2020

Smith New Neilson Library: Healthier Materials

Dano Weisbord
Smith College

Matthew Gifford
Shepley Bulfinch

Amanda Garvey
Thornton Tomasetti

WHEN IT COMES TO TOXIC CHEMICALS IN OUR BUILDINGS, THERE IS AN URGENT NEED FOR MARKET TRANSFORMATION.

WHAT'S THE BIG DEAL?

CANCER ALLEY

An 85 mile-long stretch of the Mississippi river lined with oil refineries and petrochemical plants, between New Orleans and Baton Rouge. **People living in the area are more than 50 times as likely to get cancer than the average American.***

** https://www.businessinsider.com/louisiana-cancer-alley-photos-oil-refineries-chemicals-pollution-2019-11*

Photo Credit: Giles Clarke/Getty

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Photo Credit: Story Center/You Tube

POLYVINYL CHLORIDE (PVC)

HEALTH IMPACTS

- Respiratory effects including increased risk of asthma, bronchial obstruction, and prolonged cough
- Irritation of nasal passage and eyes
- Risk of liver, brain, and lung cancers
- Phthalate additives may result in hormone and reproductive system disruption

COMMON USES

- Vinyl siding
- Pipes
- Wiring
- Roofing, flooring, windows
- **Global production exceeds 30 million tons per year, majority attributed to building materials**





Extraction/Manufacturing

Health impacts of PVC exposure are felt most strongly in the production process. Toxic chemical feedstocks include VCM, mercury, phthalates, and PFAS.

Occupancy/Use

PVC risks leaking toxins into the environment and ambient air during use. Highest risk occurs when PVC products catch fire, releasing dioxins and deadly hydrogen chloride gas.

End of Life/Disposal

Disposal releases dioxins and phthalates into the environment. These substances leach into soil and water from landfills or into the air after incineration, and are highly persistent.

POLYVINYL CHLORIDE (PVC)

According to a Swedish Study published in Neurotoxicology:

Infants or toddlers who lived in bedrooms with vinyl floors were twice as likely to have autism five years later than those with wood or linoleum flooring, the report said.

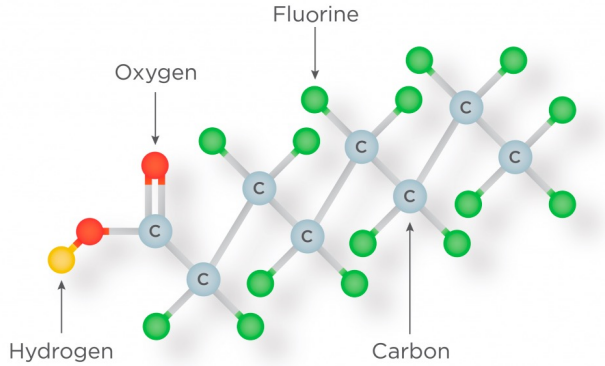
PFAS

HEALTH IMPACTS

- Risk of kidney and testicular cancer
- Decreased fertility in women
- Lower infant birth rates
- Increased cholesterol levels
- Immunosuppressants and decrease how well the body reacts to vaccines.

COMMON USES

- Non-stick cookware
- Water repellents
- Stain/grease resistant coatings
- Fire fighting foams
- Think: Cookware, food packaging, carpeting, furniture, rainwear, etc
- **PFAS are highly persistent in the environment, meaning they are in our water, our food and our bodies.**



*Long carbon chain and fluorine bond makes PFAS a **"forever chemical"***

Extraction/Manufacturing

People who *work* at PFAS production facilities, or facilities that manufacture goods made with PFAS, may be exposed in certain occupational settings or through contaminated air.

Occupancy/Use

PFAS can be transmitted to your building through contact, inhalation, or ingestion. Certain PFAS can accumulate and stay in the human body for long periods of time.

End of Life/Disposal

Given the nature of these chemicals, they do not naturally break down and there is no known way to destroy them. Hence they are called 'forever chemicals' and bio accumulate in our bodies and environment.

Where are PFAS?

- Essentially: everywhere but watch for
  - Products marketed as having a non-stick, water resistant, grease resistant, or stain resistant coating or treatment!
- Think: cookware, food packaging, carpeting, furniture, rainwear, etc.
- PFAS are highly persistent in the environment, meaning they are in our water and our food and our bodies.

Environmental Impact

- Highly persistent and mobile in the environment
- Production, use, disposal leads to contamination of:
  - surface and groundwater, soils, sediments, wastewater, compost, sewage sludge (biproduct of sewage treatment), wildlife, humans

LOCAL & STATE > Posted July 24 | Updated July 29

INCREASE FONT SIZE

State investigating 'very startling' levels of PFAS chemicals on central Maine dairy farm

State officials declined to identify the farm, but said Maine's milk supply remains safe because the farm was sending a relatively small amount of milk to a processor that was blending it with milk from other farms.

- Maine DEP had been encouraging farms to spread sludge as a form of fertilizer, as a waste management strategy
- Multiple Maine farmers are reporting an extremely high amount of PFAS in the milk from their cows
- Take away: 0 disposal capacity

Research suggests link between PFAS contamination and the coronavirus

In this file photo, DEQ staff sampling Bladen County water for GenX. Photo credit: NC DEQ.

July 13, 2020 by Greg Barnes

Facebook Twitter LinkedIn Email

Studies say people with high levels of PFAS in their systems could be more susceptible to contracting COVID-19.

BPA

Health Impacts

- Endocrine disruption
- Changes in fat metabolism, insulin resistance
- Impacts to brain, behavior, reproductive systems
- Especially harmful to fetuses and young children

Common Uses

- Polycarbonate plastics, epoxy resins, adhesives
- Paints, laminate
- Drink bottles
- Water supply lines
- Flooring
- Vinyl siding

Extraction/Manufacturing

Individuals involved in manufacturing are exposed at concentrations up to 3,100 mg/day.

Occupancy/Use

Exposure common via inhalation of dust in ambient air where BPA product is present. Studies show that over 90% of people have BPA body burdens.

End of Life/Disposal

BPA containing products are recycled, incinerated, or placed in landfills, dispersing BPA into air, water, and soil.

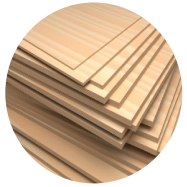
FORMALDEHYDE

Health Impacts

- Carcinogenic
- Respiratory and gastrointestinal issues
- Irritability, headaches, loss of memory and dexterity
- Eye irritation

Common Uses

- Pressed wood products (plywood)
- Glues and adhesives
- Insulation materials
- Resins, preservatives, disinfectants



Extraction/Manufacturing

Occurs naturally in the environment and is made synthetically for use in a variety of products. Workers exposed to formaldehyde experience increased rate of cancer deaths.

Occupancy/Use

Individuals inhale formaldehyde present in indoor ambient air which has been released from formaldehyde containing products.

End of Life/Disposal

Formaldehyde is considered hazardous waste; disposal is regulated under RCRA.

WHY THE URGENCY?

BUILT ENVIRONMENT

We spend 90% of our time indoors

COGNITIVE FUNCTION

Conventional:

Typical volatile organic compound levels (506-666 µg/m^3) and 20 cfm outdoor air per person

"Green":

VOC levels reduced to approximately 50 µg/m^3 and 20 cfm outdoor air per person

"Green +":

VOC levels reduced to approximately 50 µg/m^3 and 40 cfm outdoor air per person

On average, cognitive function scores were:

61 percent higher in green building conditions

101 percent higher in "green +" building conditions

Source: *The Harvard T.H. Chan School for Public Health; Center for Health and the Global Environment.*

FEDERAL REGULATION

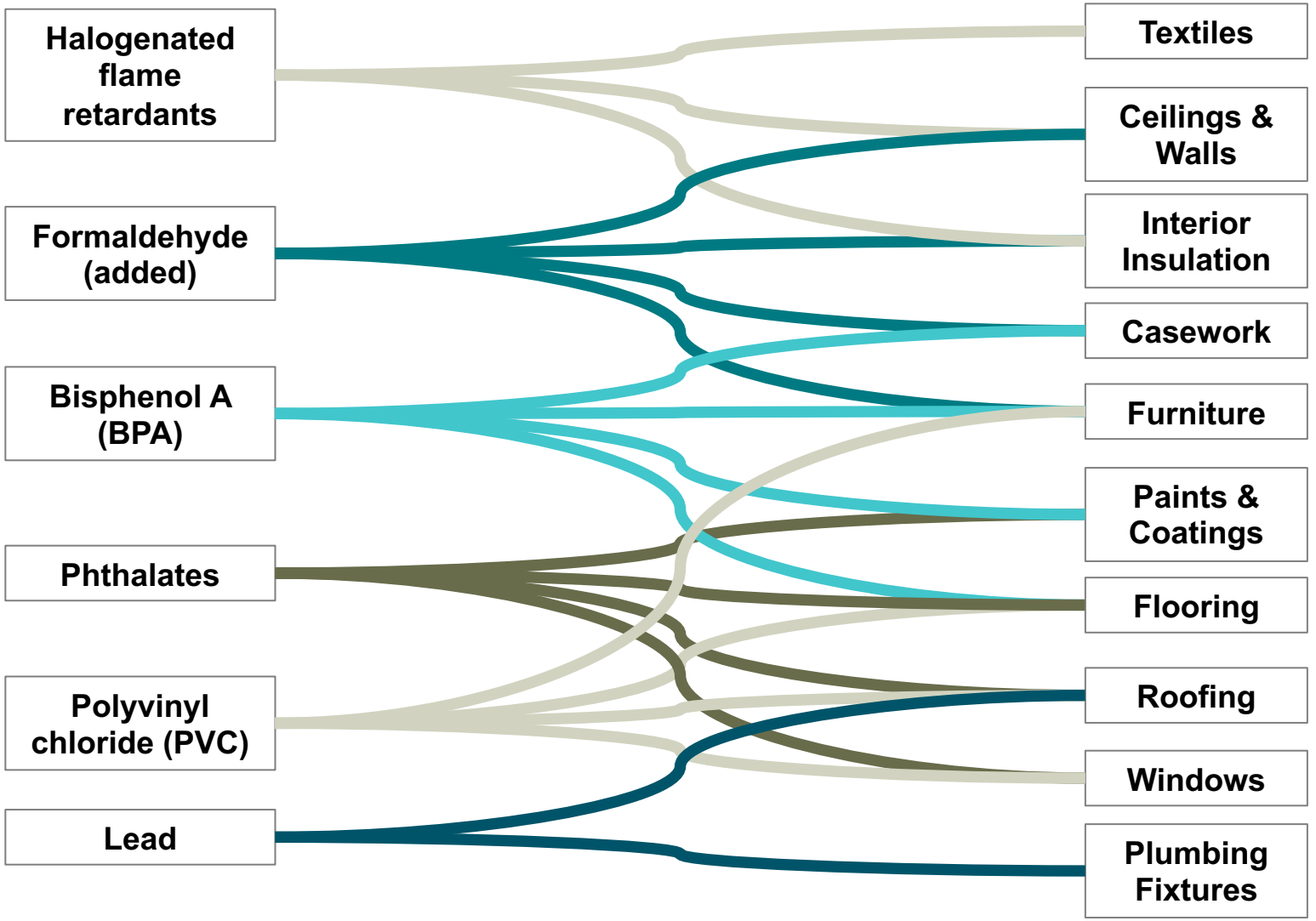
80,000+ chemicals registered in the US

767 monitored through the EPA Toxic Release Inventory

250 subjected to mandatory hazard testing by US EPA

9 are banned

THEY ARE EVERYWHERE!



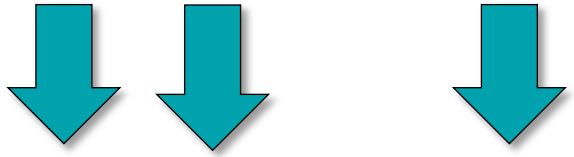
WHAT DID SMITH DO?

MATERIAL HEALTH INITIATIVE

SMITH COLLEGE

Utilize the iconic nature of this building to advocate for positive change in the marketplace and encourage manufacturers to eliminate “Red List” chemicals.

TARGETED APPROACH



Product Categories	Industry Characteristics							
	Prominently Featured Product	Impact on Occupant Health & Air Quality	Manufacturing and Disposal Impact	High Cost & Extent	Commonly contains Red List Issues	Opportunity to specify existing Innovative Products	Synergies with LEED	Limited Market - Advocacy Needed
Millwork/Doors	2	2	2	1	2	1	2	
Gypsum Board		2		1		2	1	
Interior Paints & Coatings	1	2	2	2	2		2	
Acoustic & Thermal Insulation		2	2		2	1	2	1
Interior Adhesives & Sealants		2	2		2		1	
Flooring	2	2	1	2		2	2	
Ceilings	2	2		2		2	1	
Interior Wall Systems	2	2		2		2	1	
Fire Proofing		1			1			2
Furniture and Furnishings	2	2		2	1	1	1	
Air Distribution	1	1	1	2				2
Plumbing Fixtures	1				1			2
Cabling and Wiring			2	2	2			2
Conveying Equipment	1			1				2

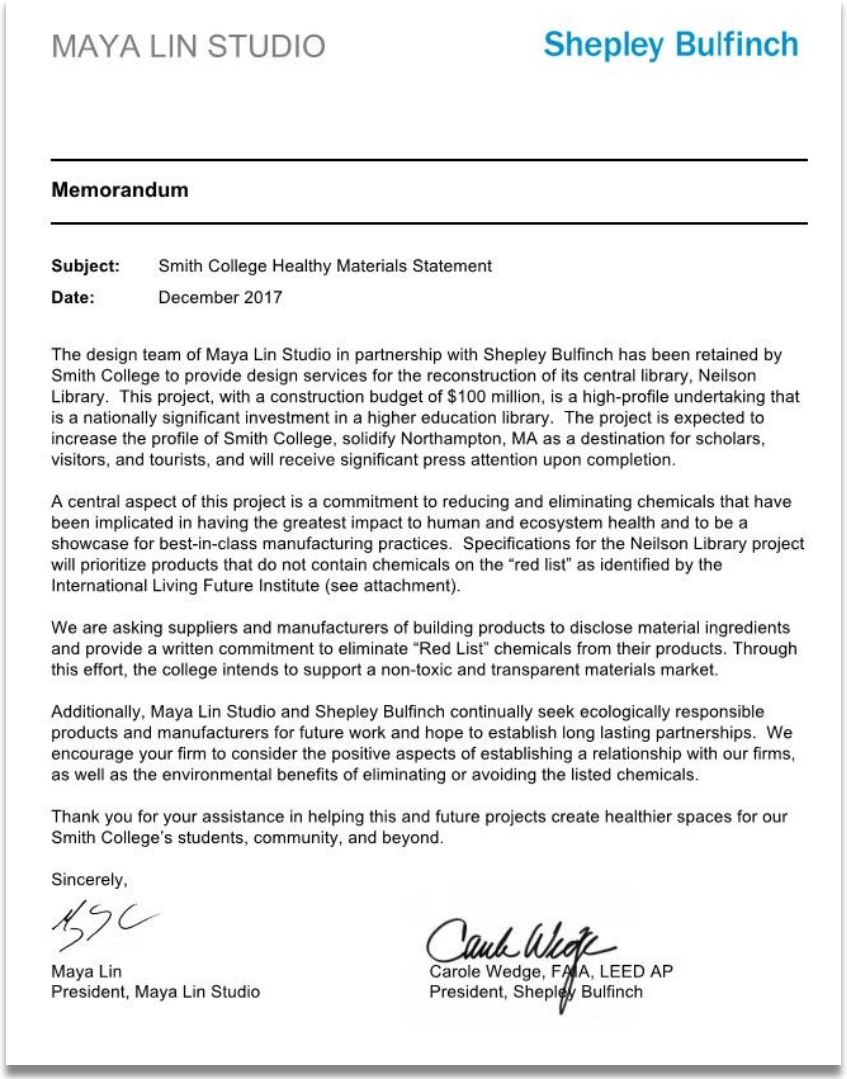
Key
1 = Some
2 = High

IDENTIFY PRODUCTS

Phase I Preliminary DD Spec Review - Identification of High Priority Products for Further Research					
CSI/Spec Number	CSI/Spec Number	Section Heading	Manufacturer	Product	Basis of Design?
079200	Joint Sealants	2.2.A Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant	GE Advanced Materials	SilPruf LM SCS2700	
			Pecora Corp	890	
			Sika	SikaSil-C990	
			Tremco, Inc.; Tremco Fire Protection Systems Group.	Spectrem 1	
		2.2.B Mildew-Resistant, Single-Component, Nonsag, Silicone Joint Sealant:	BASF	Omniplus	
			Dow	786 Mildew Resistant	
			GE Advanced Materials	Sanitary SCS1700	
			Pecora	898	
			Tremco, Inc.; Tremco Fire Protection Systems Group.	Tremsil 200 Sanitary	
		2.3.A Multicomponent, Nonsag, Traffic-Grade, Urethane Joint Sealant	BASF	Sonolastic NP 2	
			Pecora	Dynatred	
			Sika	Sikaflex 2c NS	
			Tremco, Inc.; Tremco Fire Protection Systems Group.	Vulkem 227	
		2.4.A Latex Joint Sealant	BASF	Sonolac	
			Bostik	ChemCalk 600	
			Pecora Corp	AC-20+	
			Tremco, Inc.; Tremco Fire Protection Systems Group.	Tremflex 834	
		2.5.C Two-Component Polyurethane Spray Insulating Sealant	Zerodraft	Insulating Air Sealant	
			Dow	Frothpak 12 or 180	
08 14 16	Flush Wood Doors	2.1 FLUSH WOOD DOORS, GENERAL	Eggers Industries		
			Marshfield Door Systems		
			VT Industries		
081433	Stile and Rail Doors	2.2 Stile and Rail Doors	Algoma Hardwoods		
			Eggers Industries		
			Maiman Co		
			VT Industries		
083515	Sliding Fire Doors	2.2 Sliding Fire Doors	Mckeon Rolling Steel Door	Model 7700-ss	✓
085200	Aluminum Clad Wood Windows	2.1 Manufacturers of Aluminum Clad Wood Windows	Eagle Window and Door		
			Kolbe and Kolbe Millwork		
			Marvin Windows and Doors		
092117	Gypsum Shaft Wall	2.3.C Gypsum Shaftliner Board, Type X	American Gypsum	Shaft Liner	
			CertainTeed	ProRoc Shaftliner	
			Georgia Pacific	ToughRock Fireguard Shaftliner	
			National Gypsum Co	Gold Bond Fire-Shield Shaftliner	

08 14 16	Flush Wood Doors	2.1 FLUSH WOOD DOORS, GENERAL	Eggers Industries
			Marshfield Door Systems
			VT Industries

LETTER OF COMMITMENT



MAYA LIN STUDIO

Shepley Bulfinch

Memorandum

Subject: Smith College Healthy Materials Statement

Date: December 2017

The design team of Maya Lin Studio in partnership with Shepley Bulfinch has been retained by Smith College to provide design services for the reconstruction of its central library, Neilson Library. This project, with a construction budget of $100 million, is a high-profile undertaking that is a nationally significant investment in a higher education library. The project is expected to increase the profile of Smith College, solidify Northampton, MA as a destination for scholars, visitors, and tourists, and will receive significant press attention upon completion.

A central aspect of this project is a commitment to reducing and eliminating chemicals that have been implicated in having the greatest impact to human and ecosystem health and to be a showcase for best-in-class manufacturing practices. Specifications for the Neilson Library project will prioritize products that do not contain chemicals on the "red list" as identified by the International Living Future Institute (see attachment).

We are asking suppliers and manufacturers of building products to disclose material ingredients and provide a written commitment to eliminate "Red List" chemicals from their products. Through this effort, the college intends to support a non-toxic and transparent materials market.

Additionally, Maya Lin Studio and Shepley Bulfinch continually seek ecologically responsible products and manufacturers for future work and hope to establish long lasting partnerships. We encourage your firm to consider the positive aspects of establishing a relationship with our firms, as well as the environmental benefits of eliminating or avoiding the listed chemicals.

Thank you for your assistance in helping this and future projects create healthier spaces for our Smith College's students, community, and beyond.

Sincerely,

Maya Lin
President, Maya Lin Studio

Carole Wedge, FAIA, LEED AP
President, Shepley Bulfinch

"Maya Lin Studio and Shepley Bulfinch will continually seek ecologically responsible products and manufacturers for future work and hope to establish long lasting partnerships. We encourage your firm to consider the positive aspects of establishing a relationships with our firms, and the environmental benefits of eliminating the "Red List" chemicals."

MANUFACTURER OUTREACH

Neilson Library Healthy Materials Manufacturer Commitment

Date: XX/XX/XXXX

Product: XXXX

Directions:

1. Please provide one or more of the following documents for our team to review against the Red List to confirm that the materials contain no red list chemicals:

    - An SDS or MSDS sheet, listing all materials used and CAS numbers.
    - A "Cradle to Cradle" certificate, with a minimum score of "Bronze"
    - A "Declare" Label, indicating the product is "red list free"
    - A Health Product Declaration (HPD), listing all materials used and CAS numbers

1.a. If none of the above documents are available, please complete the following table:

Component Description (if applicable)	Material / Ingredient Name	% of Total Product by weight or volume	CAS#

Neilson Library Healthy Materials Manufacturer Commitment

2. Please read and sign to the following agreement:

By signing this commitment agreement, I am attesting that product name considered for the Healthy Materials project at Smith College does not contain any of the following Red Listed Chemicals:

- Alkylphenols
- Asbestos
- Bisphenol A (BPA)
- Cadmium
- Chlorinated polyethylene and chlorosulfonated polyethylene
- Chlorobenzenes
- Chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs)
- Chloroprene (Neoprene)
- Chromium VI
- Chlorinated polyvinyl chloride (CPVC)
- Formaldehyde (added)
- Halogenated flame retardants (HFRs)
- Lead (added)
- Mercury
- Perfluorinated compounds (PFCs)
- Polychlorinated biphenyls (PCBs)
- Phthalates
- Polyvinyl chloride (PVC)
- Polyvinylidene chloride (PVDC)
- Short Chain Chlorinated Paraffins
- Wood treatments containing creosote, arsenic or pentachlorophenol
- Volatile organic compounds (VOCs) in wet-applied products

Sincerely,

[APPLICANT NAME/S]
[CORPORATE TITLE]
[CONTACT]

DESIGN TEAM COORDINATION

SHEPLEY BULFINCH

MAYA LIN STUDIO

Thornton Tomasetti

Biweekly calls:

- Design Development through Construction Documents
- TT to share vetting research updates & proposed alternates
- Architecture team to provide feedback from a design perspective (durability, performance, aesthetics, etc)
- Confirm healthy material BOD products

HEALTHY MATERIALS BOD

2.5 SETTING MATERIALS

A. Flexible Latex-Portland Cement Mortar (Medium Set): ANSI A118.4.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Healthy Materials Basis of Design:
1) MAPEI Corporation.

b. Also subject to requirements, comparable products from the following manufacturers will be considered, provided that they can provide a "Red List Free" system through procedures specified in 01 81 13 SUSTAINABLE DESIGN REQUIREMENTS

~~a.~~ 1) Bostik, Inc.
~~b.~~ 2) Custom Buidling Products.
~~c.~~ 3) Laticrete International, Inc.

2. Healthy Materials Basis-of-Design Product: MAPEI; Kerabond/Keralastic System.
3. Provide prepackaged, dry-mortar mix to which only water must be added at Project site.

SUMMARY OF SUCCESS

- Educated and advocated to over 100 manufacturers
- 96 products with healthy materials language incorporated into specs
- 68 products specifically designated as “Healthy Materials Basis of Design”
- Manufacturers are noticing a trend in the demand for healthy materials
- Process & outcomes are influencing other large institutions
- Smith is being seen as a leader by other institutions looking to get involved

RED LIST FREE AVAILABLE

JUST NEEDED TO ASK

- **Carpet:** Carpet free of PVC carpet backing, no HFRs and PFCs in fibers
- **Paint:** Red List Free painting schedule that meet additional LEED requirements
- **Insulation:** Formaldehyde-free mineral wool insulation

RED LIST FREE POSSIBLE

WITH A FEW TWEAKS

- **Ceiling tiles:** Innovative plant based acrylic binders to remove formaldehyde
- **Cork & Rubber Flooring:** Formaldehyde, BPA, and PVC free

RED LIST FREE NOT POSSIBLE

BUT COMMITTED TO CHANGE

- **Laminated Veneer Lumber:** Red List free alternates tested, but non passed strength requirements. Manufacturer made commitment.
- **Curtain wall:** Anodized metal instead of powder coating. Transparency meeting and expressed interest in better serving healthy materials projects in the future.

FURNITURE

Healthier Hospitals

A PRACTICE GREENHEALTH PROGRAM

Targeted chemicals of concern in furniture and furnishings include:

- **Formaldehyde,** a known human carcinogen, found in furniture, cabinets, countertops, and many other products.
- **Flame retardant chemicals,** which are linked to reproductive, neurocognitive, and immune system issues.
- **Per- and poly-fluorinated compounds (PFCs or PFAS)** make everyday products stain, water, and grease resistant, but also don't break down easily in the environment and build up in humans, animals, and the environment.
- **Polyvinyl chloride (PVC),** or vinyl, can be used as a cover fabric and other components of some furniture, in addition to its uses in devices, gloves, flooring, and more. It is toxic to manufacture and can contain harmful additives.
- **Antimicrobials,** including triclosan and triclocarban, that, when present in furnishings, promise to reduce infection risk but may actually create a false sense of confidence and also expose health care workers to toxic chemicals.

LEAD BY EXAMPLE

Advocate **R&D** **Commitment** **Disclosure** **Education**

DURING CONSTRUCTION

- **Submittal Review,** to ensure healthy materials products specified during design were selected in construction.
- **Substitution Research**, if something came up that did not meet healthy materials requirements.
- **Transparency Requested,** through Healthy Materials coversheets – beyond initial 68 products identified for “unspecified” products

- **If cost implications arose, Smith requested information about health implications to make informed decisions.**

Neilson Library Healthy Materials Manufacturer Commitment

Date: XX/XX/XXXX

Product: XXXX

Directions:

1. Please provide one or more of the following documents for our team to review against the Red List to confirm that the materials contain no red list chemicals:

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    - A “Cradle to Cradle” certificate, with a minimum score of “Bronze”
    - A “Declare” Label, indicating the product is “red list free”
    - A Health Product Declaration (HPD), listing all materials used and CAS numbers

1.a. If none of the above documents are available, please complete the following table:

Component Description (if applicable)	Material / Ingredient Name	% of Total Product by weight or volume	CAS#

SERVE AS INSPIRATION

Colby

MIT

WHAT DID WE USE TO VET MATERIALS?

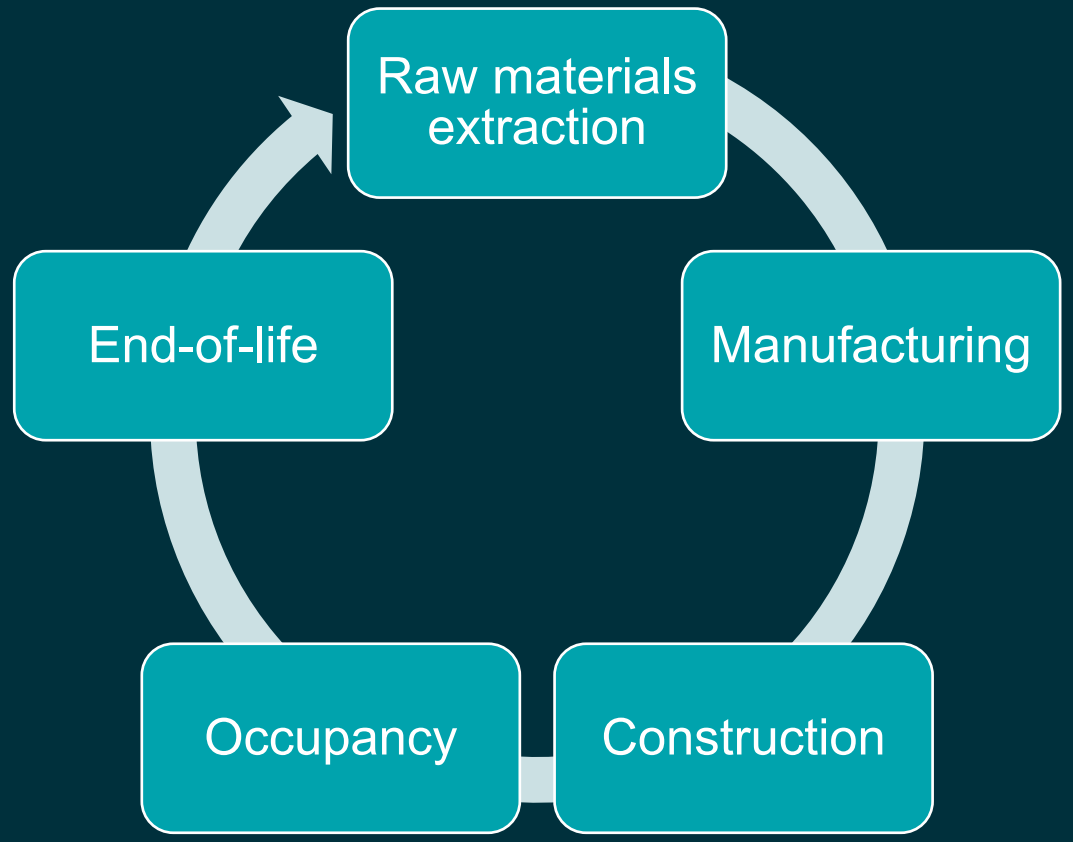
THE RED LIST

International Living Future Institute (ILFI)

“The Red List contains the worst-in-class materials prevalent in the building industry.”

The commonly-used chemicals on the Red List are:

- Polluting the environment
- Bio-accumulating up the food chain until they reach toxic concentrations
- Harming construction and factory workers



THE RED LIST

International Living Future Institute (ILFI)

- Antimicrobials (marketed with a health claim)
- Alkylphenols and related compounds
- Asbestos compounds
- Bisphenol A (BPA) and structural analogues
- California-banned solvents
- Chlorinated Polymers, including:
  - Chlorinated poly-ethylene (CPE)
  - Chloroinated poly-vinyl chloride (CPVC)
  - Chloroprene (neo-prene monomer)
  - Chlorosulfonated poly-ethylene (CSPE)
  - Polyvinylidene chlo-ride (PVDC)
  - Polyvinyl chloride (PVC)
- Chlorobenzenes
- Chlorofluorocarbons (CFC) and hydrochloro-fluorocarbons (HCFC)
- Formaldehyde (added)
- Monomeric, polymeric and organo-phosphate halogenated flame retardants (HFRs)
- Organotin Compounds
- Perfluorinated compounds (PFCs)
- Phthalates (orthophthalates)
- Polychlorinated biphenyls (PCBs)
- Polycyclic aromatic hydrocarbons (PAHs)
- Short-chain and medium-chain chlorinated paraffins
- Toxic heavy metals
  - Arsenic
  - Cadmium
  - Chromium
  - Lead (added)
  - Mercury
- Volatile organic compounds (VOC) (wet-applied products)*
- Wood Treatments containing creosote or pentachlorophenol

*VOCs are limited, not banned. Refer to the v4.0 Materials Petal Handbook for specific reference standard + thresholds.

WHAT WOULD WE DO DIFFERENTLY ON FUTURE PROJECTS?

FUTURE CONSIDERATIONS

- Unified market ask with other institutions like Harvard, etc,
- Take a class-based approach to avoid regrettable substitutions
- Require HPDs, instead of affidavits – open source data
- “Healthy” versus “Healthier”

SIX CLASSES

CLASS-BASED APPROACH

SIXCLASSES.ORG
GREEN SCIENCE POLICY INSTITUTE

- Groups chemicals of concern into “Six Classes”.
- Prevents a cycle of “regrettable substitutions,” whereby a phased out harmful chemical is replaced with a closely related chemical which may cause similar harm. (i.e. BPA)