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Green Cleaning & Chemical Substitution

Introductions

Today's objectives

- Why green matters
- Frameworks for analysis
- Techniques for reducing risk
- Examples
- Resources to help

Why?

- Worker safety
- Consumer safety
- Liability
- Insurance costs
- Regulatory compliance costs & paperwork
- Costs to control, treat, or dispose
- Worker safety equipment costs
- Community reputation
- Customer demand / supply chain
- Environment!

Safety & health

What's the big deal?

I use that in my own bathroom!

Toxicology 101:

The dose makes the poison.

Workplace exposures are typically MUCH greater than household exposures

**Bleaching the
bathroom
(sodium
hypochlorite)**

Household cleaning:

$$(15 \text{ min}) \times (12 \text{ mos/year}) \times 40 \text{ years} \\ = 120 \text{ hours over lifetime}$$

Workplace cleaning:

$$(5 \text{ hours}) \times (5 \text{ days/week}) \times (50 \\ \text{weeks/year}) \times 40 \text{ years} \\ = 50,000 \text{ hours} \\ \mathbf{5.7 \text{ YEARS over lifetime}}$$

Many factors influence health impacts

- Acute vs. chronic exposure
- Ambient conditions
- Routes of exposure
- Individual physiological conditions
- Other hazards (eg, flammable)
- & many other variables!

- Immediate vs. delayed effects

Frameworks

A way of thinking and an order of operations

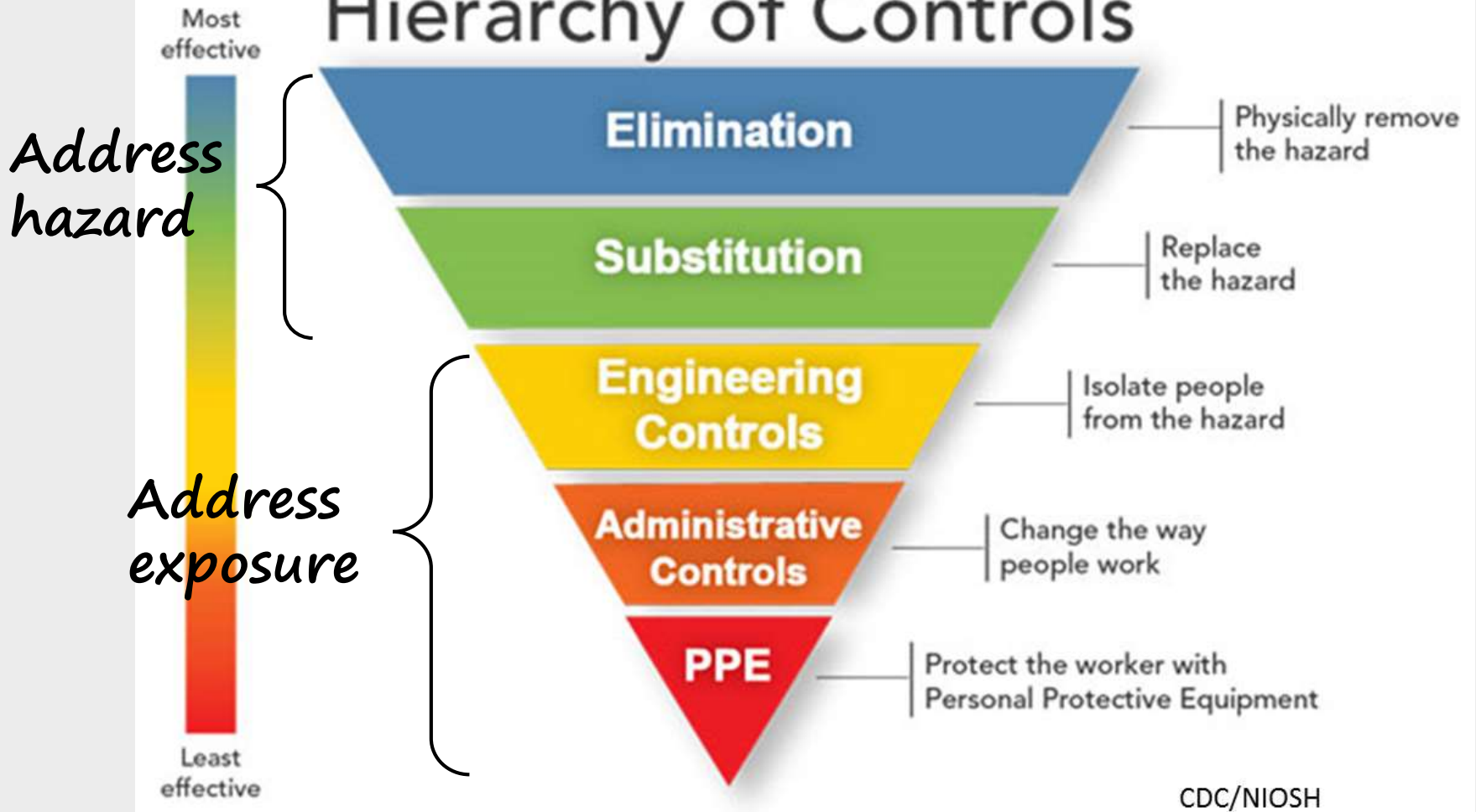
Frameworks

Our focus

$$\text{Risk} = \text{hazard} \times \text{exposure}$$

*Usual workplace safety focus
Hard to control
Never = 0
Sometimes fails*

Hierarchy of Controls



Toxics Use Reduction techniques

- Input substitution
- Product reformulation
- Redesign / modification
- Modernization
- Improved operation & maintenance
- Recycling

Massachusetts Toxics Use Reduction Act



D.D.T.
Powerful Insecticide
HARMLESS TO HUMANS
Applied by
TODD Insect Fog Sprayers
Approved 1946
Nations Health Organization - Geneva
U.S. Public Health Service



What is a Green Cleaner?

“Green” means nothing!

Lack of ingredient disclosure

Limited data



Safer Choice

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[Partner of the Year Awards](#)

Search Products that Meet the Safer Choice Standard

[EN ESPAÑOL](#)

 Show entries

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Product Name	Company	Sector	Type
Simple Green Industrial Cleaner and Degreaser	Sunshine Makers, Inc.	Business	All-Purpose Cleaners
Simple Green Industrial Cleaner and Degreaser - Lemon Scent	Sunshine Makers, Inc.	Business	All-Purpose Cleaners
Simple Green All Purpose Cleaner and Degreaser	Sunshine Makers, Inc.	Home	All-Purpose Cleaners
Simple Green All Purpose Cleaner and Degreaser - Lemon Scent	Sunshine Makers, Inc.	Home	All-Purpose Cleaners
Simple Green All-Purpose Cleaner & Degreaser - Lavender	Sunshine Makers, Inc.	Home	All-Purpose Cleaners



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TIPS FOR GREENER CLEANING
EWG'S CLEANERS



[Simple Green Stone Wipes](#) [DISCONTINUED]

Product Category: [Countertop Cleaner](#)

Cleaner



[Simple Green All-Purpose Cleaner, Lemon](#)

Product Category: [General Purpose Cleaner](#)

Cleaner



[Simple Green Concentrated All-Purpose Cleaner](#)

Product Category: [General Purpose Cleaner](#)

Cleaner



[Simple Green d Pro 3 One-Step Germicidal Cleaner & Deodorant](#)

Product Category: [Disinfectant](#)

Cleaner



[Simple Green Heavy-Duty Cleaner and Degreaser-Pressure Washer Concentrate](#)

Product Category: [Degreaser](#)

Cleaner



[Simple Green Lime Scale Remover](#)

Product Category: [Hard Water Stain Remover](#)

Cleaner



[Simple Green Naturals Dish Washing Liquid](#) [DISCONTINUED]

Product Category: [Hand Washing Detergent](#)

Cleaner



[Simple Green Pro HD Heavy-Duty Cleaner](#)

Cleaner

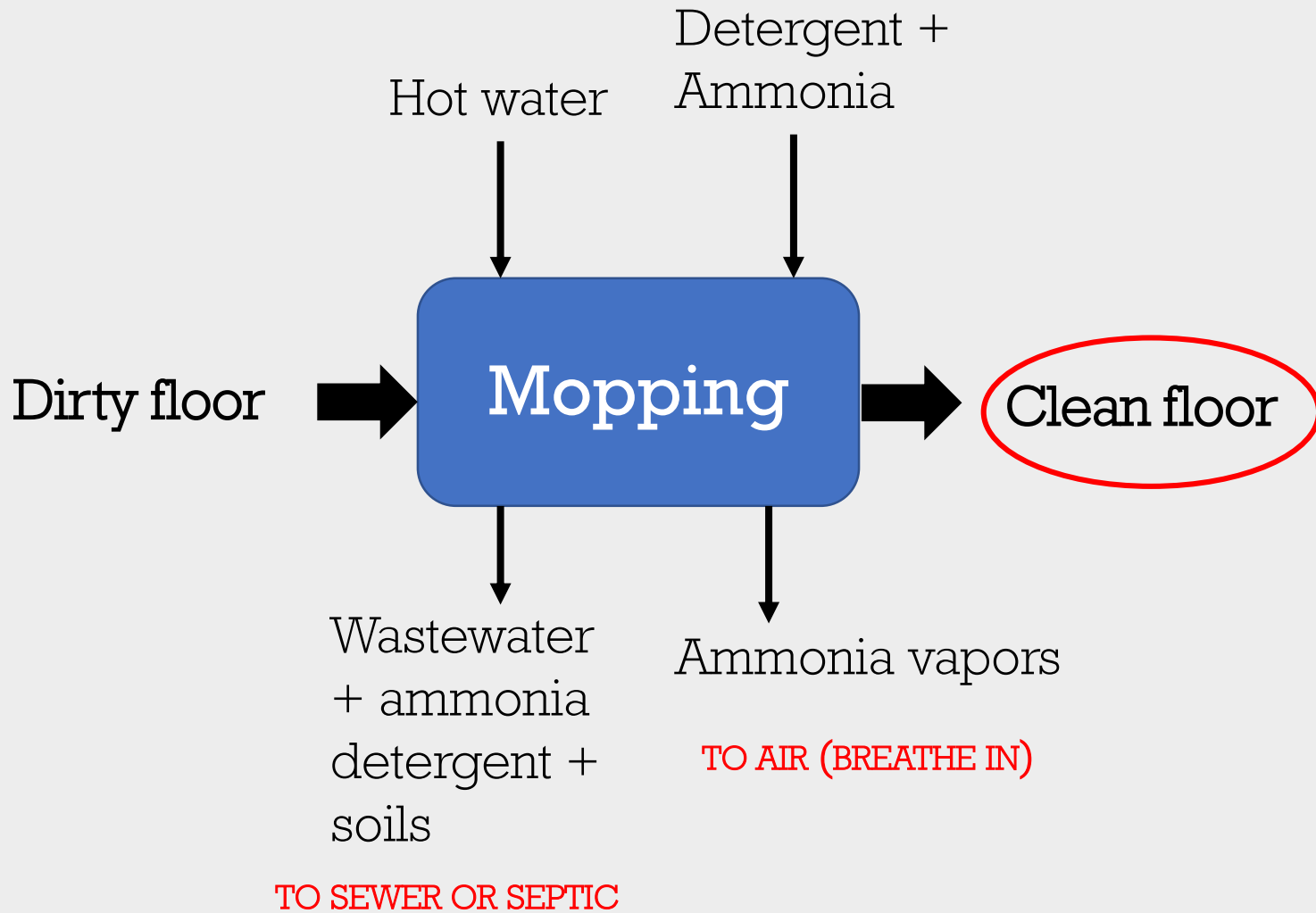


Frameworks: process mapping

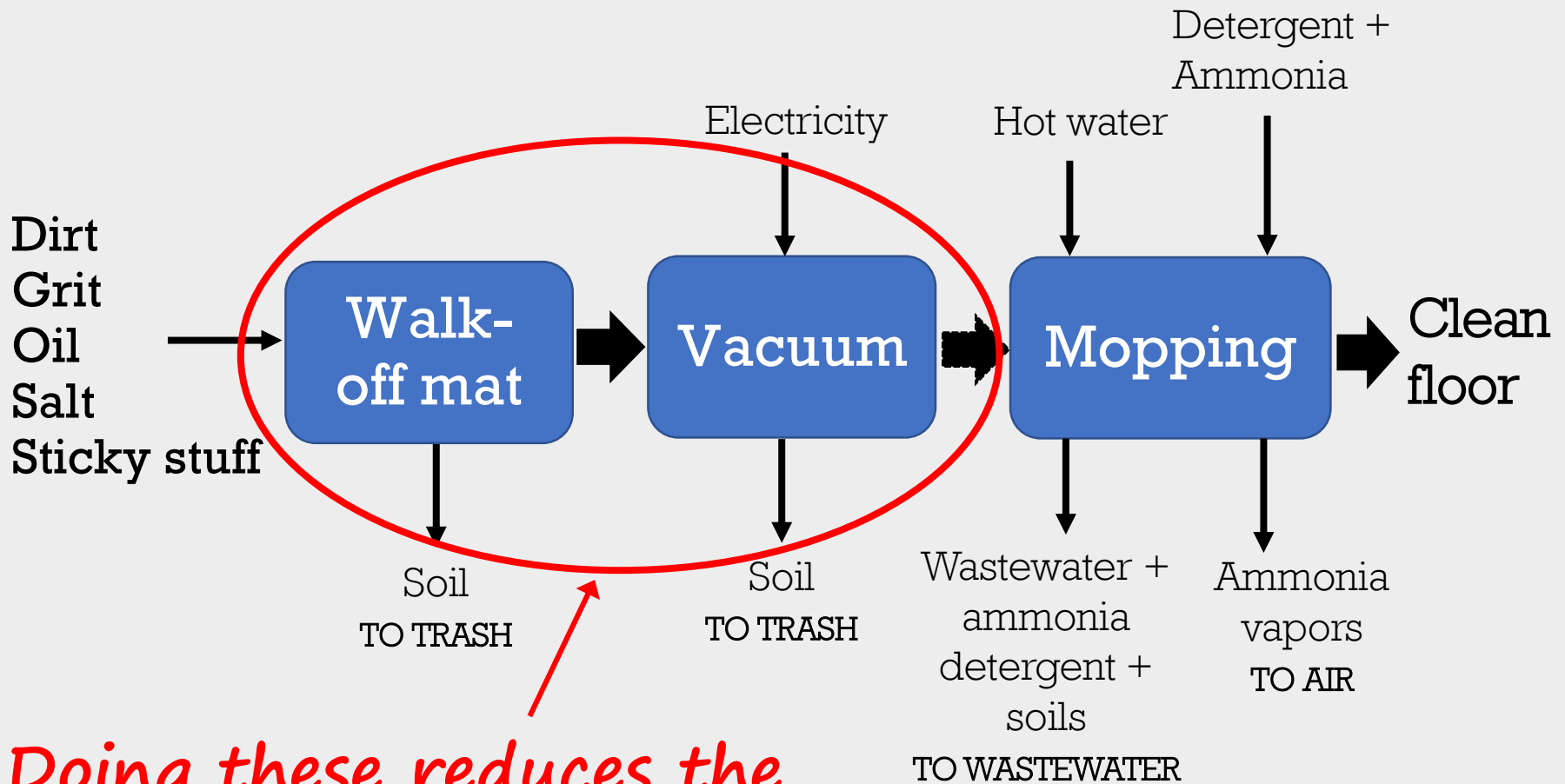
First, define the objective!

The best solutions may not be
at the problem – may be
upstream

Floor mopping



Floor mopping



Doing these reduces the work required of mopping

Examples

Product Reformulation

Offer products with “natural” finish

Switching to soy-based glues instead for formaldehyde glues in plywood

Removing heavy metals from your paint product

Input Substitution

Switch to aqueous parts washer instead of mineral spirits or solvent-based model

Using ultrapure water for cleaning instead of hazardous solvents

Switch to water-based or low-VOC paints or coatings

Process Re-design

Eliminate unnecessary cleaning steps

Dry clean-up before wet

Replace spray coating with powder coating

Replace solvent-based paint strippers with mechanical process like abrasion

Modernization

Installing high-efficiency nozzles to conserve chemicals/coatings

Installing automated flow controls

Using optical sensors to control duration of cleaning or prevent product loss

Replace older, leaky inefficient machines

Improved Operations & Maintenance

Read & follow product labels!

Pre-measure cleaning products

Train staff regularly

Regular leak detection & repair

Inventory & purchasing control

Rearrange production schedule to reduce number of times machines need to be cleaned

Use lids on process tanks to reduce evaporation

Recycling

Capture final rinse to reuse as first rinse

Solvent distillation and reuse

Filtering, reclaiming, and reusing cleaning solutions

Filtering, reclaiming, and reusing plating baths

Resources

Use your SDS, but...

Look beyond the SDS

Resources: EPA Safer Choice



Look for the label

Find Safer Products

Research Ingredients/chemicals

<https://www.epa.gov/saferchoice>



Find Safer Products



Safer Chemical List

Resources: Green Seal



Find Safer Products

Get your product certified

Clearly written standards

<http://www.greenseal.org/Home.aspx>



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Green Seal uses science-based programs to empower consumers, purchasers, and companies to create a more sustainable world.

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our standards ▶

Resources: Green Cleaning Lab at MA Toxics Use Reduction Institute



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Find safer cleaning products

Professional and Retail Cleaning Product Testing and Evaluations

Product Testing for Green Cleaners and DIY cleaners

CleanerSolutions database to help find or replace a solvent

Consulting services to find alternative solvents or cleaning methods

<https://gcl.cleansolutions.org/>

Resources for Chemical Substitution

Your own employees!

Your peers at other facilities

Manufacturer or vendor info

Trade association

Industry journals

State technical assistance
programs and websites

Resources:



UNITED STATES
DEPARTMENT OF LABOR

Occupational Safety and Health Administration

- Transitioning to Safer Chemicals Toolkit
- Framework - 7 Steps
- Links to Resources



https://www.osha.gov/dsg/safer_chemicals/index.html

Chemical Substitution Resources:



How can this chemical affect my health?

■ Acute (Short Term) Effects [Data sources](#)



Irritates the Eyes – Can cause irritation or serious damage to the eye.



Irritates the Skin – Can cause irritation or serious damage to the skin.

- Search for chemicals by name or CAS number
- Shows Health Effects, Hazards, Environmental Impacts and Alternatives

<http://www.chemhat.org/en>

Resources: Chemical Substitution



Subsport: Substitution Support Portal

- Evaluate alternatives to avoid regrettable substitution
- Research ingredients/chemicals
- Case study database with examples of chemical substitution successes

<https://www.subsport.eu/>

Thank you!

DEC Environmental Assistance Office

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