SCIENCE

Publisher: Richard S. Nicholson
Editor-in-Chief: Daniel E. Koshland Jr.
Editor: Ellis Rubinstein
Managing Editor: Monica M. Bradford
Deputy Editors: Philip H. Abelson *(Engineering and Applied Sciences);* John I. Brauman *(Physical Sciences);* Thomas R. Cech *(Biological Sciences)*

Editorial Staff
Assistant Managing Editor: Dawn Bennett
Senior Editors: Eleanore Butz, R. Brooks Hanson, Barbara Jasny, Katrina L. Kelner, David Lindley, Linda J. Miller, Phillip D. Szuromi, David F. Voss
Associate Editors: Gilbert J. Chin, Pamela J. Hines, Paula A. Kiberstis, Suki Parks, L. Bryan Ray
Letters: Christine Gilbert, *Editor;* Steven S. Lapham
Book Reviews: Katherine Livingston, *Editor;* Annette Theuring, *Assistant Editor;* Susan Randolph, *Editorial Assistant*
Contributing Editor: Lawrence I. Grossman
Editing: Valerie Jablow, Cara Tate, *Senior Copy Editors;* Douglas B. Casey, Harry Jach, Erik G. Morris, Christine M. Pearce
Copy Desk: Ellen E. Murphy, *Supervisor;* Linda B. Felaco, Joi S. Granger, Beverly Shields, Melissa Q. Rosen, Kameaka Williams, *Assistant*
Editorial Support: Sherryf Farmer, *Supervisor;* Linda Dienavs, Carolyn Kyle, Michele Listisard, Diane Long, Patricia M. Moore
Administrative Support: Sylvia Kihara, Charlene King, Jeanette Prastein
Telephone: 202-326-6501; **FAX:** 202-289-7562; **TDD:** 202-408-7770

News Staff
News Editor: Colin Norman
Features Editor: John M. Benditt
Deputy News Editors: Tim Appenzeller, Joshua Fischman, Jean Marx, Jeffrey Mervis
News & Comment/Research News Writers: Christopher Anderson, Faye Flam, Troy Gately, *copy,* Constance Holden, Richard A. Kerr, Eliot Marshall, Rachel Nowak, Richard Stone, Lisa Seachrist (intern)
U.S. Bureaus: Marcia Barinaga (Berkeley), Jon Cohen (San Diego), Anne Simon Moffat (Chicago), John Travis (Boston)
Contributing Correspondents: Joseph Alper, Barry A. Cipra, Robert Crease, Elizabeth Culotta, Ann Gibbons, Virginia Morell, Robert Pool, Leslie Roberts, Gary Taubes, M. Mitchell Waldrop
Administrative Support: Fannie Groom, Jennifer Hodgin
Telephone: 202-326-6500; **FAX:** 202-371-9227

Art & Production Staff
Production: James Landry, *Director;* Wendy K. Shank, *Manager;* Lizabeth A. Harman, *Assistant Manager;* Laura A. Creveling, Scherraine B. Mack, Linda C. Owens, *Associates*
Art: Amy Decker Henry, *Director;* C. Faber Smith, *Associate Director;* Katharine Sutliff, *Scientific Illustrator;* Holly Bishop, *Graphics Associate;* Elizabeth Carroll, *Graphics Assistant,* Leslie Blizard, *Assistant*

Europe Office
Senior Editor: Richard B. Gallagher
Associate Editor: Jeffrey Williams
News Editor: Daniel Clery
Correspondent: Peter Aldhous
Editorial Associate: Belinda Holden
Business Manager: Julie Eastland
Marketing Manager: Jane Pennington
Address: Thomas House, George IV Street, Cambridge, UK CB2 1HH
Telephone: (44) 0223 302067; **FAX:** (44) 0223 302068

EDITORIAL

Reflections on the Environment

William K. Reilly, former administrator of the Environmental Protection Agency (EPA), can now speak bluntly about U.S. policies. He has been the Payne Visiting Professor at Stanford University. What follows is based on a lecture he delivered on 12 January 1994.*

The overall tone was that bad judgments have been involved in priorities allocated to environmental matters. Huge sums of money are being spent on hypothetical risks experienced by a few individuals while ecological matters affecting millions of people are not adequately addressed. One of Reilly's targets was the Congress:

> Throughout the 1970s and 1980s, Congress constructed an arsenal of laws, typically in response to an episode of media attention and public alarm.... Many of these laws addressed serious problems but they were typically conceived in isolation, and constructed without reference to other environmental problems or laws.... No law ever directed that we seek out the best opportunities to reduce environmental risks, in toto; nor that we employ the most efficient, cost-effective means of addressing them.

A substantial portion of the lecture was devoted to risks. Risks involving technology over which the individual has no control are regarded by the public as most fearsome. The EPA adjusted its policies accordingly. When granting a tolerance for a new pesticide or an air pollutant, a lifetime risk of one in a million for cancer was the standard. Reilly mentioned a number of familiar risks that are greater. The hazard of death by lightning is 35 times as great; by accidental falls, 4000 times as great; and in a motor vehicle, 16,000 times as great. He emphasized that one in a million is a very remote risk.

Reilly indicated an open mind with respect to the validity of risk assessment procedures used by the EPA. He pointed out that in analyzing results from test animals the EPA was an order of magnitude more stringent than the Food and Drug Administration. He mentioned the fact that Bruce Ames has pointed to flaws in assumptions about human effects based on the incidence of tumors in mice and rats given huge doses of chemicals.

Reilly suggested that one way risk regulation might be improved would be to avoid basing it on the most exposed individual. The costs that society must bear to protect such individuals may be excessive:

> Superfund has relied on different exposure assumptions from other EPA programs, though it conducts its risk assessments similarly. The risks it addresses are worst-case, hypothetical present and future risks to the maximum exposed individual, i.e., one who each day consumes two liters of water contaminated by hazardous waste. The program at one time aimed to achieve a risk range in its clean-ups adequate to protect the child who regularly ate liters of dirt.... And it formerly assumed that all sites, once cleaned up, would be used for residential development, even though many lie within industrial zones. Some of these assumptions have driven clean-up costs to stratospheric levels and, together with liabilities associated with Superfund sites, have resulted in inner-city sites suitable for redevelopment remaining derelict and unproductive. The consequence, in New Jersey and other areas, has been to impose a drag on urban redevelopment in the inner city, and to push new industry to locate in pristine, outlying sites.

Reilly noted that costs of cleanup of federal facilities such as Department of Energy sites have been estimated to be hundreds of billions of dollars. He recommended that Americans ask themselves what they are getting from the existing federal facilities cleanup programs. He stated that risks attributable to contaminated underground water at some sites are negligible and no reliable assessments of risks to health and the environment have been conducted. He went on to say that there is now a need for developing new priorities and redeploying scarce budget outlays toward environmental problems that affect millions of people,

like improving air quality and protecting coastal waters, the Great Lakes, Chesapeake Bay, the Gulf of Mexico, and other highly productive but imperiled natural systems on which we depend. Federal budget outlays for clean-up of contaminated federal facilities are out of control, ill-considered, and in need of a thorough review to base clean-up priorities on actual threats to people's health and the environment.

Philip H. Abelson

*W. K. Reilly, "Risky business: Life, death, pollution, and the global environment," address delivered on 12 January at the Institute for International Studies, Stanford University, Stanford, CA.