

cell-forming bone marrow. Exposures of 200 to 400 rems kill half the people exposed within a month, by Abrams's estimate; 100 to 200 rems injure the immune system and carry a long-term risk of cancer. Fewer than 100 rems can cause nausea and vomiting, with the cancer risk decreasing as the exposure decreases.

The immediate medical recommendation for people exposed to radioactive particles is to shed contaminated clothing, wash their skin and avoid ingesting anything radioactive. In terms of intervention, at the low end of the exposure scale iodide can be ingested to prevent the body from incorporating radioactive iodine. But neither iodide nor bone marrow transplantation is a panacea. Iodide can cause side effects ranging from allergy to thyroid problems, and pregnant women taking iodide can harm their fetuses. Though iodide was distributed in Poland after the accident, several U.S. experts told *SCIENCE NEWS* that, at least from the data they saw in the press, the action was not warranted. And bone marrow transplantation is a complex, difficult and risky procedure. Bone marrow transplant specialist Robert Gale, of the University of California at Los Angeles, went to the USSR a week after the accident and, joined later by several colleagues, was reported to have begun performing transplants there. Such a procedure needs to be done within one to two weeks after exposure, notes Andrew Yeager, a bone marrow transplant specialist at Johns Hopkins University in Baltimore. Following the transplant, the patient has to be completely isolated from infection while the new marrow takes root.

Knowing which radioisotopes contributed to the dose is important in estimating the severity of exposure because certain isotopes, such as krypton, aren't absorbed by the body. With so few data available on the exposure levels within the USSR, calculating the long-term health effects is guesswork at best. At the moment, says H. Jack Geiger of the City University of New York and president of Physicians for Social Responsibility, "the major long-term meaning of this event is the need for international cooperation."

For the United States, the international aspect of the accident became more immediate on Monday, when the National Oceanic and Atmospheric Administration reported its first measurements of very dilute Chernobyl fallout in the U.S. atmosphere — above the Oregon-Washington coast and the Gulf of Alaska. There is no danger within the United States from these near-background levels of radiation entering the atmosphere via the jet stream, according to U.S. radiation-health experts. Some of that fallout was also detected at ground level in rain. The 500 picocuries per liter of iodine-131 measured in Washington state "pose no danger," the task force reported Tuesday.

The 'white overalls' of overconfidence

After so many years of accident-free, "nominal" technological performances, the timing of the Chernobyl nuclear disaster, amidst three U.S. space program failures, reminds us of something we tend to forget: Even the highest technology is operated by human beings. And it appears there was a similar, tragic behavior pattern of overconfidence, even arrogance, on the part of those who operate and oversee these systems in both countries.

It is clear now that some officials within NASA were aware of potential problems that could occur if the Challenger were launched in cold weather. Nevertheless, the launch took place and the "unthinkable" happened. The loss of Challenger, coupled with the failure last month of a Titan 34D and last week's explosion of an unmanned Delta rocket, is a blow from which NASA may not fully recover for decades. It will also take a long time to completely unravel the reasons why Challenger was launched that day, but among them almost certainly are the false sense of security and the disdain for public scrutiny that can come with success.

This attitude is also chillingly evident in a feature article on the Chernobyl plant in the February 1986 *SOVIET LIFE* magazine, a USSR-sponsored publication. In it, the Soviets took a care-free, whistling-past-the-graveyard look at the plant and the town of Pripjat, which was born with the startup of Chernobyl in 1977. In what may have been history's worst-timed piece of public relations, the Soviet publication quoted Pyotr Bondarenko, a shift superintendent specializing in safety review, as saying "that working at the [Chernobyl] station is safer than driving a car."

Twenty-nine-year-old Boris Chernov, a Chernobyl steam turbine operator, told *SOVIET LIFE*, "I wasn't afraid to take a job at a nuclear power plant. There is

more emotion in fear of nuclear power plants than real danger. I work in white overalls. The air is clean and fresh; it's filtered most carefully. My workplace is checked by the radiation control service. If there is the slightest deviation from the norm, the sensors will set off an alarm on the central control panel."

One can only wonder about the physical conditions of these two men today. The Soviet government — to its own detriment, as well as to that of surrounding countries experiencing higher-than-normal radiation levels — has carried its charade over into the weeks following the accident, maintaining that death, injury and harm to the environment have been relatively minimal.

The Soviet stonewalling contrasts greatly, of course, with the widespread and continuing public inquiry of NASA in the wake of the shuttle disaster and the Titan and Delta failures. What has been exposed, however, is a similar — albeit more subtle — attitude on the part of some of those charged with the safety and performance of the shuttle. The public trust gained through the successful Apollo, Skylab and Viking programs was abused by those who would cut corners for time, money or other reasons. This may not have been totally intentional. Such people may have actually come to believe what many of us did: that NASA was indeed invincible, that everything, no matter what, would always be "nominal." But the NASA and Chernobyl tragedies dictate a new attitude, a new caution, a new attention to detail regarding high technology.

One wishes that the words of Pripjat Mayor Vladimir Voloshko in *SOVIET LIFE* did not bear such sorrowful irony. The only problems in a town surrounding a nuclear reactor, he said, were "teething problems. Pripjat is currently experiencing a baby boom. [The] day-care centers and nursery schools . . . can't cope with the demand." — *J. Greenberg*

However, health experts recommend that Europeans nearer Chernobyl avoid food and water contaminated by radioactivity. U.S. radiation-monitoring teams were dispatched last week to Moscow, Bucharest and Warsaw to measure possible radiation exposures that the U.S. diplomatic corps might receive. According to the State Department, initial readings indicate "there is no reason for significant health concerns."

The State Department and the interagency task force both noted early this week that the raging graphite fire at Chernobyl's unit-4 reactor, detected in aerial photos last week, may still be burning. The task force said it could not confirm news reports — generated by Swedish

analysis of commercial-satellite survey photos — that a second reactor might be burning. However, at a task force briefing this week, Harold Denton, director of the Nuclear Regulatory Commission's office of reactor regulation, did report indications that a second reactor at the Chernobyl complex might be having trouble cooling — a suggestion that it might not proceed safely to full, "cold" shutdown.

Many Western scientists expect that a better picture of the accident may be forthcoming now that three members of the International Atomic Energy Agency — a Swedish, a Soviet and a U.S. nuclear scientist — have been invited to discuss the accident with Soviet officials.

— *J. Raloff and J. Silberner*