

ENVIRONMENT

Assessing environmental enforcement

In what is billed as the first national survey of environmental enforcement trends, Laurie A. Rich of the Environment Information Center concludes that such efforts "are on the verge of being overwhelmed by new problems and new regulatory requirements."

In a summary article, "The Coming Crisis in Environmental Enforcement," in the November *NEW ENGINEER*, Rich says that expenditures for pollution control equipment are rising rapidly, but that enforcement funding falls far short of actual needs, while manpower devoted to enforcement is actually decreasing in some key areas. The Environmental Protection Agency lost 36 people from the enforcement effort this year and nationwide spending for enforcement was down \$2.5 million. Estimates by the EPA show an increase of \$60 million was needed. (Ohio's air pollution enforcement program, for example, was cut nearly in half last year.)

Compared with the \$8.3 billion spent annually by industry on air and water pollution abatement, such sums for enforcement are not only small, but disproportionately important. For example, if regulatory confusion delays construction of a \$1 billion industrial facility by one year, Rich says, the ultimate added cost may be \$100 million.

"If states and the federal government are unwilling to spend the relatively small sums necessary for adequate enforcement programs," she concludes, "the positive clean-up trends that have been developing could be reversed."

Quieting domestic jets

The Department of Transportation has issued a new Aviation Noise Abatement Policy that would give domestic airlines eight years to replace or modify their noisiest jets and six years to replace or modify the rest of their subsonic planes. Rules for supersonic aircraft will be issued after the 16-month demonstration period involving the Concorde has ended. The new policy does not yet affect international carriers, but the government is pledged to work through the International Civil Aviation Organization to negotiate noise abatement rules.

At a public hearing held by DOT Secretary William T. Coleman Jr., the airlines proposed that the cost of modifying old planes or buying new ones should be borne by travelers, through a 2 percent ticket surcharge. Consumer and environmental groups countered that the airlines should finance the changes themselves. Congressional approval would be needed for any change in the tax on tickets.

Local airports will also be subjected to government pressure to cut down on noise. Approach procedures are being changed, as are rules on minimum altitudes; new departure rules will be developed within a year. Airports are being encouraged to construct physical barriers for noise abatement.

Fluorocarbon scoreboard

The White House Council on Environmental Quality has compiled a scoreboard telling which government agencies are involved in what actions related to controlling spray cans whose propellants may damage the atmosphere. A summary:

The Food and Drug Administration (FDA) has proposed warning labels on nonessential aerosol products containing harmful chlorofluorocarbons. By April, FDA, the Environmental Protection Agency (EPA) and the Consumer Product Safety Commission will propose rules to phase out nonessential uses altogether. Finally, the whole bureaucratic alphabet soup will cooperate, under EPA coordination, in conducting related environmental and economic research on the ban.

PHYSICAL SCIENCES

High-beta baseball plasma

Recent changes in the structure of the controlled thermonuclear fusion experiment called 2XIIB at the Lawrence Livermore Laboratory (SN: 8/21/76, p. 121) have resulted in improvements in the energy density of the plasma contained in the machine that may be harbingers of important developments for magnetic-mirror fusion.

One of the important experimental numbers is the ratio between the energy density of the plasma and that of the confining magnetic field. In effect, this value, termed beta, measures the balance between the plasma's natural attempt to escape the field and the field's pressure to retain it. Beta values approaching and even exceeding unity are now achieved at the center of 2XIIB's plasma, according to a report in the Nov. 29 *PHYSICAL REVIEW LETTERS* by B. G. Logan and 10 others of LLL.

High beta values (under good conditions of plasma temperature and confinement time) are considered desirable. A beta exceeding one in the center of the plasma seems to be leading toward the reversed-field condition desired by some of the people involved in magnetic-mirror experiments like 2XIIB, a condition in which the presence of the plasma causes a reversal of the direction of the confining field at its center. If this occurs, increasing plasma density could actually work to enhance confinement instead of making it more difficult.

Odd isotope effect in superconductivity

Why certain substances become superconducting—lose all electrical resistance—at very low temperatures and others do not is only imperfectly understood by theoreticians. Thus, experimental trials with various substances sometimes come up with strange surprises. One such, which concerns the strange effects of different isotopes of hydrogen in hydrogen-metal compounds, is reported in the Nov. 22 *PHYSICAL REVIEW LETTERS* by P. Duffer, D. M. Gualtieri and V. U. S. Rao of the University of Pittsburgh.

The study was motivated by the observation that the presence of hydrogen in a compound or alloy often raises the temperature at which superconductivity occurs or makes an alloy superconducting that was not so without hydrogen. The next question is whether, in such cases, the isotope of hydrogen present (deuterium or ordinary hydrogen) makes a difference. The present study compared hafnium-vanadium alloy mixed with hydrogen and with deuterium. They report that introduction of either hydrogen isotope depresses the temperature at which superconductivity appears, and that deuterium depresses it more than hydrogen. This contrasts with the behavior of palladium-hydrogen and palladium-deuterium alloys, where deuterium raises the superconducting temperature, and of alloys with thorium, where the difference of hydrogen isotopes has no effect. "Much further work is needed to obtain a clear understanding of the superconducting behavior of metal-hydrogen systems," the experimenters conclude.

Theoretical trouble for element 126

If it is true that element 126 exists in ancient mineral samples—and that claim is now widely doubted—it means that element has a much longer lifetime (millions of years) than was previously suspected. If so, that puts theory in a bind. As P. Möller and R. J. Nix of Los Alamos Scientific Laboratory point out in the Nov. 29 *PHYSICAL REVIEW LETTERS*, calculation by a method that works for the actinide elements gives 126 a half-life against alpha decay of 18 years and against spontaneous fission of only 39 milliseconds. Möller and Nix prefer to believe that the claimed evidence does not come from 126.