

City of Toronto Sewer Use By-law and Green Purchasing

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Greening Health Care:

*Purchasing Choices that will Reduce Your Energy Costs
& Environmental Impact Toronto, Sept. 22, 2003*

City of Toronto Sewer Use By-law

- ☛ Sewer use by-laws restrict what can be disposed of through the sewer and in what quantities
 - e.g. City of Toronto
 - 38 subject pollutants identified for reduction and/or elimination through the development and implementation of pollution prevention plans

City of Toronto Sewer Use By-law

☛ City of Toronto Sewer Use By-law 457-2000

- Requirement for Pollution Prevention Plan and submission of plan summary by December 31, 2001 to Commissioner (revised to March 31, 2002);
- Submit a revised and updated plan summary at least once every 2 years (from original submission date);
- Prepared a revised and updated P2 plan once every 6 years (from original submission date).

What is in a Pollution Prevention Plan?

- ☛ A description of the processes at the premises which use or produce subject pollutants;
- ☛ A description of those processes at the premise which are to be subject of pollution prevention planning;

What is in a Pollution Prevention Plan (cont.)?

- ☛ A list of the subject pollutants present at the premises at any stage of the operation of the premises;
- ☛ A summary of the plan;
- ☛ A declaration from an authorized person that the content of the plan is, to the best of that person's knowledge, true, accurate and complete

Subject Pollutants: Inorganics (Total =11)

☞ Arsenic

☞ *Cadmium*

☞ *Cobalt*

☞ *Chromium*

☞ Copper

☞ *Mercury*

☞ *Molybdenum*

☞ Nickel

☞ *Lead*

☞ *Selenium*

☞ *Zinc*

Subject Pollutants: Organics (Total = 27)

- ☛ *Benzene*
- ☛ *Chloroform*
- ☛ *1,2-dichlorobenzene*
- ☛ *1,4-dichlorobenzene*
- ☛ *Cis-1,2-dichloroethylene*
- ☛ *Trans-1,3-dichloropropylene*
- ☛ *Ethyl benzene*
- ☛ *Methylene chloride*
- ☛ *1,1,2,2-tetrchloroethane*
- ☛ *tetrachloroethylene*
- ☛ *Toluene*
- ☛ *Trichloroethylene*
- ☛ *Total xylene*
- ☛ *Di-n-butyl phthalate*
- ☛ *Bis (2-ethylhexyl) phthalate*
- ☛ *Alkylphenols*
- ☛ *Alkylphenol ethoxylates*
- ☛ *Aldrin/dieldrin*
- ☛ *Chlordane*
- ☛ *DDT*
- ☛ *Hexachlorobenzene*
- ☛ *Mirex*
- ☛ *PCB's*
- ☛ *3,3'-dichlorobenzidine*
- ☛ *Hexachlorobenzidine*
- ☛ *Pentachlorophenol*
- ☛ *Total PAHs*

Example of Some 'Subject Pollutants' Found in Health Care Facilities

- ☞ Cadmium
- ☞ Chromium
- ☞ Cobalt
- ☞ Lead
- ☞ Mercury
- ☞ Molybdenum
- ☞ Selenium
- ☞ Zinc
- ☞ Alkylphenols
- ☞ Alkylphenol ethoxylates
- ☞ Benzene
- ☞ Chloroform
- ☞ 1,2-dichlorobenzene
- ☞ 1,4-dichlorobenzene
- ☞ Bis (2-ethylhexyl) phthalate
- ☞ Di-n-butyl phthalate
- ☞ PCB's
- ☞ Toluene
- ☞ Xylene

Where are Subject Pollutants Found?

☛ Mercury:

- Housekeeping & Central Services: spills clean up, bleach
- Laboratories: reagents, preservatives (thimerosal), stains, fixatives (B5), plumbing (accumulates in trap)
- Patient Care Areas:
 - thermometers, blood pressure cuffs, manometers, Anderson tubes; esophageal dilators, pressure gauges,
- Facility: fluorescent lights, batteries, thermostats
- Diagnostic Imaging: X-ray films and solutions
- Dentistry: dental amalgams
- Pharmacy: old pharmacy stock, medications

Where are Subject Pollutants Found?

☞ Chromium

- Laboratories: chrome washing solutions

☞ Cobalt, Molybdenum

- Physical Plant: scavenger in boilers for corrosion prevention
- Laboratory: cobalt catalyst in microbiology reagents

☞ Lead

- Diagnostic Imaging: shields and aprons

Where are Subject Pollutants Found?

☞ Selenium

- Patient Care, Pharmacy, Housekeeping: hair care products

☞ Zinc

- Laboratories: tissue fixative (ZnCl_2)
- Pharmacy: ointment,
- Housekeeping: floor care products

Where are Subject Pollutants Found?

- ☛ Alkyl Phenols (including nonylphenol and octylphenol) and their ethoxylates
 - Housekeeping: Odour counteractant; Tub and tile cleaner, other cleaners
- ☛ 1,2-dichlorobenzene
 - Housekeeping: Drain cleaners
- ☛ 1,4-dichlorobenzene (Para)
 - Housekeeping: para-containing urinal blocks

Where are Subject Pollutants Found?

☛ Phthalates

- Print shop: binding glue
- Facility wide: e.g. from leaching of plasticizers in plastics

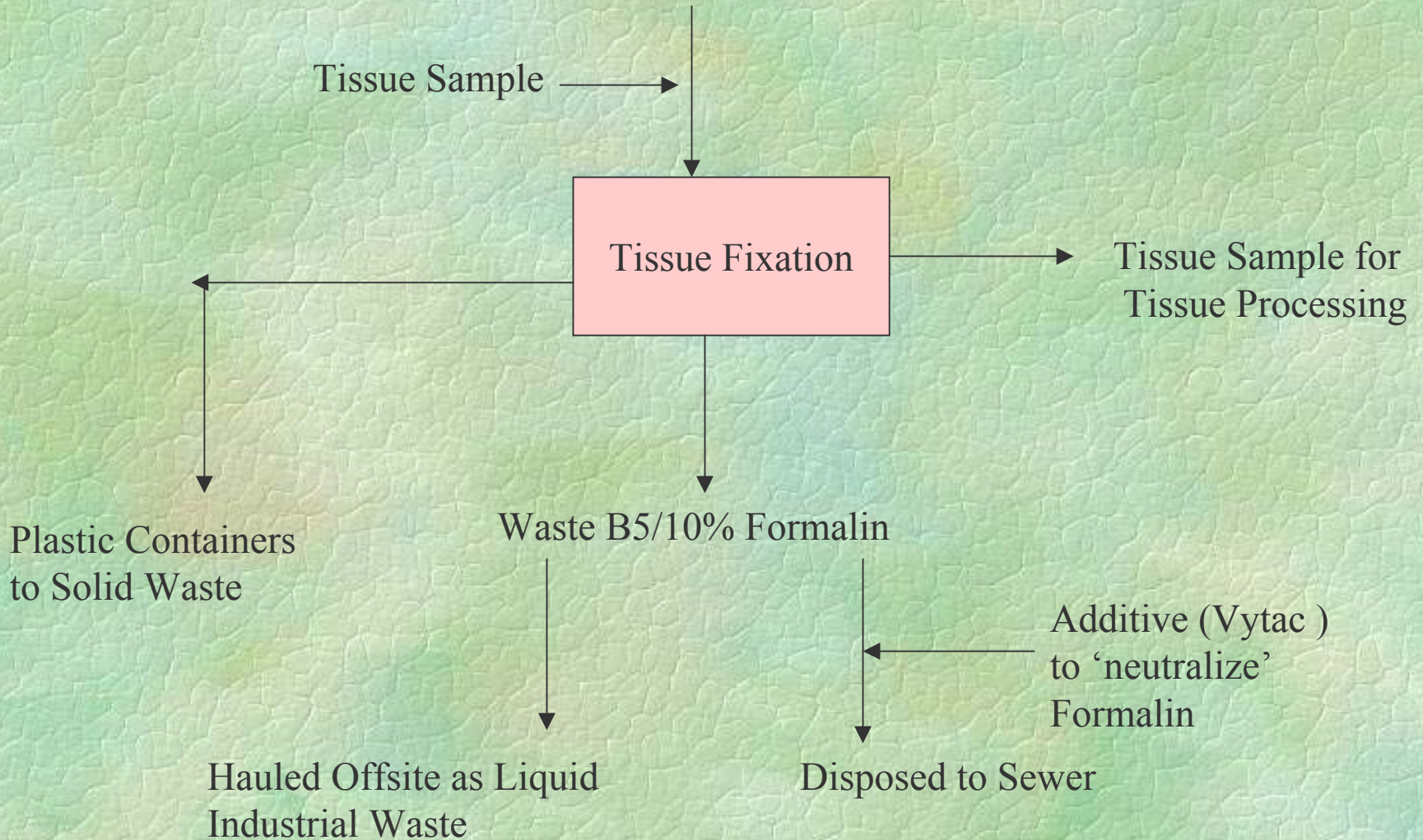
☛ Xylene

- Pathology, Histology: tissue preparations

☛ Other Solvents (toluene, chloroform)

- Laboratories

B5 / 10% Formalin
(Prepackaged: various container sizes)



**Example of a Process Flow Diagram for B5
(HgCl₂) / Formalin Use in Pathology**

Example: Substituting mercury based fixative (B5) in Pathology

- Facility assessment
- Review MSDSs
- Interview staff
- Contact suppliers

- Review information in literature
- Contact vendors, pathologists
- Find others who have used process with success

- Conduct comparison trials
- Get guidance from others who have used it with success (mentoring)

- Have pathologist & staff from mentor facility talk with pathologist & staff in learning facility

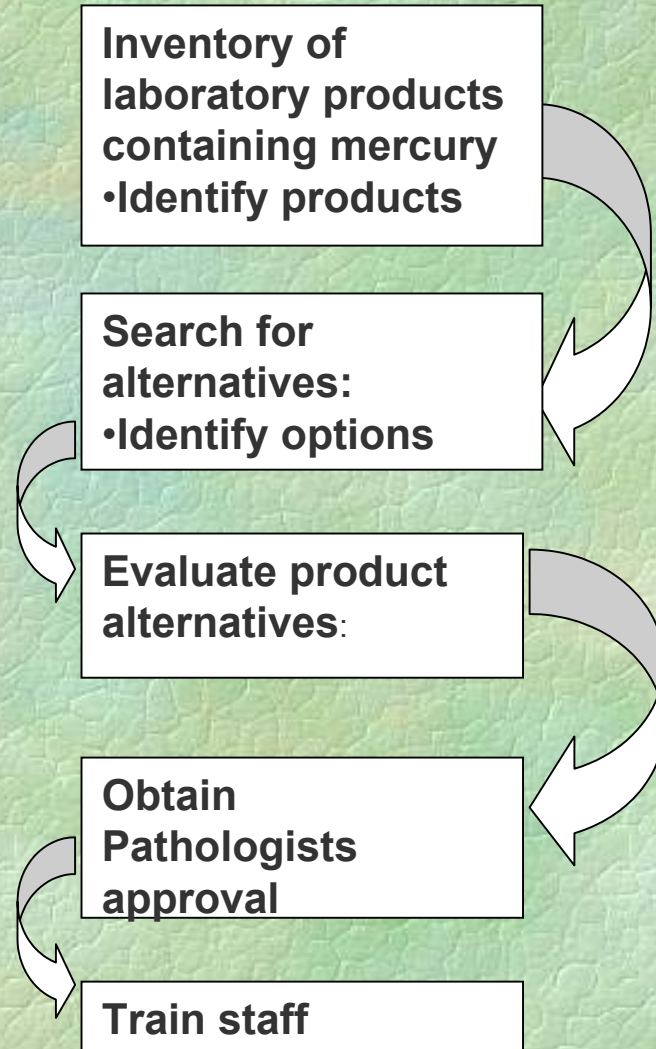
- Inventory of laboratory products containing mercury
- Identify products

- Search for alternatives:
- Identify options

- Evaluate product alternatives:

- Obtain Pathologists approval

- Train staff



Primary Pollution Prevention Option Used to Meet Requirements in Sewer Use By-law

☛ Product Substitution:

- Identify possible alternatives which are commercially available;
- Test alternative product with no or reduced subject pollutants;
- Replace original product with alternative that has reduced or no subject pollutants, if its acceptable.

Challenges:

- ☛ MSDSs do not show constituents below 1%;
- ☛ Some products do not require MSDS's (FDA products in labs)
- ☛ Significant data gaps due to out of date, or lost documents;
- ☛ Some subject pollutants are listed under various names;

Some of the many names of mercury additives (www.sustainablehospital.org)

☛ Merthiolate salt
Merthiolate sodium
Merzonin sodium
Merzonin, sodium salt
Nosemack
Sodium ethylmercurithiosalicylate
Mercuriothiolate
Mertorgan
Merfamin
Septicol
SET
Sodium ethylmercuric thiosalicylate
Sodium ethylmercurithiosalicylate
Sodium merthiolate
Sodium o-
(ethylmercurithio)benzoate
Sodium salt of 2-
(carboxyphenyl)thioethylmercury
Sodium 2-
(ethylmercurithio)benzoate

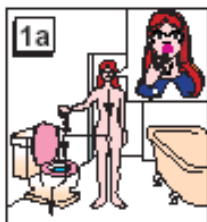
☛ Thimerosal
Thimerosal solution
Thimerosalate
Thimerosol
Thimerosol solution
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Thiomersalate
Thiomersal
Thiomersalan
Vitasepto

Challenges

- ☛ As soon as you finish a P2 Plan it becomes obsolete if you do not have control on new products coming in;
- ☛ Difficulty engaging purchasing department to develop a system to monitor incoming product content for subject pollutants;
- ☛ Each hospital is conducting own research and contacting suppliers to determine similar issues redundancy in cost and time

Emerging Areas of Concern

- ☛ Pharmaceuticals and Personal Care Products (PPCP)

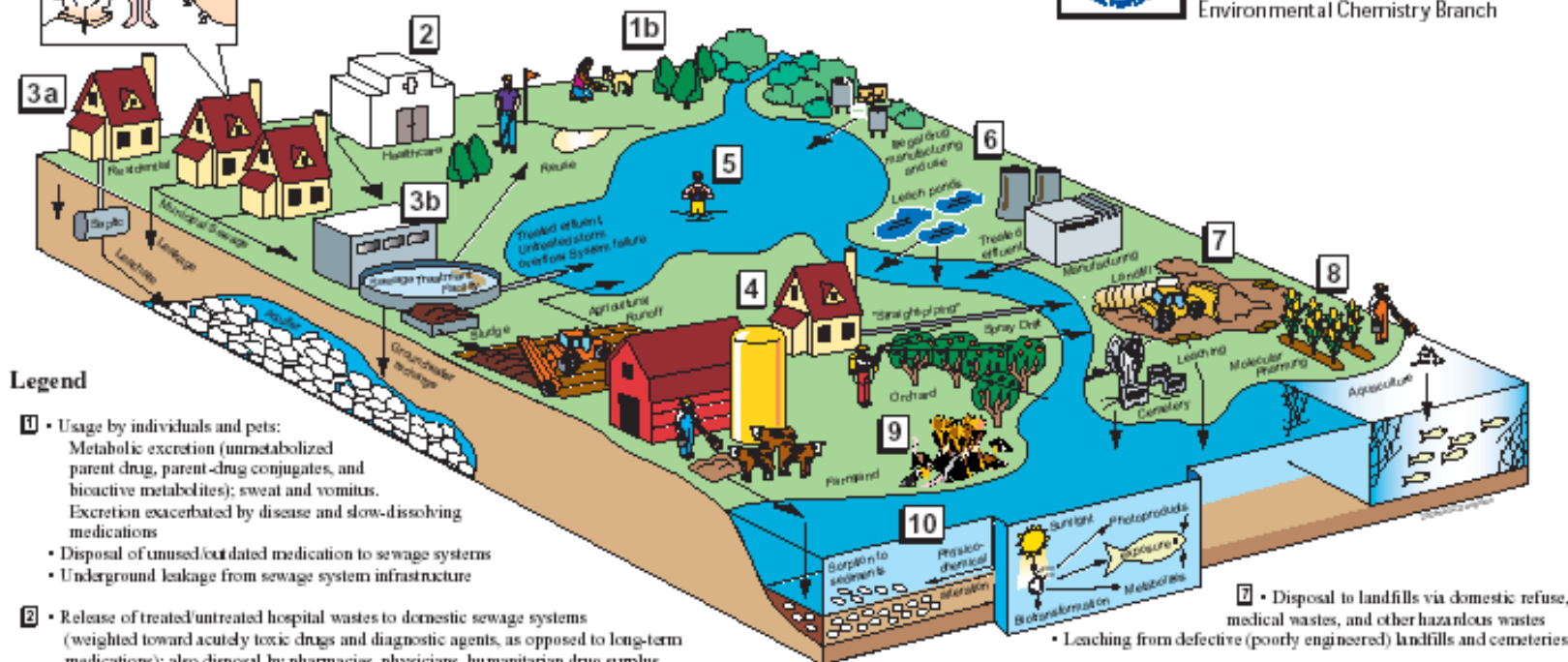


Origins and Fate of PPCPs¹ in the Environment

¹Pharmaceuticals and Personal Care Products



U.S. Environmental Protection Agency
Office of Research and Development
National Exposure Research Laboratory
Environmental Sciences Division
Environmental Chemistry Branch



Legend

- 1 • Usage by individuals and pets:
Metabolic excretion (unmetabolized parent drug, parent-drug conjugates, and bioactive metabolites); sweat and vomitus.
Excretion exacerbated by disease and slow-dissolving medications
• Disposal of unused/outdated medication to sewage systems
• Underground leakage from sewage system infrastructure
- 2 • Release of treated/untreated hospital wastes to domestic sewage systems (weighted toward acutely toxic drugs and diagnostic agents, as opposed to long-term medications); also disposal by pharmacies, physicians, humanitarian drug surplus
- 3 • Release to private septic/leach fields
• Treated effluent from domestic sewage treatment plants discharged to surface waters or re-injected into aquifers (recharge)
• Overflow of untreated sewage from storm events and system failures directly to surface waters
- 4 • Transfer of sewage solids ("biosolids") to land (e.g., soil amendment/fertilization)
• "Straight-piping" from homes (untreated sewage discharged directly to surface waters)
• Release from agriculture: spray drift from tree crops (e.g., antibiotics)
• Dung from medicated domestic animals (e.g., feed) - CAFOs (confined animal feeding operations)
- 5 • Direct release to open waters via washing/bathing/swimming
- 6 • Discharge of regulated/controlled industrial manufacturing waste streams
• Disposal/release from clandestine drug labs and illicit drug usage
- 7 • Disposal to landfills via domestic refuse, medical wastes, and other hazardous wastes
• Leaching from defective (poorly engineered) landfills and cemeteries
- 8 • Release to open waters from aquaculture (medicated feed and resulting excreta)
• Future potential for release from molecular farming (production of therapeutics in crops)
- 9 • Release of drugs that serve double duty as pest control agents:
examples: 4-aminopyridine, experimental multiple sclerosis drug → used as an avicide;
warfarin, anticoagulant → rat poison; azacholesterol, antilipidemics → avian/rodent reproductive inhibitors; certain antibiotics → used for orchard pathogens; acetaminophen, analgesic → brown tree snake control; caffeine, stimulant → coqui frog control
- 10 Ultimate environmental fate:
• most PPCPs eventually transported from terrestrial domain to aqueous domain
• phototransformation (both direct and indirect reactions via UV light)
• physicochemical alteration, degradation, and ultimate mineralization
• volatilization (mainly certain anesthetics, fragrances)