Cities were in many cases originally created for protection. This is about the only logic of urban growth that is no longer significant.

Robert Moses
***Working for the People*, 1956**

HAZARDOUS WASTE

Constructing Rules for Dismantling Ships

Labor groups, environmental activists, and shipping experts have begun finalizing international guidelines that would reduce threats from toxic substances released during the ship scrapping process and would protect the health and safety of laborers who dismantle ships. In June 2001, government representatives and stakeholders in the ship dismantling industry gathered in Geneva, Switzerland, to develop the new guidelines.

The meeting was organized by the United Nations Environment Programme under the auspices of the Basel Convention on the Transboundary Movement of Hazardous Wastes and Their Disposal. The International Labour Organization, the International Maritime Organization, the International Chamber of Shipping, and several environmental nongovernmental organizations, particularly Greenpeace and the Basel Action Network, are participating in efforts to refine and support the guidelines. Guideline preparation drew largely from information from the International Maritime Organization Marine Environment Protection Committee on ship recycling and from the International Chamber of Shipping standard inventory of potentially hazardous materials aboard vessels and code of good practice for shipowners.

The 89 pages of Basel Convention draft guidelines are being established at a crucial time in the shipping industry. A dramatic expansion in international maritime trade has led to a corresponding increase in ship scrapping. With an average sea life of 20–25 years, an estimated 500–700 merchant vessels are expected to be dismantled every year for the next 15 years.

The guidelines will introduce worldwide principles for retiring, selling, and dismantling obsolete ships. They will identify potential contaminants and prevent their release, and introduce improved measures for emergencies and accidents. They will encourage sorting parts for reuse, recycling, and disposal. Finally, they will also address the construction and operation of ship scrapping facilities.

Ship scrappers are exposed to extremely hazardous working conditions. "There are chemical, physical, biological, ergonomic, and psychosocial [such as anxiety due to the dangerous work environment] risks present at all stages of the work process," says Paul J. Bailey, an International Labour Organization senior technical specialist. "Most workers, and to some extent employers, are unaware of the long-term effects of exposure to toxic fumes from cutting operations."

Dismantling one large vessel can require removing several tons of hazardous wastes including persistent organic pollutants such as mercury, lead, polychlorinated biphenyls, and asbestos. In the discussion paper "Is There a Decent Way to Break Up Ships?" published online by the International Labour Organization in 2000, Bailey notes that other occupational hazards of ship scrapping include exposure to lead, chromates, radiation, and explosives. The dismantling process not only threatens the health of workers but can also introduce pollutants to the groundwater and air of nearby communities.

The guidelines encourage future ship design that limits hazardous materials, notes Pierre Portas, a senior program officer for the Secretariat of the Basel Convention. "A critical element is the preparation of ships for dismantling," he says. "Decontamination is a prominent feature, and cleanup activities will reduce downstream adverse effects at the dismantling yards."

The ship scrapping industry is located primarily in developing nations where labor is inexpensive, and environmental laws—if they exist—may be inadequate or unenforced. In many countries, ship dismantlers work unsupported by any worker safety guidelines or collective bargaining, according to Bailey. India is the world leader in ship dismantling at 38%, followed by China at 25%, Bangladesh at 19%, Pakistan at 7%, and the rest of the world at 11%, according to the International Maritime Organization.

Worker and employer education is an essential component in safeguarding worker health, says Bailey. "Even where appropriate personal protective equipment is available, it is often not worn," he says, both because of lack of worker education and the extreme heat and humidity of the work environment. "If hazardous material could be clearly identified and its location marked on the ship, workers would find it easier to use the appropriate protective equipment, thereby reducing risk." Laborers also need instruction on working safely at steep heights, he says.

Portas expects guideline approval by the Basel Convention's Technical Working Group by mid-2002. The sixth meeting of the conference of the parties to the Basel Convention will consider final adoption of the guidelines in December 2002. **–John Tibbetts**

Ship-to-shore pollution. Ship scrapping occurs most frequently in developing countries with few or lax environmental and occupational regulations. New guidelines should help address risks to both workers and nearby water and air.

The Image Works

The Beat

edited by **Erin E. Dooley**

Urban Issues

EU Sewers Still Not Up to Standard

It was not the best news for Europe's major urban areas. At a March 2001 seminar on the European Commission's (EC) Urban Waste Water Treatment Directive, environment commissioner Margot Wallström chided several European towns and cities, including the EC's hometown of Brussels, for not implementing the directive's requirements on time.

Some of the "named and shamed" cities, as Wallström called them, still discharge untreated wastewater into the environment in violation of the 1991 directive's deadlines. Others have failed to keep the EC adequately informed on issues such as identifying sensitive areas and building primary and secondary treatment plants. "The environment of the EU [European Union] would look different if legislation was enforced in member states," said Wallström.

The directive is meant to reduce nutrient output from industrial and municipal sources and improve the quality of drinking water throughout EU member states. The directive established three principal deadlines: install stringent collection and treatment systems for designated sensitive water areas (those that are eutrophic or otherwise seriously polluted by wastewater) by the end of 1998, establish secondary systems in larger cities by the end of 2000, and establish secondary systems in all cities by the end of 2005.

Most member states missed the first two deadlines and have been slow to inform the EC on their progress, although Denmark and Austria are now close to compliance with the 1998 deadline. France and Germany are especially delinquent, but no French or German cities are cited on the EC's list because their governments failed to provide the commission with data on which to assess their adherence to the directive.

In April, the EC referred Spain to the European Court of Justice and sent written warnings to France and the United Kingdom for failing to meet the 1998 deadline to identify sensitive water areas. The commission also warned Germany about its inadequate legislation to help meet the directive's deadlines. The EC further noted that member states have "proceeded in a restrictive fashion when designating sensitive areas and have not taken into account the fact that discharged wastewater migrates and contributes to the level of pollution downstream."

"From the very beginning, many of the member state governments weren't aware of the real implications of the directive," says Francis Rillaerts, secretary-general of Eureau, a Brussels-based association of scientific and technical organizations concerned with drinking water quality and wastewater. "A lot of investment has been made quickly in the last three or four years. But in many cases, it's just been too late."

The Named and Shamed

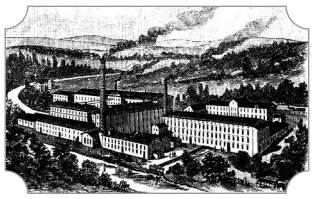
Belgium: Brussels
Greece: Elefsína-Aspropyrgos, Pátrai
Ireland: Cork, Dundalk
Italy: Foce Sarno, Imperia Foce Impero, Medio Sarno, Merano, Milan, Misterbianco, Taranto
Portugal: Barreiro, Costa do Estoril, Cova da Beira, Matosinhos, Porto Setúbal, Vila Nova de Gaia
Spain: Alginet, Cádiz, Donostia-San Sebastian, Gijón, La Coruña, Logroño, Tui
United Kingdom: Bebington, Brighton, Dover-Folkestone, Dundee, Hastings, Hull, Middlesbrough, Port Talbot, Portsmouth, Sunderland-Whitburn, Torbay

Of the EU countries cited, the United Kingdom boasts the most towns and cities on the list. But not all of the 11 U.K. cities deserve their place on the list, says Kate Hutchinson, a coastal pollution officer for the Marine Conservation Society, an environmental group based in Ross-on-Wye. "The commission is definitely justified in smacking the United Kingdom on the wrist," Hutchinson says, "because the government always had the attitude towards environmental directives to wait until the last minute. On the other hand, the data the commission used for its 'named and shamed' list was two to three years old, and some of the cities on the list have since come up to standard or have major works in progress."

As proof that the commission's directive works, Wallström reports that in many of Europe's rivers and lakes where the requirements have been implemented, water quality has improved significantly. Not in Belgium's capital city, however—the EC has warned its host country that it will face judiciary proceedings if Brussels fails to adhere to the directive. Belgium just began treating wastewater last fall and currently plans to complete its secondary treatment plant in 2004–2005, nearly five years past the deadline. **–Rebecca Clay**

Brits Breathing Easier

In his book *The Skeptical Environmentalist*, University of Aarhus statistician Bjørn Lomborg contends that the air quality in London is better now than at any time since 1585. London's air quality saw its lowest point during the Great London Smog of December 1952, which resulted in the deaths of 4,000 people. Since that period, Lomborg says, air particle and sulfur dioxide levels in the city have dropped by 95%. He adds that airborne lead levels in Britain dropped 90% between 1980 and 1995. Lomborg attributes the improvement to the decline of heavy industry, the disuse of residential fireplaces, and improvements made in vehicle emission technologies.



Chemical Companies Commit to Kids

Thirty-six chemical manufacturers have committed to providing essential data including hazard, exposure, and risk assessments for children on 20 commonly used commercial chemicals. The Voluntary Children's Chemical Evaluation Program was announced by U.S. EPA administrator Christie Whitman in July 2001.

The list of chemicals includes acetone, benzene, trichloroethylene, and toluene. Previous research has determined that the listed chemicals, used in manufacturing products such as plastics, drugs, and detergents, have been found in human tissue and may be present in drinking water and indoor air. The first assessments should be presented to the EPA in summer 2002.

A Hit with Sand Fly Spit

Researchers at the National Institute of Allergy and Infectious Diseases have developed a breakthrough vaccine with the potential to alleviate suffering for the estimated 12 million people worldwide affected with one of the leishmaniases, a group of potentially fatal diseases that can cause destruction of the mucous membranes near the face, painful skin lesions, and infestations of internal organs. The leishmaniases are transmitted by sand flies, blood-feeding insects. The vaccine, which tests show to be effective with mice, utilizes a protein found in sand fly saliva to confer immunity. Further testing is planned on other animals. This research could lead to vaccines for other insect- or tickborne diseases, says institute director Anthony Fauci.

Top to bottom: Desk Gallery; Ramses Van Ryssen; Ed Rowton/Walter Reed Army Institute of Research

CHILDREN'S HEALTH

New Risk for Newborns

In the September 2001 report *Safety Assessment of Di(2-ethylhexyl)phthalate (DEHP) Released from PVC Medical Devices*, the U.S. Food and Drug Administration (FDA) states that certain populations, particularly newborn males, may be at risk for adverse health effects due to DEHP exposure. DEHP is widely used to soften polyvinyl chloride (PVC) plastics, which are used in medical settings for IV bags and tubing, blood bags, feeding tubes, and tubing for dialysis and heart bypass procedures. Because DEHP does not bond to PVC molecules, it can leach from plastics containing it.

Baby blues. Newborn males who require certain medical treatments may bear the greatest risk for exposure to DEHP, a chemical found in medical equipment such as IV bags and tubing.

Numerous animal studies show that DEHP exposure produces toxic effects, especially impaired testicular development. But extending these results to humans is complicated by differences in routes of exposure, metabolism, and possible mechanisms of toxicity. Further, few human studies have been conducted, and exposures are often based on theoretical estimates. However, the FDA concludes there is sufficient evidence that DEHP in medical devices may pose a risk to certain patient populations undergoing procedures that involve PVC materials. Newborns undergoing intensive medical treatment may receive proportionally larger doses of DEHP and may be more sensitive to potential effects, so they draw special concern. Male newborns, whose testicles are still developing, are thought to be at the greatest potential risk.

"We did a risk assessment to see whether there was a level of concern following exposure to DEHP released from medical devices, and we identified some exposure scenarios that might possibly represent harm," says Mel Stratmeyer, health sciences branch chief at the FDA's Center for Devices and Radiological Health, which conducted the assessment. Stratmeyer emphasizes *possibly*. "We didn't feel there was a lot of concern with the possible exception of young male infants who might be critically ill and have prolonged exposure to numerous devices that contain DEHP," he says.

However, Health Care Without Harm (HCWH), an international coalition of 339 health, environmental, and other groups, believes greater concern is warranted. The group petitioned the FDA in June 1999 to require labeling of medical devices containing DEHP and to establish a program promoting PVC alternatives. The FDA rejected HCWH's request, although it is considering labeling certain medical devices, such as those used on critically ill newborns.

In October 2000 the National Toxicology Program (NTP) Center for the Evaluation of Risks to Human Reproduction released evaluations of the effects of phthalates on reproduction and development. The report on DEHP concludes in part that there is "serious concern" that DEHP exposure in critically ill infants "may adversely affect male reproductive tract development." Additionally, DEHP risk assessments published by Health Canada in 2001 and the European Union in 2000 draw similar conclusions.

HCWH, which is resubmitting its petition for labeling of some PVC medical devices, generally commends the FDA assessment. "Overall, we're pleased with it," says Charlotte Brody, coordinator of HCWH. However, she says there are significant data gaps, especially in identifying and assessing fetal exposures during pregnancy, infant exposures during lactation, and aggregate exposure from multiple procedures. "The challenge is for the FDA and health care providers to protect vulnerable populations by minimizing exposures to PVC products that can leach DEHP," she says. "The FDA assessment is the first step in protecting vulnerable populations, but a plan of action is needed." **–Julia R. Barrett**

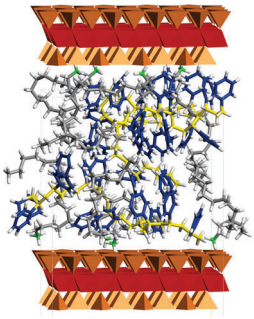
INNOVATIVE TECHNOLOGIES

Molding Better Plastics with Clay

The future may once have been mere plastics, but today the future is *super*plastics. Plastics are being treated with nanoparticles to create stronger, cleaner, more flame-resistant plastics. The concept dates back to experiments in the 1950s mixing clay with liquid rubber in tire manufacture, but today researchers are putting a new twist on the process, focusing on improving many of the plastics' material properties.

One method of reducing plastic flammability involves treating the plastic with polybrominated diphenyl ethers (PBDEs). But PBDEs resist physical, chemical, and biological degradation, and they can leach out into the environment. Some PBDEs can trigger neurologic reactions similar to those caused by polychlorinated biphenyls. So Evangelos Manias, director of the Nanostructured Materials Lab at Pennsylvania State University, is working on the dispersion of nanometer-thin particles of natural clays to plastics to improve flame resistance.

The clays (mainly montmorillonite) and plastic blend invisibly. Mixing montmorillonite with a polymer such as polypropylene forms a polymer similar to the untreated form, but more highly fire resistant; when it does burn, it does so cleanly. If the composite is exposed to heat, the clay creates a barrier of "char" on the outside, preventing heat and oxygen from penetrating and fueling combustion (as well as preventing toxic decomposition materials from exiting). The new blend is also stronger and less permeable to both liquids and gases.



Superplastics. Plastic polymers are combined with clay nanoparticles to create a stronger, cleaner, more flame-resistant material.

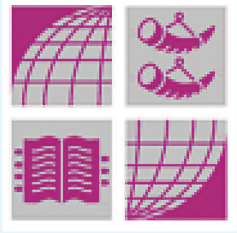
Jeffrey Gilman, an expert on nanocomposites and flame resistance in polymers at the National Institute of Standards and Technology, believes clay alone won't reduce flammability enough to allow for complete substitution for PBDEs; adding more clay does not yield a corresponding decrease in flammability, he says, and can yield a very rigid, concrete-like polymer. But Manias says the addition of clay allows for much less PBDE to be used.

Top to bottom: PhotoDisc; Evangelos Manias

Preventing Biological Warfare

The Department of Peace Studies at the University of Bradford in West Yorkshire, United Kingdom, was created in response to initiatives taken by members of the Religious Society of Friends (or Quakers) to form a British peace studies center similar to centers in Scandinavia and North America. The prevention of biological warfare through the strengthening of the Biological and Toxin Weapons Convention (BTWC) is one of the department's main research projects.

Located on the Internet at http://www.brad.ac.uk/acad/sbtwc/, the department's BTWC Web site is a primary source of information on the convention, which was first negotiated in the early 1970s, and the protocol being developed to make the convention a more potent and timely defense against the proliferation of biological weapons.



Links to the site's most recently added documents and videos are listed on the home page. The Convention (Ratifications and Signatories) link leads to the texts of all the major agreements leading up to the convention, going as far back as the 1925 Geneva Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare. Under the Current Protocol Text link are procedural reports and working papers from each round of negotiations.

Evaluation papers written by project researchers offer detailed insights into the routine workings of the protocol negotiation conferences and examine developments in the negotiation process. "Evaluation Paper No. 22, The US Rejection of the Composite Protocol: A Huge Mistake Based on Illogical Assessments" discusses the July 2001 decision by the U.S. government to not support the protocol and urges the United States to reconsider its position. The paper also provides background on the U.S. political stance on biological and chemical weapons. Other accessible protocol documents include briefing papers prepared for conference delegates and papers from conferences held periodically to review the operation of the convention.

The Information about Biological Weapons and the BTWC page contains links to articles and speeches by department experts, video lectures on the BTWC protocol negotiations, and information on related programs carried out by the department. **–Erin E. Dooley**

Manias believes the clay–polymer compounds should be recyclable, although there have not yet been any major studies in that area. It might be different, he admits, in a use such as auto body recycling, where a much greater volume of clay might be involved, but he adds that not enough research has been done to substantiate that concern. Bert Powell, a senior scientist for Southern Clay Products, says, "There are some processors now who prepare clay nanocomposites by creating a concentrate, which is then diluted to the desired concentration through the addition of untreated polymer. That tends to imply that mixing treated and untreated [polymers] in recycling won't be an issue."

Manias says the clay can be added at the final stages of polymer processing without changing current industrial practices. "The small amounts of clay do not cause any wear in the equipment, and when appropriate organoclays are used, manufacturers can use the same equipment, timing, and settings as in their normal processes," he says.

The Federal Aviation Administration has shown interest in the technology for uses such as airplane seat covers and overhead bins. (The administration partially funded joint research by Gilman and Manias that was featured in the July 2000 issue of *Chemistry of Materials*.) General Motors, Basell, Southern Clay Products, and Blackhawk Automotive Plastics have produced a nanocomposite step-assist for 2002 GMC Safari and Chevrolet Astro vans. Gilman says the technology is already used in sports equipment, and is being considered for use in a heart pump codeveloped by Penn State and Arrow International. **–Lance Frazer**

Top to bottom: PhotoDisc; Christopher G. Reuther/EHP

Dialing Information

Reacting to pressure from consumer groups, three of the world's largest mobile phone manufacturers have announced that they will begin providing radiation information with their products. The information, to be included in user manuals for phones made by Ericsson, Motorola, and Nokia, will contain each product's specific absorption rate (SAR). This standard, set in conjunction with the European Committee for Electrotechnical Standardisation, is a measure of radiation absorption measured in W/kg body weight. The current maximum safe SAR is 2.0, though most mobile phones now on the market are rated between 0.5 and 1.0. Ericsson spokesperson Michael Westmark says the SAR value indicated on the phone package will be the maximum value and that callers would very seldom reach the maximum level in a properly constructed network.

Saying Good-bye to Sulfur

Zero-sulfur gasoline and diesel fuels, which may contain no more than 10 ppm sulfur, should be available in all European Union countries beginning in January 2005 and will be mandatory in those countries by 2011, thanks to a European Commission proposal adopted in May 2001. The commission is taking these steps to promote a more rapid introduction of fuel-efficiency technologies by vehicle manufacturers. Use of sulfur-containing fuels reduces the efficiency of currently used pollution-reducing devices such as catalytic converters. These measures should lead to significant reductions in automobile carbon dioxide emissions.

Parks without Puffers

Children and others who use Los Angeles city and county parks will now be able to enjoy at least portions of them free of tobacco smoke. Officials announced in August that smoke-free zones would be established and enforced in all of the area's 375 parks and recreation centers. The regulation prohibits smoking on all ball diamonds and in children's play. The effort is aimed at protecting children from the harmful health effects of secondhand tobacco smoke and from tobacco waste, which small children can pick up, ingest, and be burned by. This move is in conjunction with a similar California state law that takes effect 1 January 2002.