The machine running wild, the bulldozer on the rampage, the crane swinging aimlessly against the sky—these are the signs of a people that is making things over without knowing why, or to what end. The physical and cultural environment has meaning only insofar as it bears the marks of what we are and what we aspire to be.
August Heckscher, *The Public Happiness* (1962)

CHEMICAL EXPOSURES

Another Fast-Food Fear

Some toxic chemicals may appear where consumers least expect them: on fast-food packaging, says Lauren Sucher, communications director of the nonprofit Environmental Working Group (EWG) of Washington, D.C. Fluorinated telomers, a type of very small polymer with Teflon-like properties, keep grease from seeping through paper and cardboard packaging such as french fry cartons and pizza boxes. And although the telomers themselves may be innocuous in normal use, they can break down upon ingestion into perfluorooctanoic acid (PFOA). PFOA also is a component in the manufacturing process of fluoropolymers and can be present in trace amounts in fluorinated telomers.

Although the human health effects of PFOA are still unconfirmed, the chemical's ubiquity is cause for concern. Studies submitted in 2001 by the 3M Company (then a PFOA manufacturer) to the government found the chemical in the blood of 96% of 598 children tested in 23 states and the District of Columbia, Sucher says. The EWG is concerned that people could ingest PFOA that transfers from packaging to food, and that as the telomers break down in landfills and other disposal channels, PFOA could enter the environment.

Identifying exactly which products use fluorinated telomers is no simple matter. These telomers aren't regulated, and most packaging doesn't identify their presence. Typically they are applied at paper mills, which supply coated paper to manufacturers that in turn supply packaging to restaurants.

In March 2003, the U.S. Environmental Protection Agency (EPA) initiated a priority review under the Toxic Substances Control Act. The review was based on limited data showing some presence of PFOA in people's blood and studies involving laboratory animals that showed potential developmental and reproductive toxicity, liver toxicity, and cancer. In a 14 April 2003 *Federal Register* notice, the EPA released a preliminary risk assessment for PFOA and outlined a public process for further developing the assessment.

In July 2003 the EWG asked nine of the country's largest restaurant chains—Burger King, KFC, Krispy Kreme, McDonald's, Pizza Hut, Starbucks, Subway, Taco Bell, and Wendy's—to report on the types of chemical coatings used in their products. As of October 2003, none of the chains had responded directly to the EWG. But some—such as McDonald's, which does use fluorinated telomers for certain products, and Krispy Kreme, which doesn't, and instead uses clay-based products exclusively—have responded to press inquiries following publicity of the EWG's request.

"A question we have to answer," says EPA public affairs officer David Deegan, "is exactly how people are being exposed to PFOA." Scientists are scrambling to find how the chemical finds its way into the bloodstream. Deegan says it's unknown whether food packaging is actually a source of exposure, and that PFOA hasn't been detected in such wrappings.

But Sucher says there is precedent for perfluorochemicals used in paper products ending up in human blood. The internal monitoring studies done by the 3M Company and reviewed by the EPA show that at least one perfluorochemical metabolite specific to paper protection applications is readily found in people, including 85% of the children tested. Sucher says perfluorochemicals such as PFOA have a half-life of an estimated 4.4 years in the human body.

"We are looking at paper applications as just one of several possible pathways to PFOA exposure [in] the environment," says Michelle Reardon, a spokesperson for DuPont, a current PFOA manufacturer. But, she says, many other pathways are under investigation as well. Fluorinated telomers are also used in the manufacture of fire-fighting foam, leather products, carpeting, garments such as stain-resistant trousers, and many other applications. Sorting out these potential sources and pathways of PFOA exposure is one of the priorities of the EPA's review, Deegan says.

In the meantime, Sucher says, environmental groups hope that companies, especially those in the food business, will move away from products with the potential to spread PFOA. "They have every right to use them," she says. "They are abiding with federal law. On the other hand, as a public health advocacy group, we want them to try to find alternatives." **–Scott Fields**

The extra ingredient? Government agencies and environmental advocacy groups are questioning the safety of a chemical in food packaging materials.

Photodisc

Built Environment

Home, Green Home

The Green Dream House doesn't seem out of place among the surrounding Victorian-style homes in McCook, Nebraska. "When you drive by, you don't think, 'That looks recycled,'" says Bruce Maine, a sustainable design manager with the Omaha-based architectural consulting firm HDR and a member of the task force that designed the house. And that's the point. The board of directors behind America Recycles Day, which raffled off the house as part of its yearly campaign to promote awareness of recycled products, wants people to know that green building materials can be commonplace—even in middle America.

Recycling benefits the environment by reducing the need for landfill space and incineration. According to the U.S. Environmental Protection Agency, in 1999 recycling and composting prevented about 64 million tons of material from ending up in landfills and incinerators. And by reducing the need to extract and process virgin materials, recycling conserves natural resources such as water, timber, and minerals, and reduces pollution and the emission of greenhouse gases.

The Nebraska house was the national grand prize for the fifth annual America Recycles Day in 2001 and was raffled off in a random drawing from more than 6.2 million pledges to recycle more and buy recycled products. "It's one thing to recycle, but if you're not buying products that have recycled content, then there won't be a market for your recyclables," says Steve Andrews, a program specialist with the Nebraska State Recycling Association. America Recycles Day is held each November 15.

The winner of the house, which was completed in July 2003, chose its location and some of its design features. Recycled products used in the house include carpet made of 25–100% recycled polyethylene (plastic bottles) and a roof made of recycled steel. When the useful life of the house is over, the steel roof can be recycled again, Andrews says.

Other sustainable features of the house include natural linoleum, which is made of linseed oil, resins, and wood flour. It's biodegradable and, unlike vinyl, is not associated with releases of potential toxicants in its manufacture and disposal. The designers also chose paint and adhesives that contain no volatile organic compounds, which can cause eye, nose, and throat irritation, headache, nausea, and damage to the liver, kidneys, and central nervous system.

The house was framed using insulating concrete forms, or ICFs, made of expanded polystyrene (which doesn't deplete the ozone layer) and filled with concrete and reinforcing bars (which are generally 99% recycled steel). Using ICFs requires little to no use of wood on the exterior of a building. Coupled with a well-insulated roof and foundation, ICF walls can save as much as 50% on heating and cooling bills. And, Maine says, "You end up with a house that is incredibly strong and could well withstand high winds"—an important feature in a storm-prone area such as Nebraska.

The designers further improved the ICFs by replacing 20% of the cement in the concrete with fly ash, a by-product of coal burning from electrical power generation. The use of fly ash in cement reduces the need for limestone calcination, a process that uses a large amount of energy, usually generated by burning fossil fuels. For every ton of fly ash used to replace cement in concrete, approximately 0.8 ton of carbon dioxide is prevented from being released into the atmosphere, according to the U.S. Department of Energy.

That use of fly ash in the ICFs is an exciting feature and is very significant in reducing the environmental impact of the house, says Nadav Malin, editor of *Environmental Building News*. The rest of the house's features are good choices, he says, and builders who employ alternative building methods use these features regularly.

Andrews says the house was designed to showcase environmentally friendly building features that the average homeowner can easily obtain. "I wanted to hit people with readily available products," he says. Even if a store doesn't keep the materials in stock, they can be ordered easily, as long as the buyer knows what to ask for. "We're trying to educate the consumer so they can go into a home supply store and ask the right questions," he says.

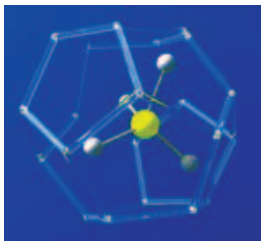
Such materials are also affordable. The Green Dream House was built for about $103 per square foot, compared to the average cost for building a new house in Nebraska of $100 per square foot.

The America Recycles Day grand prizes vary each year. The 2001 house was the third and most recent house given away. For 2003, the grand prize was a 2004 Ford Focus partial zero-emissions vehicle, which achieves the cleanest rating in the Environmental Protection Agency's Green Vehicle Guide and is built with some recycled components. **–Angela Spivey**

Top to bottom: National Energy Technology Laboratory; Artville

Frozen Fuel

Japan, a country almost totally dependent on foreign fuel, has embarked on a long-range program to determine the economic and environmental feasibility of extracting frozen methane hydrate that's located off its central Pacific coast. Methane hydrate—methane gas surrounded by a lattice of ice molecules—burns when exposed to flame, but any change in temperature or pressure causes the compound to gasify. Next year alone, Japan will funnel US$120 million into research that may someday lead to viable recovery methods for the volatile fuel.



Conservative estimates place the total global amount of methane hydrate supplies at twice that of known fossil fuels. Although methane is a known greenhouse gas, it is unclear how exploiting it in this form—which amounts to 3,000 times the volume of methane existing in the atmosphere—could impact climate change.

South America Tracks Chemicals

To coordinate plans for new national chemical tracking systems, representatives from nine South American countries met at a UN-supported meeting in São Paulo, Brazil, in June 2003. These systems will follow the path of chemicals from production through disposal. Argentina, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, and Venezuela are launching the first phases of their chemical inventories with an 18-month trial period that will focus on a small list of substances. Eventually the countries hope to track industrial, agricultural, and transport-related chemicals, and to provide detailed reports on emissions for use by governments, industry, and advocacy groups.

China's New FDA

After a spate of food poisoning that resulted in 138 deaths and more than 7,000 cases of serious illness during 2002, the Chinese government has approved the creation of the new China Food and Drug Administration (CFDA). The CFDA will replace the State Drug Administration and include food, herbal products, and cosmetics in its purview. As part of its food safety functions, the CFDA will coordinate the food-related supervisory functions of China's health, agriculture, quality inspection, industry, and commerce agencies. Among the first of the CFDA's priorities are to establish a comprehensive monitoring mechanism for the processing and sale of food products and to conduct routine premarket monitoring of pesticides and other agricultural chemicals in food.

MATERIALS SCIENCE

Building a Better Brick

Just another brick in the wall? Not exactly. Partners in a Danish housing project have just finished using a new recycled brick in the construction of 26 houses. Although there are few firm figures to date, recycling bricks this way is expected to save energy and money, reduce emissions of pollutants such as carbon dioxide during the manufacturing process, and slash the extraction of virgin clay, sand, and gravel. Detailed postconstruction analyses investigating these assumptions should be available over the course of the next year.

The idea for using recycled bricks emerged when the Danish nonprofit housing company Herning Boligselskab asked COWI, a global engineering, environmental, and socioeconomic consulting firm, for ideas on how to make a housing project in the central Denmark city of Herning more environmentally friendly. Along with solar heating, alternative insulation materials, and rainwater for toilet flushing, COWI suggested using *miljøsten*, a patented alternative brick previously used in just one house. The bricks were designed by Stig Maegaard, owner of the small engineering company Ekotek, and Astrup Cement, which manufactures them.

"Green" house effect? Recycled bricks may make housing healthier for the environment.

About 95% of each brick is composed of crushed recycled bricks. Mortar granules are added for bonding. Unlike traditional bricks, which must be fired at temperatures of up to 2,000°F, the bricks are formed at room temperature in molding machines using vibration and high pressure. They have the same density as traditional bricks, says COWI project manager Niels Møller Jensen, and cost about 10% less to produce. The energy needed to produce 1 traditional brick can be used to make about 15 recycled bricks. And Jensen says contractors do not need any special skills, techniques, or materials to lay the bricks.

Word of the Danish innovation has not spread widely. Organizations such as the U.S. Brick Industry Association, whose members fire about 8 billion bricks each year, and the U.K. Brick Development Association had not heard of this or similar brick recycling techniques when contacted by *EHP*. Contrary to Jensen's assertion that no special materials are needed to work with *miljøsten*, Brick Development Association director Michael Driver says there is no lime mortar that works with all types of clays. He adds that some companies are pursuing other "green" brick strategies, such as substituting plastics, glass, or dried, inert sewage for some of the clay content, and using alternative energy sources such as fuel cells for the firing process.

COWI is analyzing the life cycle of the *miljøsten* manufacturing process and impacts on the indoor and outdoor environment, and expects to publish initial findings in December 2003, possibly on Herning Boligselskab's site (**http://www.faellesbo.dk**). **–Bob Weinhold**

TRADE/COMMERCE

Shareholders Speak Up

Producers of agrochemicals and related products are under fire from shareholders who are asking about potentially damaging environmental practices. To reach upper management, many shareholders rely on a tool available only to those who have owned at least $2,000 worth of company stock for a year or more: the shareholder resolution.

While not legally binding, "the shareholder resolution by its very nature commands the attention of top management and ultimately the board of directors," says Nicole St. Clair, communications manager at the Coalition for Environmentally Responsible Economies, a Boston-based coalition of investment funds and public interest groups. "If they can't be resolved through dialogue, shareholder resolutions, in addition to corporate responses, will appear in the company's annual [investor statement]. This . . . raises visibility for shareholders who are clearly dissatisfied with management on some issue."

Monsanto shareholders have asked that company to disclose its policies for exporting potentially carcinogenic pesticides that are banned in the United States to developing countries, and describe potential liabilities associated with the sale of genetically modified (GM) plants. Bayer, which is implicated in the 1999 deaths of 24 Peruvian children who accidentally consumed methyl parathion (marketed by Bayer as Folidol) that was confused with powdered milk, is under pressure from shareholders to take responsibility for the poisoning and provide treatment and financial compensation for the children. And one shareholder has asked The Dow Chemical Company to outline plans for cleaning up dioxin contamination near its plant in Midland, Michigan, and prevent future releases. All of these requests are still pending.

Shareholder resolutions often couch potential liabilities in financial terms, adds Doug Cogan, deputy director of social issues at the Investor Responsibility Research Center (IRRC), a Washington, D.C.–based investor research firm. "Shareholders aren't just focused on their own social or environmental agenda," he says. "They also believe their recommendations can help a company achieve better financial performance."

In Monsanto's case, shareholders worry that GM organisms and banned pesticide exports enhance vulnerability to lawsuits and negative publicity. Leslie Lowe, director of the program on energy and environment at the Interfaith Center on Corporate Responsibility (ICCR), a New York organization representing religious investment groups, says shareholders have long worried that Monsanto's business model overrelies on GM products, even as consumer resistance and scientific unknowns erode the market in this area.

Regarding banned pesticides, Lowe adds, "It's entirely possible that these products could make people sick in the countries where they are used. This makes it likely that injured parties would sue the company in U.S. courts, where they do have access."

Shareholder resolutions in most cases request a tangible strategy for dealing with environmental problems. But, Lowe says, investors who turn to the resolution process often encounter resistance from the companies, which typically view the process as hostile and infused with bureaucracy.

"Some companies won't even talk to investors who take this confrontational approach," says Samuel Smolik, global vice president for environment, health, and safety at Dow. "So, we always encourage investors to not take that step." But, he adds, "although we believe there are better ways to handle issues, we will willingly work with people who do choose to file [resolutions]."

Cogan agrees that filing shareholder resolutions should be considered a last resort. "But when management is turning a deaf ear to shareholders' concerns," he says, "this is a highly effective way to get them to sit up and listen." **–Charles W. Schmidt**

COWI

ehpnet

Household Products Database

Each day most of us spray, spread, squeeze, pour, and shake any number of chemical products onto our bodies and into our home environments as part of our daily routines. Household shelves display a bounty of chemical products ranging from pesticides and drain cleaners to shaving cream and air fresheners. In 2002, U.S. consumers bought more than $20 billion worth of household cleaners alone. To provide consumers with a reliable source for information on how to safely use household chemical products, the National Library of Medicine (NLM) offers the Household Products Database, located at http://householdproducts.nlm.nih.gov/index.htm.

The database, which is planned to be updated periodically, currently contains information on more than 4,000 consumer brands. (The initial brands included were selected based on market share and shelf presence in the Washington, D.C., and San Francisco metropolitan areas; today, users may nominate additional products for inclusion.) The site also offers contact information for manufacturers and poison centers, as well as a glossary of terms and acronyms used in material safety data sheets (MSDSs), access to toxicity reports, and other resources that consumers may consult for more detailed chemical information.

The Products page groups products into seven categories: Auto Products, Home Inside, Pesticides, Landscape/Yard, Personal Care/Use, Home Maintenance, and Hobbies & Crafts. Selecting a category pulls up a list of more specific product groups (for example, insulation-related items) and then a list of product types (for example, duct wrap or spray foam). Selecting a product type pulls up a list of specific brand-name products, each with its own comprehensive entry based on data from the product's MSDS. Visitors can also browse through an alphabetic product listing or search for specific products by brand name, type, or manufacturer.

Individual brand entries include complete manufacturer contact information, an overview of acute and chronic health effects the product may cause, recommendations for first aid, tips for safely storing and disposing of the product, and a listing of ingredients from the MSDS or product label. Each ingredient name links to more detailed information including synonyms, health studies done on the chemical, toxicity information in the NLM's TOXNET database, and chemical information in its ChemIDPlus database.

On the Ingredients page, information on product constituents can be accessed using either a chemical's name or its Chemical Abstracts Service registry number. Searches bring up information on the chemical as well as a listing of products containing that ingredient. The MSDS page allows visitors to search for information on specific health effects. Entering a health effect (for example, muscle pain or nausea) into the search field pulls up a listing of relevant products.

The website also lists other resources of interest including links to the Environmental Protection Agency Consumer Labeling Initiative and its site on hazardous products in the home, and to the American Association of Poison Control Centers. **–Erin E. Dooley**

Mar del Plata Declaration

An October 2003 meeting between children's environmental health experts and pediatrics association leaders from Argentina, Bolivia, Brazil, Chile, Paraguay, Peru, and Uruguay, held in Mar del Plata, Argentina, has resulted in a new promise to foster children's environmental health in South America. In the Mar del Plata Declaration, the group pledged to work collectively to educate pediatricians about environmental health; conduct more research on sanitation, deforestation, water quality, and mercury and lead poisoning; bring these problems to the attention of national governments and international agencies; monitor the quality of children's environmental health; and develop programs to educate community members about creating healthful environments for children.

Eat Your Food—and Wrapper, Too

USDA food chemist Tara McHugh has invented new food wraps that biodegrade in the best way—they are edible. The wraps are made in different flavors of dehydrated fruit and vegetable purées, which are combined with vegetable-based lipids to make the wraps more water-resistant. The new wraps won't completely replace foil or petroleum-based plastic wraps, but they can be used in lunchbags, freezers, and other applications where wrapped items won't be heavily handled. More bonuses? The wraps can be made using imperfect produce, giving farmers a market for off-grade goods. Each wrap also provides a full fruit/vegetable serving. The edible wraps should start appearing on store shelves in late 2003.

Retail Therapy for the Environment

Backed by such names as Marks & Spencer, Monoprix, Versace, and Prada, UNEP executive director Klaus Töpfer announced a new initiative in June 2003 focused on changing consumer attitudes toward consumption and influencing the $7 trillion global retail industry to work toward sustainability.

To launch the campaign, which arose out of talks at the 2002 World Summit on Sustainable Development, Töpfer hosted a Paris meeting of international retailers and associations to explain how they can influence consumers to see a sustainable lifestyle as fashionable and push sustainability among suppliers, transporters, and other consumerism-related industries. One initiative partner, the online fashion magazine *Lucire*, is featuring stories on fashion companies that are integrating the principles of sustainability into their businesses.

Clockwise from left: NLM; Digital Stock; Digital Vision