovery	Not compat. with rubber or Al	Combustible – must meet fire safety codes	Additional finishing equip. and training required
Waste Management	Handle spent solvent and solids as haz. waste		Difficult to distill water prior to waste mgmt		Bacterial growth needs to be managed; waste not haz.	Residual PCE a concern	Separation required prior to waste mgmt	None

Summary of Alternatives – Financial Criteria

Assessment Criteria	PCE	Carbon Dioxide	Glycol Ethers (*Rynex and Gen-X*)	Glycol Ethers + CO_2 (*Solvair*)	Hydrocarbons	nPropyl Bromide	Siloxanes	Wet Cleaning
Equipment (*)	$30,000 - $65,000	$80,000 - >$150,000	$90,000	>$150,000	$40,000 - $75,000	$40,000 - $65,000	$40,000 - $75,000; Lic. fee $2500/yr	$36,000 - $61,000
Annualized cost per pound cleaned: small facility ‡	$1.13	?	$1.48	>$1.48	$1.08 - $1.16	?	$1.23	$1.23
Annualized cost per pound cleaned: large facility ‡	$0.85	$1.14	?	?	$0.80 - $0.87	?	$0.91	?

* Capital costs from survey conducted in Los Angeles, California by the South Coast Air Quality Management District Small Business Assistance program, 2004, or from system literature, as available

‡ Operating costs derived from Morris and Wolf, 2005 study

Summary of Alternatives – EH&S

Assessment Criteria	PCE	Carbon Dioxide	Glycol Ethers *(Rynex and Gen-X)*	Glycol Ethers + CO_2 *(Solvair)*	Hydrocarbons	nPropyl Bromide	Siloxanes	Wet Cleaning
Persistence: Water	Mod. (60 days)	Low (15)	Low (38)	Low (15)	Low (6)	Low (15)	Low (38)	Low
Persistence: Soil	Mod. (120 days)	Low (30)	Low (75)	Low (30)	High (180)	Low (30)	Mod. (75)	Low
Persistence: Sediment	High (540 days)	Mod. (140)	High (340)	Mod. (140)	High	Mod. (140)	High (340)	Low
Persistence: Air	High (98 days)	High (180)	Low (0.41)	Low (0.32)	Low (<2)	Mod. (14)	High (10)	Low
Bioaccumulation (BCF)	Low (83)	Low (3.2)	Low (1.2)	Low (1.5)	unknown	Low (8.3)	Mod. (2000)	Low
Aquatic Toxicity (mg/L)	Not est.	Low (44)	High (1.2)	Low (100)	Not est.	Low (9.5)	High (0.021)	Low
Exposure limits (ppm)	25	5000	100	100	100	10	10	NA
Dermal/Ocular/ Respiratory Irritant	All	None	Dermal, ocular	Dermal, ocular	Dermal, ocular	All	Respiratory	None
Carcinogenicity	Probable Human Carcinogen (IARC 2A)	No	Animal studies indicate potential	Animal studies indicate potential	Animal studies indicate potential	No	Animal studies indicate potential	No
Repro/Develop Toxicity	No	No	No	No	No	Repro. tox. to males & females	Studies indicate concern	No
Flammability (NFPA rating)	0	0	1	1	2	3	2	0
Other	Combustion byproducts: HCl and phosgene	Asphyxiant in high conc.	NA	NA	NA	NA	Degradation products: formaldehyde	NA
Target Organs	Eyes, respiratory, liver, kidneys, CNS	Lungs, respiratory, skin, CNS, cardio-vascular	CNS, skin, eyes	CNS, skin, eyes	CNS	Neuro-toxicant, CNS, liver, eyes, resp., skin	Liver	none
Volatile Organic Compound	Yes	No	Yes	Yes	Yes	Yes	No	No

Summary of Alternatives – Regulatory Restrictions

Regulatory Consider-ations	PCE	Carbon Dioxide	Glycol Ethers *(Rynex and Gen-X)*	Glycol Ethers + CO_2 *(Solvair)*	Hydrocarbons	nPropyl Bromide	Siloxanes	Wet Cleaning
Clean Air Act	HAP	No	No	No	VOC	VOC	No	No
Hazardous waste disposal	Listed hazardous waste	No	No	No	Yes	No	No	No
Flammability (NFPA rating)	No (0)	No (0)	Combustible liquid (1)	Combustible liquid (1)	Flammable (2)	Flammable (3)	Combustible liquid (1)	No (0)
Federal reportable toxic chemical	Yes	No	Yes	Yes	No	No	No	No
Mass. reportable toxic chemical	Yes, high hazard substance	No	Yes	Yes	No	Yes	No	No
Other	Leak detection and repair	High pressure storage may require compliance with codes	NA	NA	Compliance with local fire safety codes required	Compliance with local fire safety codes required	NA	Permit req'd for discharge to POTW or septic

Overall Summary

Assessment Criteria		PCE reference	Carbon Dioxide	Glycol Ethers (*Rynex and Gen-X*)	Glycol Ethers + CO_2 (*Solvair*)	Hydrocarbons	N Propyl Bromide	Siloxanes	Wet Cleaning
Technical Criteria	Cycle time	45 min	✚	⊘	⊘	⊘	≈	⊘	⊘
	Load capacity	50 lbs	⊘	⊘	⊘	✚	≈	≈	≈
	Difficult clothing types	Leather, Suedes, Beads, Delicates	≈	✚	✚	✚	≈	✚	≈
	Spotting requirements	Medium	⊘	✚	✚	≈	≈	⊘	≈
Financial Criteria	Equipment	$30,000 - $65,000	⊘	⊘	⊘	⊘	≈	⊘	✚
	Cost per pound cleaned	$1.13	⊘	⊘	⊘	≈	≈	⊘	⊘
Regula-tory	Hazardous, HAP, Discharge limits, Reportable toxic chemical (US and MA)		✚	≈	≈	✚	≈	✚	✚
Environmental Criteria	Persistence: Water	Moderate (60 days)	✚	✚	✚	✚	✚	✚	✚
	Persistence: Soil	Moderate (120 days)	✚	✚	✚	⊘	✚	≈	✚
	Persistence: Sediment	High (540 days)	✚	≈	✚	✚	✚	≈	✚
	Persistence: Air	High (98 days)	≈	✚	✚	✚	✚	≈	✚
	Bioaccumulation (BCF)	Low (83)	≈	≈	≈	?	≈	⊘	≈
	Aquatic Toxicity	Not estimated	✚	⊘	✚	?	✚	⊘	✚
Human Health and Safety Criteria	Exposure limits	25 TLV	✚	✚	✚	✚	⊘	⊘	✚
	Dermal/Oral/ Respiratory	Irritant	✚	≈	≈	≈	≈	✚	✚
	Carcinogenicity	Prob. Human Carcinogen	✚	✚	✚	✚	✚	✚	✚
	Repro/Develop Toxicity	No	≈	≈	≈	≈	⊘	⊘	≈
	Flammability	Nonflammable	≈	⊘	⊘	⊘	⊘	⊘	≈

How Have we Found Dry Cleaners

- ERP reporters
- Trade association databases
- Dry-by visits (OTA)
- Participants in demonstrations of wet cleaning

Upcoming Trainings for Dry Cleaners

- **Wednesday - April 28, 2010**, 4:00 - 6:00PM
- Bridgewater State College, East Campus Commons, Room 113 (Executive Dining Room)
- **Friday - April 30, 2010**, 4:00 - 6:00PM
- UMass Lowell/Wannalancit Bldg – 600 Suffolk St. MIL Room 1st floor
- **Wednesday May 5, 2010**, 4:00 - 6:00PM
- Quinsigamond Community College, 670 West Boylston Street, Worcester – Harrington Learning Center, Room 109A

How You Can Work With Dry Cleaners

- **Assist in evaluating technically and economically feasible alternatives**
- TURI Resources available:
  - TURI's 2006 Five Chemicals Alternatives Assessment Study – section on dry cleaning
  - Assessment of Safer Alternatives to Perc for Professional Garment Care (pending)
  - Community website: http://www.turi.org/community/wet_cleaning

HELP IS AVAILABLE

- The MA Office of Technical Assistance provides free, confidential help, including onsite visits.

  Marina Gayl at 617-626-1077

  Rick Reibstein at 617-626-1062

- The MA Toxics Use Reduction Institute has information on dry cleaning alternatives.

  Joy Onasch at 978-934-4343

  Pam Eliason at 978-934-3142

- The MA DEP staff provide clarifications and explanations of the TURA regulations.

  Lynn Cain at 617-292-5711