Third, U.S. specialists say that if the most seriously exposed workers were being treated in this country, they would not be handled on an outpatient basis. They would be kept in the hospital in "reverse isolation." This aims to prevent exposure to microbes which can be deadly for people with radiation-weakened immune systems. However, not all hospitals are equipped to provide this kind of protection, and nearly all hospitals harbor drug-resistant bacteria.

Although this may be the worst, it is not the first spill of its kind. Hübner says that similar but better confined incidents have occurred in Algeria and the Republic of China. In another Mexican case in 1962, a child found a gamma source—probably used in radiography—lying in the street. He brought it home and kept it in a cookie jar. Except for the father, who visited on weekends, the entire family died.

More recently, in February 1983, a foundry in Auburn, New York, discovered that the new molten steel coming out of its furnace was radioactive. As in Mexico, the problem was discovered accidentally. Workers noticed one day that the steel thickness gauge, which operates on a cesium-137 source and a detector, was misbehaving. When a repairman came, his Gieger counter began to register radiation the moment he walked in the door. The New York health department investigated and concluded that about 25 curies of cobalt-60 had been included in the scrap for melting. Fortunately, the scrap never left the plant. But neither did anyone learn the origin of the cobalt-60.

The impact of the Juarez accident has not registered as yet. But one activist, Robert Alvarez of the Environmental Policy Institute, believes it could affect plans for replacing the pesticide EDB with food irradiation chambers. Alvarez says that the food irradiation scheme would require deploying huge quantities of cesium-137 on the Mexican side of the border, where a growing quantity of produce for the U.S. market originates. As Alvarez says, "They don't have the same safety standards we have, and Mexico has had a history of severe accidents involving radiation sources."

Federal agencies like the NRC have not yet decided on policy recommendations as a result of the accident. They are still working on the immediate problem. But the NRC's Lubenau says "people are talking about changing export regulations" so that reactor by-products may be shipped only to people licensed to receive radioactive material.

—ELIOT MARSHALL

Soviets Drop Farther Back in Weapons Technology

The latest annual report issued by Richard DeLauer, the Pentagon's top scientist, does not flatly say that the United States is militarily superior to the Soviet Union. That would contradict statements by Defense Secretary Caspar Weinberger that the purpose of the present U.S. military buildup is to "catch up to the Soviets" or "to restore the military balance."

DeLauer does, however, state that the United States leads the Soviets in virtually every basic technology that influences military capabilities, including sensors, optics, life sciences, materials, micro-electronics, propulsion, radar, robotics, signal processing, guidance, navigation, manufacturing, and telecommunications. He also says that most U.S. weapons systems are superior to those of the Soviet Union, and suggests that the distance between the two countries is widening, not narrowing.

Since last year, for example, the Soviets have lost their lead in conventional warheads, and the United States has improved its lead in computers, software, and submarine detection. Despite having spent double what the United States did for strategic weapons over the last decade, the Soviets remain inferior in bombers, submarines, and submarine-launched missiles, equal in land-based missiles and superior only in antiaircraft missiles. According to the report, the Soviets spent $100 billion more than the United States in the last decade on weapons procurement for its conventional forces, yet the United States remains equal or superior to the Soviets in 17 of 18 tactical weapons systems.

Responsibility for these deficiencies may lie in what DeLauer calls some "inherent weaknesses" in the Soviet Union's weapons research effort. "Equipment and instrumentation shortages plague most Soviet R & D efforts and R & D organizations are often compelled to design and manufacture their own instruments," he says. "Computer services are in especially short supply. The U.S.S.R. also tends to follow the United States in technology because Soviet rewards are for maintaining schedule rather than technical innovations that win contracts. Although the Soviet Union annually graduates around three times the number of engineers graduated in the United States, there is widespread underemployment. Soviet engineering manpower is used inefficiently and is frequently overspecialized."

Elsewhere in the report, DeLauer documents the continuing movement of defense research away from universities, in-house laboratories, and contract research centers and into private industry. Despite considerable publicity regarding the militarization of academic campuses, only 3.2 percent of the Pentagon's research is now conducted at universities, down from 3.9 percent 2 years ago.

—R. JEFFREY SMITH

Better Living Through Chemistry?

An exhaustive study by a committee of the National Research Council has concluded that although the number and uses of chemicals are voluminous, very little is known about their hazards.

Of the 53,500 commercially important chemicals, "only a few have been subjected to extensive toxicity testing and most have scarcely been tested at all," stated the committee.*

The committee found that no toxicity data are available for about 80 percent of 49,000 chemicals in commerce, a category which included thousands of industrial chemicals but excluded pesticides, cosmetic ingredients, drugs, and food additives. Toxicity information about chemicals in these latter categories is lacking as well even though they are more heavily regulated. Toxicity data were either inadequate or nonexistent for 64 percent of the 3400 pesticides and inert ingredients examined in the survey, 74 percent of 3400 cosmetic ingredients, 61 percent of 1800 drugs, and 80 percent of 8600 food additives. (Proprietary information from industry was not included in the study.)

The committee found that even when testing was performed, the

**Toxicity Testing: Strategies to Determine Needs and Priorities* (National Academy of Sciences, Washington, D.C., 1984). $22.50.

methodology was often flawed and that the experiment should be redone. In its review of more than 3000 pesticides, for example, the committee discovered deficiencies in half of the teratology studies and two-thirds of the genetic toxicity experiments. For cosmetic ingredients, it recommended that 75 percent of the tests for eye irritation and 40 percent of studies examining human sensitivity to the chemicals be performed again.

In general, the findings of the committee indicated that the amount of information available about chemicals correlated with the degree of federal regulation. Of all the categories, drugs have been most adequately tested while chemicals in commerce were studied the least. The committee stated that information about human exposure was scant, noting that "there are few legal reporting requirements for human exposure."

The study was conducted at the request of the National Toxicology Program which sought guidance about how to decide which chemicals of the 5 million in existence to test first and what tests should be conducted. Chairman of the committee was James L. Whittenberger, director of Southern Occupational Health Center at the University of California at Irvine.—**MARJORIE SUN**

Dingell Warns Reagan on Cancer Appointments

Representative John D. Dingell (D–Mich.), chairman of the House subcommittee that oversees the National Institutes of Health, has written President Reagan a stern letter telling him he should improve the quality of his appointments to the National Cancer Advisory Board.

The board has 18 members, 12 of them physicians and scientists, who serve staggered 6-year terms. This year six members, all of them scientists, are retiring. There are no Ph.D.'s among the remaining members.

Dingell notes that Reagan's 1982 appointments—the four new scientist members are all practicing physicians—"did not adequately address" basic research. The result is that the board "is either underrepresented or has no representation at all in at least the following areas: virology, immunology, carcinogenesis, pediatric oncology, and medical oncology."

Dingell writes: "The unfortunate propensity of your Administration to undervalue substantive scientific expertise cannot be tolerated," and calls on Reagan to appoint people "whose research qualifications are impeccable."

Dingell's letter was inspired in part by a letter from five scientists, published in *Science* (20 January 1984), expressing concern about the board's scientific competence and noting that in 1982 none of the candidates proposed by NIH was appointed. NIH's 1984 list is now in the White House and selections should be announced in about a month.

—**CONSTANCE HOLDEN**

Russian Influence in Science Diminishing

The impact of Soviet science on the rest of the world has declined "dramatically" since the height of détente, according to an analysis of citations from Russian scientific articles.

Andrew Sessler and Rita La Brie of Lawrence Berkeley Laboratory found that even in mathematics, where the Soviets' work is generally acknowledged to be world-class, Soviet contributions have been scanty as judged by citations from their journals.

The study used the *Science Citation Index* to get a list of 3942 journals, ranked according to the number of articles they contain, of which 63 were from the Soviet Union. Their leading series of publications, *Nauk Doklady* (journals put out by the Soviet Academy of Sciences), ranked third in total number of articles, but fell to 82 when ranked according to average number of citations per article, or "impact."

The total number of items published in the Soviet journals fell from 18,506 in 1975 to 15,014 in 1981. During the same period there was a worldwide increase by 67 percent to more than 700,000 items. Ranked by impact, the Soviet journals had fallen to 2442 in the total field of 3942.

The authors found it "surprising" that in half the 128 fields listed in *SCI* no Soviet journals are listed as major contributors. These include anatomy, alcoholism, education, embryology, energy, entomology, forestry, materials sciences, nutrition, mineralogy, plasma physics, psychology, radiology, statistics, and veterinary medicine. Publications in many fields, of course, are not available because they impinge on military matters—such as aerospace engineering and computers.

Even in areas where Soviet journals are plentiful, the impact rating stands far below that of the most-cited journal in the field. In chemistry, for example, the highest ranked journal, *Chemical Reviews*, has a rating of 10.581 compared with 1.124 for the top Soviet journal. In physics the comparable figures are 16 and 2. Mathematics fares better: 1.135 versus 0.304.

Some of the apparent low impact of Soviet science is owing to the fact that many of the most cited Soviet articles are published in Western journals. Francis Narin of Computer Horizons in New Jersey, who participated in a study of Soviet citations covering the mid-70's (published last year in *Social Studies of Science*), says there are really two sets of articles in any given field: those published in the West and cited by Western scientists, and those published in Soviet journals and cited by Soviets. "Even in areas of known excellence they are undercited" by the rest of the world, he says.

Soviet experts are inclined to believe that the main cause for the decline in citations has been the drying up of contacts with the West. Loren Graham of the Massachusetts Institute of Technology points out that the thousands of Russian and American scientists involved in exchanges have dwindled to a couple of hundred, and there has been a concomitant loss of interest in Russian science.

At the same time, there are suspicions that the quality of Soviet science has also suffered, in large part because of increased anti-Semitism and the emigration of Jews, particularly mathematicians. "There is not a good institute in Moscow that hasn't lost some of its staff to emigration," says Graham.

Graham quotes mathematician Lipmann Behrs to the effect that the Soviets seem bent on crippling a field—mathematics—in which they have long possessed an extraordinary depth of talent and tradition of excellence.—**CONSTANCE HOLDEN**