

SCIENCE

EDITORIAL

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: Eleanor Butz, R. Brooks Hanson, Pamela J. Hines, Barbara Jasny, Katrina L. Kelner, Paula A. Kiberstis, David Lindley, Linda J. Miller, L. Bryan Ray, Phillip D. Szuromi, David F. Voss
Associate Editors: Gilbert J. Chin, Suki Parks
Letters: Christine Gilbert, *Editor*; Steven S. Lapham
Book Reviews: Katherine Livingston, *Editor*
Contributing Editor: Lawrence I. Grossman
Editing: Valerie Jablow, *Supervisor*; Cara Tate, *Senior Copy Editor*; Jeffrey E. Cook, Harry Jach, Erik G. Morris, Christine M. Pearce
Copy Desk: Ellen E. Murphy, *Supervisor*; Joi S. Granger, Daniel T. Helgerman, Melissa Q. Rosen, Beverly Shields, Kameaka Williams, *Assistant*
Editorial Support: Sherry Farmer, *Supervisor*; Brent Gendleman, Carolyn Kyle, Michele Listisard, Diane Long, Patricia M. Moore, Ted Smith
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: Linda B. Felaco (copy), Constance Holden, Richard A. Kerr, Andrew Lawler, Eliot Marshall, Rachel Nowak, Antonio Regalado (intern), Robert F. Service, Richard Stone, John Travis
U.S. Bureaus: Marcia Barinaga (Berkeley), Jon Cohen (San Diego), Anne Simon Moffat (Chicago), Wade Roush (Boston)
Contributing Correspondents: Barry A. Cipra, Robert Crease, Elizabeth Culotta, Ann Gibbons, Virginia Morell, Dennis Normile (Tokyo), Robert Pool, Gary Taubes
Administrative Support: Fannie Groom, Jennifer Hodgkin
Telephone: 202-326-6500; **FAX:** 202-371-9227; **Internet Address:** science_news@aaas.org

Art & Production Staff

Production: James Landry, *Director*; Wendy K. Shank, *Manager*; Elizabeth A. Harman, *Assistant Manager*; Laura A. Creveling, Scherraine B. Mack, Stephen E. Taylor, *Associates*; Leslie Blizard, *Assistant*
Art: Amy Decker Henry, *Director*; C. Faber Smith, *Associate Director*; Katharine Sutliff, *Scientific Illustrator*; Holly Bishop, *Graphics Associate*; Elizabeth Carroll, Preston Morrhigan, *Graphics Assistants*

Europe Office

Editorial: Richard B. Gallagher, *Office Head and Senior Editor*; Stella M. Hurtle, Julia Uppenbrink, *Associate Editors*; Belinda Holden, *Editorial Associate*
News: Daniel Clery, *Editor*; Michael Balter (*Paris*), Patricia Kahn (*Heidelberg*), *Contributing Correspondents*
Administrative Support: Janet Mumford; Anna Riches
Address: 14 George IV Street, Cambridge, UK CB2 1HH
Telephone: (44) 1223-302067; **FAX:** (44) 1223-302068
Internet address: science@science-int.co.uk

Science Editorial Board

Charles J. Arntzen	F. Clark Howell
David Baltimore	Paul A. Marks
J. Michael Bishop	Yasutomi Nishizuka
William F. Brinkman	Helen M. Ranney
E. Margaret Burbidge	Bengt Samuelsson
Pierre-Gilles de Gennes	Robert M. Solow
Joseph L. Goldstein	Edward C. Stone
Mary L. Good	James D. Watson
Harry B. Gray	Richard N. Zare
John J. Hopfield	

Impact of Regulations on Universities

Academia is plagued with federal and state regulations, a few of which are beneficial, but most of which are not. Too often the regulations are enforced with more zeal than common sense. Because of their dependence on federal funds, institutions of higher learning are particularly vulnerable to a growing burden of mandates. In what follows, three problem areas will be touched on—student aid, research grants, and hazardous materials.

A report prepared for the National Association of Independent Colleges and Universities has documented numbers and characteristics of regulations related to student aid. One title of the Higher Education Act has given rise to 7000 sections of regulation. A new or changed regulation is issued at about 2-day intervals. The regulations contain many examples of rules that are burdensome, redundant, conflicting, or unrelated to what is being regulated. Though few individual regulations are onerous, their collective impact is great. The motivation for enhanced federal oversight stemmed largely from participation in student loan aid programs by irresponsible trade schools. Despite the fact that most colleges and universities have histories of excellent performance, they are penalized by the "one size fits all" approach often applied by federal agencies.

The regulatory burden involved in research grants has increased greatly from that of earlier days. Increasingly, the burden has fallen on principal investigators. When a research proposal is submitted for federal funding, it must be accompanied by 61 certifications by the university. These deal with such matters as fraud, conflict of interest, drug abuse, hazardous materials, age discrimination, and equal opportunity. Much of the official information relevant to the 61 certifications must be supplied by research scientists. Principal investigators and supervisors are responsible for training employees and students for compliance with regulations governing animal welfare, human subjects, scientific misconduct, hazardous materials, and others.

The management of hazardous materials is particularly vexing. Chemists at universities are required to comply with regulations that were written to govern operations of the chemical industry and large users of their products. Often, industrial organizations deal with tons of a limited number of different materials. The level of chemical expertise of labor handling the materials often is deficient. In contrast, university laboratories have abundant technical expertise. Quantities of wastes are small, but tend to be numerous and unpredictable. Costs of disposal are high. Management of wastes demands attention and the time and talent of creative scientists.

The management of acids, bases, and combustibles is of minimal concern. The major problem is the increasing number of chemicals that have been declared by EPA to be carcinogens. The ultimate number will be enormous. More than half of all organic chemicals produce tumors in sensitive rodents when maximum tolerated doses are administered for a lifetime. When a residue containing only a tiny fraction of a so-called carcinogen is discarded from an experiment, such a mixture becomes officially hazardous waste. It requires special handling, paper work, and a costly disposal process.

Federal regulations are onerous enough, but they are often exceeded by state regulations. This is illustrated by experiences at Stanford University. At that institution, more than 4000 people work with chemicals in about 700 laboratories located in schools and departments throughout the large campus. Research and teaching at Stanford produce about 25,000 small containers of chemical waste annually. State regulators require that such containers be labeled, specifying six pieces of information. If during the course of visits the inspector finds two containers mislabeled, the university is declared recalcitrant and fined because multiple violations have occurred. To be liable for a fine, there need be misdating on only two specimens. In the health, environment, and safety fields, Stanford is subject to regulation by more than 20 federal, state, county, and local agencies. The costs in time, personnel, money, and slowing of the advancement of science are enormous. The benefits to society are scarcely detectable.

Last November, the voters of this country indicated that they wanted assurance that some common sense existed in Washington. A phenomenon badly in need of congressional scrutiny and action is the regulatory mess.

Philip H. Abelson