

Favor me with silence.  
Horace (65–8 B.C.)

CHEMICAL EXPOSURES

## The Ugly Side of Beauty Products

In recent decades reproductive and developmental problems have become more prevalent—for example, data from the Centers for Disease Control and Prevention (CDC) show that male reproductive problems, including undescended testicles and hypospadias, doubled between 1970 and 1993. Environmental chemicals are strongly suspected to be contributing factors. Several recent reports highlight the presence of low-level concentrations of potential reproductive or developmental toxicants, particularly phthalates, in cosmetics and personal care products. A key question is whether these exposures are significant enough to cause harm.

In June 2004, Environment California issued *Growing Up Toxic: Chemical Exposures and Increases in Developmental Diseases*, which details chemicals found in consumer products and their potential health impacts. Other reports released around the same time by the Environmental Working Group (*Skin Deep: A Safety Assessment of Ingredients in Personal Care Products*) and Friends of the Earth (*Shop Till You Drop? Survey of High Street Retailers on Risky Chemicals in Products 2003–2004*) support Environment California's publication.

According to these three reports, makeup, shampoo, skin lotion, nail polish, and other personal care products contain chemical ingredients that lack safety data. Moreover, some of these chemicals have been linked in animal studies to male genital birth defects, decreased sperm counts, and altered pregnancy outcomes. There is no definitive evidence for the same effects in humans, but widespread exposure, primarily to phthalates, has been shown to occur.

Phthalates, as key components in plastics, appear in many consumer products. The main phthalates in cosmetics and personal care products are dibutyl phthalate in nail polish, diethyl phthalate in perfumes and lotions, and dimethyl phthalate in hair spray. Often, their presence is not noted on labels.

"The concerns that are focused around this particular chemical [class] have arisen from a series of tests and

studies that have been released recently that point to significant potential health concerns," says Sujatha Jahagirdar, an environmental advocate with Environment California. For example, a population study conducted by the CDC and published in the March 2004 issue of *EHP* demonstrated that 97% of 2,540 individuals tested had been exposed to one or more phthalates. Another preliminary study conducted at the Harvard School of Public Health and published in the July 2003 issue of *EHP* showed a correlation between urinary phthalate metabolite concentrations and DNA damage in human sperm. However, exposure sources in this study were unknown.

The personal care industry remains confident about phthalate safety, however. The Cosmetic Ingredient Review panel, an independent research group sponsored by the Cosmetic, Toiletry, and Fragrance Association, published a detailed literature review in February 2003 that unequivocally states that current use of phthalates in cosmetics and personal care products is safe. Marian

Stanley, manager of the Phthalate Esters Panel of the American Chemistry Council, says, "Some of these concerns [from environmental groups] are based on high-dose animal testing. The exposure that we really see in people—and we have the CDC numbers to back that up—is remarkably low. To us, why bother getting rid of a highly useful product when there should be no concern?"

Therein lies the controversy—environmental groups view the CDC data as evidence of widespread exposure, whereas industry groups view it as evidence of low-level exposure that falls well below amounts shown to cause problems in animal studies. The environmental groups respond that although it may be low-level exposure, it is *chronic* low-level exposure. Says Elizabeth Sword, executive director of the nonprofit Children's Health Environmental Coalition: "In my view there is sufficient evidence to pique my concern, not only as a parent but as the executive director of this organization, to circulate this information directly to parents in a way that they can then make the healthiest decisions."

However, consumers cannot make such judgments without knowing the ingredients contained in the products they use. "There are industry trade secrets and formulations that for industry reasons are kept from the consumer," says Sword. "This prevents the consumer from making fully informed decisions."

Environment California and the other environmental organizations hope to change that through consumer education and policy reform at the state and federal levels. "Environment California is pushing for a common-sense chemical policy that requires chemical manufacturers to test . . . their chemicals before they are released into the market and also provide the public with the tools that it needs to protect itself from potential dangerous impacts," says Jahagirdar. "Labeling is an extremely important and ethical thing for manufacturers to be doing."

"I think a lot of this comes down to an individual's acceptance of risk," says Sword. "[Each person's] personal risk tolerance is different. I think what we as a society need to feel confident about is that adults will at least make better decisions if you give them a way to do so, particularly when the health of a child may be at risk from making a bad decision." —**Julia R. Barrett**



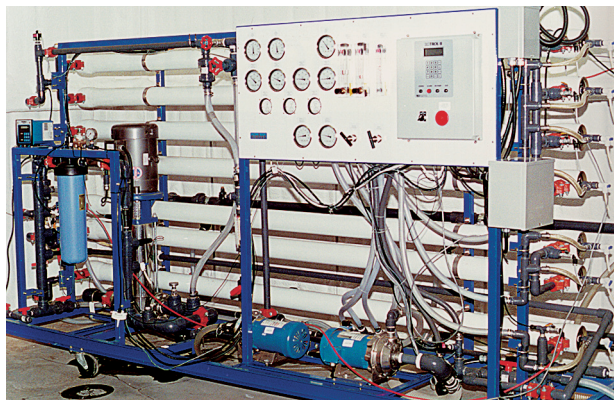
**Starting too young?** Concern is mounting over the effects of long-term exposures to chemicals—such as phthalates—found in cosmetics and personal care products.

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## INNOVATIVE TECHNOLOGIES

## Reverse Osmosis Moves Forward

As drought and growing populations cause water supplies to dwindle in areas around the world, reclaimed wastewater offers a possible solution. Indeed, some communities in California already use reclaimed wastewater to irrigate crops, water golf courses, and augment freshwater aquifers to block saltwater intrusion. Critics are concerned about the potential health hazards of the pharmaceuticals, hormones, and other contaminants that even treated wastewater has been shown to contain. But recent research reveals that the process of reverse osmosis may remove some of these contaminants.



**One step back, two steps forward.** New advances in reverse osmosis may mean cleaner—and healthier—reclaimed wastewater.

As described in the 12 March 2004 issue of the *Journal of Chromatography A*, Joel Pedersen, an environmental chemist at the University of Wisconsin–Madison, and his colleagues used gas chromatography–mass spectrometry to look for 19 compounds in effluent samples collected from reclaimed wastewater plants in California. They found detectable concentrations for 13, including food preservatives, painkillers, oral contraceptive hormones, and prescription medications. However, at the 228th American Chemical Society meeting held in Philadelphia in August 2004, Pedersen further reported that gas chromatography confirmed all 13 compounds to have been eliminated at two pilot plants testing reverse osmosis for contaminant removal.

Nonetheless, Pedersen cautions that it's too early to recommend that all reclaimed wastewater facilities employ reverse osmosis. "This is a case where the analytical chemistry is ahead of the toxicology," he says.

"Little is known about the toxicity of trace concentrations of these compounds," agrees Shane Snyder, project manager of research and development at the Southern Nevada Water Authority (SNWA) in Las Vegas. Snyder has monitored the flow of treated wastewater effluent into nearby Lake Mead since 1997. He says fish in Las Vegas Bay are the healthiest in all of Lake Mead because they thrive on nutrients in the effluent. Snyder and colleagues at the U.S. Fish and Wildlife Service are writing a paper on this topic.

Often used to remove salts, reverse osmosis requires electricity to pump water through semipermeable membranes. "A lot of work is involved to perform reverse osmosis correctly," says Pedersen. "Large-scale reverse osmosis may not be economically feasible in some areas." Salts, contaminants, and biofilms can clog the pores of membranes, raising maintenance costs.

Still other costs can make the process prohibitively expensive for inland cities in particular. Reverse osmosis generates brine. While coastal California wastewater facilities dump brine into the ocean, inland facilities must heat the brine to evaporate the water, then dispose of the dry salt in a landfill. "The cost of brine disposal is often more expensive than the cost of reverse osmosis itself," says Snyder. About 30% of treated water ends up as brine during reverse osmosis. That water loss "is not acceptable when you live in the desert," Snyder says. By comparison, standard treatment results in less than 1% water loss, according Snyder.

Moreover, "reverse osmosis membranes are not infallible," says Snyder. For instance, the carcinogen *N*-nitrosodimethylamine, a disinfectant by-product of wastewater treatment, breaches reverse osmosis membranes. However, dangerous compounds may be removed with less expensive treatments than reverse osmosis. For example, advanced oxidation methods can destroy *N*-nitrosodimethylamine.

But it's too soon to count reverse osmosis out just yet. Newer models require less pressure to pump water through. "More efficient membranes will lower the energy costs of reverse osmosis," Snyder predicts, "and likely make the process more cost-effective." —Carol Potera

## Smoky Horror Picture Show?

At the American Medical Association's 2004 annual meeting, the group's policy-making House of Delegates adopted a resolution urging the film industry to give an "R" rating to movies with scenes of characters smoking. The goal of the resolution is to reduce the amount of smoking seen in movies, and to limit those scenes to movies seen only by adults.

Speaking before the assemblage, Stephen Hansen, coordinator of the association's Tobacco Control Coalition, cited several recent studies showing that the number of smoking scenes onscreen is up from an average of 5 scenes per hour in the 1950s to 11 today. Other studies suggest that film depictions of smoking may correlate with the onset of smoking in youth.



## EU Bans Phthalates in Toys

In September 2004 the European Competitiveness Council voted to ban three phthalates from all products intended for children and to prohibit the use of three others specifically in toys and other items intended to be chewed or sucked by very young children. These chemicals, which are used to soften vinyl plastic, have been linked with reproductive and liver effects, and are known to leach from products that contain them. More than 900 tons of phthalates are produced each year.

Once the measure has been adopted formally by the council it will be sent to the European Parliament for a second reading. The European Commission will be charged with overseeing the implementation of the ban.

## Roaming Foam May Find a Home

The polystyrene foam that helps boat docks stay afloat can break off in large chunks, littering the lakescape and posing a boating hazard. Foam is traditionally very hard to recycle because it is wet and oily, and often contains metal screws and other items that can damage recycling machines. Now the Missouri-based company BioSpan Technologies has developed a solvent that dissolves the wet, dirty chunks at a ratio of more than 3 cubic yards of foam per gallon of solvent. The dissolved blend is then mixed with recycled asphalt to patch potholes. Other products made with the blend are used to preserve cement, wood, and metal.





## INTERNATIONAL HEALTH

## North Korean Catastrophe

When the Democratic People's Republic of Korea (DPR Korea, or North Korea as it is still commonly known) makes headlines, it usually concerns the country's nuclear ambitions. But recently the environment made the news, when the United Nations Environment Programme (UNEP) issued its *DPR Korea: State of the Environment 2003* report, which describes environmental



conditions in the secretive Asian country. The report paints a grim picture of a mountainous, heavily forested country facing serious environmental challenges.

The report, which is available online at <http://www.rrcap.unep.org/reports/soe/dprksoe.cfm>, was produced by officials from 20 North Korean government and academic agencies with advice from experts at UNEP and funding from the United Nations Development Programme. In a 27 August 2004 press release announcing the first-ever nationwide report on conditions in North Korea, UNEP acknowledged "a paucity of research and data on which to base reliable environmental assessments."

The nation is mired in a morass of intertwined environmental problems. The report says North Korea's population is projected to grow from 23 million in 2004 to 29 million in 2020. Coal warms most houses and powers most industry. It is a major cause of severe air pollution, yet according to the report, the national goal is

to quintuple coal consumption by 2020. As it is, the amount of firewood cut to meet the demand for fuel jumped from 3.0 million cubic meters per year in 1990 to 7.2 million cubic meters in 1996, causing serious deforestation.

"Soil erosion has in large part been caused by the cutting down of trees on hillsides and common land," says Paul French, author of the 2004 book *North Korea: The Paranoid Peninsula*. "This was done to make way for extra private plots where people could grow food during the famine [which began in the late 1990s]. . . . The local people had little choice as this was an



**A glimpse inside.** A dearth of data exists in the public realm on the environmental problems facing North Korea, but a new report from the United Nations Environment Programme leaves little doubt that severe pollution problems are affecting the country and its people.

extreme survival strategy in the face of the famine and government callousness and inability to provide food."

The government turned a blind eye, says French, and people managed to get some extra food. However, the rains, when they came, simply washed off the hillsides—because most of the nation's forests are on slopes steeper than 20 degrees, deforestation causes erosion and flooding in the watershed. In 1995, floods cost North Korea US\$15 billion in damages, and soil erosion nationwide the next year was estimated at 15 tons per hectare.

Although numerous sewage treatment plants have been built in North Korea, many households in small towns and rural areas still discharge untreated sewage into surface waters. The UNEP report attributed severe stream pollution to a "decrease in investment in environmental protection and abnormal operation of wastewater/sewage treatment plants."

In the Taedong River, which flows through the capital, Pyongyang, the effects

of these inputs are compounded by the construction of a barrier at the sea to block incoming floodwaters and by low river volume. Both of these factors have reduced the river's natural purification capacity, concentrating contaminants near wastewater discharge points. Today, the Taedong exceeds government environmental standards and continues to deteriorate.

The report cites a number of government efforts to plant trees and conserve water, indicating that officials are aware of declining environmental conditions. However, the report avoided mention of the unique political/economic context for

North Korea's environmental conditions. Ruth Greenspan Bell, who studies Asian environmental matters for the nonprofit research group Resources for the Future, says she would assume the situation in North Korea to be the same as that in countries such as the Soviet bloc before 1989 and China today—"that environmental protection, if it exists, lacks any independent role and gets subsumed to production and full-employment goals."

The entry for North Korea in the 2004 *CIA World Fact Book* notes that this nation, "one of

the world's most centrally planned and isolated economies," faces desperate economic conditions. The industrial infrastructure "is nearly beyond repair as a result of years of underinvestment and spare parts shortages," and industrial output has been declining for years. The Central Intelligence Agency estimates that massive military spending supports an army of 1 million.

Bell raises a second question about the data used in the report. "It is often important to take data from societies like North Korea—in which independent data gatherers and assessors don't exist—with a grain of salt," she says. "Too often people feel compelled to tell authorities what they want to hear." Still, noted UNEP director Klaus Töpfer at the report's launch, "By bringing together the available environmental information and identifying priority issues, the report will help strengthen monitoring and assessment, policy setting, action planning, and resourcing in DPR Korea." —David J. Tenenbaum

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## Noise Pollution Clearinghouse

Not all sound is bad, but too much of the wrong sounds harm your health. What many people don't know is that everyday items such as lawn mowers and kitchen blenders can emit noise at hazardous levels. More than 30 million Americans work at a job where they are exposed to hazardous sound levels on a regular basis. One-third of Americans with some degree of hearing loss can attribute that loss to sound exposure. And the evidence is building to point toward other noise-related health effects. The Noise Pollution Clearinghouse (NPC) is one group whose mission is to foster awareness of noise-related issues. On the NPC's website, located at <http://www.nonoise.org/>, visitors can find many different resources to learn about what noise pollution is and how it can be fought.

The NPC has four ongoing campaigns: Quiet Classrooms, Quiet Lawns, Quiet Lakes, and Silencing Car Alarms. The Quiet Classrooms portion of the site offers tips to students, teachers, and others on how to make the learning environment as quiet as possible, while the Quiet Lawns page rates 40 different lawn mowers in terms of noisiness. The Quiet Lakes page features information on the noise caused by sport watercraft and what the NPC is doing to fight this noise source. The Silencing Car Alarms portion of the site tells why the NPC thinks car alarms should be outlawed and lists quieter alternatives for keeping cars safe from thieves.

For the layperson, the NPC has assembled an online library of almost 50 articles, reports, and seminal documents from a variety of sources. Within this section is a dictionary of noise terms, a primer on environmental noise, and more technical documents from national and international experts. A separate library contains noise-related documents just from the U.S. Environmental Protection Agency. This page also links to the full text of the Noise Control Act and federal regulations from the Office of Noise Abatement and Control, as well as to *Noise Effects Handbook: A Desk Reference to Health and Welfare Effects of Noise*. This 10-chapter textbook was written by the Office of Noise Abatement and Control to address effects ranging from fetal impacts to how loss of hearing affects speech and other activities.

Starting once more from the homepage, the Hearing Loss and Occupational Noise Library includes documents from the Occupational Health and Safety Administration, the National Institute for Occupational Safety and Health, and the Mining Safety and Health Administration. Located here are criteria, guides, and standards for protecting workers' hearing, plus a bibliography of 2,500 references on hearing and ear protection, among other topics. The NPC also is building an online noise law library with federal, state, local, and European noise-related laws and regulations as well as proposed regulations.

For people who want to put their knowledge to work, the NPC Resource Library page has links for activists, educational resources, upcoming noise conferences and meetings, and potential funding sources. The NPC also provides pages on its website for local noise organizations that could not otherwise afford to host their own sites. —Erin E. Dooley



## Coco Locomotion

Coconuts are the latest plant to be tapped for bio-based fuels. In October 2004, a unit of the Philippine National Oil Company opened the first cocodiesel plant. The plant is meant to show Filipino farmers how the technology can benefit them and their communities. Coconut oil and methanol are the major raw materials used to produce a biodiesel that burns cleaner than regular diesel without the need for engine modifications. The fuel costs about 8¢ less per kilometer to use, and the process also yields glycerine, which can be used to make soap. Some Filipino government vehicles are already using a 1% blend of cocodiesel as part of a presidential drive to reduce vehicular pollution.



## Targeting Mosquitoes Online

Ever wonder whether those swarming mosquitoes in your backyard are carrying West Nile virus or some other disease? Researchers at Texas A&M University are developing a web-based real-time system that researchers and the public will be able to use to see where disease-carrying vectors have been spotted. The Mosquito Spatial Information Management System will map disease occurrence, epidemiology, and control procedures. Jim Olson, an entomologist on the team, said the system is just a small part of a larger multiagency project to determine the level of mosquito resistance to pesticides. This information will help pest management officials choose the most appropriate mosquito control measures for any given locality.

## Mozambique Phases Out Leaded Gas

In August 2004 Mozambique announced its intention to ban the importation of leaded gasoline by the end of the year. The decision followed government approval of an action plan by the Leaded Gasoline Phase-out Task Force, a multiagency group working to facilitate the replacement of leaded gas with safer options, and to educate the public on the health and societal benefits of doing so. The task force plans to completely phase out the use of leaded gasoline in the country by mid-2005.

Most lead exposure is to airborne lead and lead in dust and soil. Excessive lead exposure is associated with cognitive impairment, stunted growth, and permanent brain damage and mental retardation. Lead has been found in vegetables grown in urban African gardens at levels higher than U.S. EPA allowable limits.

