

Meanwhile, another group of scientists under Ernest McConnell at the National Institute for Environmental Health Sciences (NIEHS) in Research Triangle Park, North Carolina, had been running tests on this American-made NPPD. (The researchers did not use NPPD collected in Moscow, because they had none, and the amounts collected later would have been too small to use in testing.)

The department's conclusion is that NPPD poses essentially no health hazard.

The researchers found that the NPPD induced no significant effects in mouse bone cells or hamster ovary cells. A skin test revealed that it is not easily absorbed, but that once it is in the body, it is quickly metabolized and flushed out within 48 hours. The department's conclusion is that NPPD poses essentially no health hazard, and that anyone worried about skin irritation should simply wash with soap and water.

The embassy's search for NPPD in January turned up a second sleuthing compound in some of the cars. It is called luminol and is available commercially in the United States. It has many applications, including as an agent to detect latent blood deposits. Although mutagenic in the Ames test, luminol is not dangerous, the State Department concluded, because the safety data sheet issued for it in the United States carries no health warnings. The government did not investigate further.

One useful by-product of this curious investigation is a spot test for detecting NPPD in the field, developed by NIEHS. The paraphernalia is compact enough to fit in a spy's pocket, says its inventor C. W. Jameson, chemist for the National Toxicology Program. In his test, a solution or a swab turns pink in the presence of NPPD. The technique is highly specific and can detect minute quantities of the chemical a day or two after it has been deposited. The Russians may be interested.

Did the State Department overstate the risks last August? Brodine says it did not, for he believes the U.S. community never regarded the cancer threat as terribly serious, even at the peak of the furor. Redman was asked whether he had any second thoughts about the wisdom of sounding the alarm so sharply on the eve of the summit. "None whatsoever," he answered, "absolutely none." ■ **ELIOT MARSHALL**

Briefing:

FDA Approves Pasteur's AIDS Test Kit

In a development that could bring to a head a long-standing patent dispute between the Pasteur Institute and the U.S. government, the Food and Drug Administration has approved a test, manufactured by Genetic Systems Corporation of Seattle, to screen blood samples for antibodies to the virus that is widely believed to be the prime cause of AIDS. The test was developed by Genetic Systems under license to the Pasteur Institute.

The FDA approval removed the final regulatory barrier to marketing the test in the United States. A Genetic Systems spokesperson said that the company will begin shipping the test to blood banks and other customers by the end of February. Genetic Systems could, however, still face a legal problem.

The U.S. government holds a patent on an AIDS antibody test resulting from work by a team headed by Robert C. Gallo of the National Cancer Institute, and federal officials maintain that the Genetic Systems test is covered by that patent. Five companies have already been licensed by the U.S. government to develop and market AIDS antibody tests, and have agreed to pay royalties amounting to 5 percent of their profits. Marketing of the Genetic Systems test without such a license could be a direct infringement of the U.S. patent, these officials argue.

The Pasteur Institute claims, however, that the U.S. patent is invalid because a group at the institute headed by Luc Montagnier was the first to isolate the putative AIDS virus, and a patent on an antibody test was filed in both Europe and the United States several months before the U.S. government filed its application. The Pasteur Institute is seeking to have the U.S. patent overturned and, in a separate action, has filed suit against the U.S. government claiming Gallo's group misused information and materials supplied by Montagnier's group (*Science*, 3 January, p. 11).

Exactly what the U.S. government intends to do about the Genetic Systems test is not clear. Lowell Harmison, a senior official in the Department of Health and Human Services who has been coordinating the government's scientific response to the Pasteur Institute's patent claims, says the matter is still under discussion. However, Harmison notes that companies who took licenses to the U.S. patent have had a working test for well over a year, while the

Pasteur Institute's licensee is only now ready to market its test. "There is no question as to who the rightful owner of the invention is," says Harmison.

Although the Genetic Systems test is entering the U.S. market late, the company believes it has a better product because it gives fewer false positives than the existing tests.

The existing U.S. tests are based on a virus isolated by Gallo's group, which he calls human T-lymphotropic virus type III, or HTLV-III. The virus is mass-produced in a line of T cells called the H9 cell line. Surface antigens on the H9 cells can sometimes react in the test to give false positive results, requiring expensive follow-up tests to confirm the initial finding.

Genetic Systems' test is based on a virus first isolated by Montagnier's group early in 1983, which the Pasteur team calls lymphadenopathy/AIDS virus, or LAV. (LAV and HTLV-III have been shown to be variants of the AIDS virus.) It is mass-produced in culture in a line of T cells called CEM. The CEM line does not have the surface antigens found on the H9 line, however, and thus, according to a statement by Genetic Systems, it "virtually eliminates" the problem of false positives in the antibody test. ■

COLIN NORMAN

U.S. Tops Soviets in Key Weapons Technology

A new report from the Pentagon's top scientist, Donald Hicks, states that the United States leads the Soviet Union in virtually every basic technology that could affect military capabilities over the next 10 to 20 years. In particular, the report indicates that the United States enjoys a strong advantage in technologies that may be relevant to the creation of a defense against ballistic missiles, such as electro-optical sensors, guidance and navigation, microelectronics, robotics, signal processing, signature reduction, and telecommunications.

The report, which is published annually, states for the second time in a row that the United States has widened its lead in computers and software. It also says that the United States is first in life sciences, materials, production, propulsion, radar, and submarine detection. The Soviets, in contrast, lead in no areas, and match the United States only in aerodynamics, warheads, directed energy, optics, and power sources, according to the report.

Deployed U.S. weapons systems are rated equal or superior to those of the Soviet Union in 25 of 31 areas, roughly the same as last year. No comparison is made in two of the areas—ballistic missile defense and surface-to-air missiles—where the United States has chosen not to deploy any weapons system, and the imminent deployment of a superior U.S. antisatellite weapon will eliminate an existing Soviet lead. Artillery and mines are thus the sole areas in which the United States is clearly inferior.

The report again notes that the Soviets have assigned more personnel and a far greater portion of their gross national product to defense than the United States, to little avail. One problem is that "Soviet capital investment has not kept pace . . . advanced equipment has not been provided, automated support systems are not available, and as a result productivity may be lower. Moreover, the nature of Soviet society tends to stifle innovative and imaginative thinking—key elements in the pursuit of research," the report states. It optimistically predicts that the Soviets will have trouble closing existing technology gaps and that "new ones are likely to emerge." ■

R. JEFFREY SMITH

Thiokol Had Three Concerns About Shuttle Launch

Officials of the National Aeronautics and Space Administration (NASA) had three sound reasons to postpone the ill-fated launch of the space shuttle Challenger, according to engineers and officials of Morton Thiokol, Inc. One was a warning about potential leaks in the joints of the shuttle's booster rockets due to low temperatures. As *Science* reported last week, Thiokol engineers explicitly warned of such leaks on the evening before the launch, but senior NASA and Thiokol officials chose to disregard the warnings.

A second reason, which was considered more of a budget concern than a safety hazard, was the existence of unusually rough seas offshore, which might have jeopardized recovery of the boosters after launch. Several ships in the recovery area reported 26-foot waves on the day before the launch, several Thiokol engineers say, and some equipment needed to reel in the booster parachutes had fallen overboard.

At the moment that Thiokol first learned about these conditions, the ships were moving out of the recovery area into calmer waters. Had they been unable to recover the

boosters after their splashdown, it would have cost the government an extra \$40 million to replace them.

A third potential reason to postpone the launch, according to Thiokol officials, was the presence of ice in a network of water troughs used to suppress acoustic reverberations from the boosters at lift-off. According to a Thiokol engineer, "there were substantial uncertainties" about how well the ice-filled troughs could protect the shuttle orbiter, as well as the struts supporting various fuel tanks, from acoustic shock.

Fourteen Thiokol engineers gathered in a conference room in Brigham City, Utah, to discuss these concerns shortly after 1 p.m. on 27 January when they learned of the weather forecast for the launch. "We fought like hell all day to get permission for a presentation to NASA," a senior engineer told *Science*. By the time it was made, the engineers had done an analysis predicting that rubber gaskets used to seal the booster joints would probably be between 27 and 29° F. Since the coldest temperature that the gaskets had ever been tested was 47° F., in a static firing in Utah, the engineers could not predict exactly how they would perform in such a cold environment.

During a teleconference that evening, NASA officials and engineers, including Larry Mulloy, the manager of booster programs at the Marshall Space Flight Center, asked Thiokol to quantify how much and how quickly gasket performance might be degraded. "Although we had no data, we knew their performance was going from good to bad as the temperature dropped, and we were afraid that it was worse than ever before. There was not one positive statement in an engineering sense to support a launch that night," a Thiokol engineer said. All 14 engineers, as well as four others from Thiokol, supported a recommendation that the launch be postponed. Included in this group were Robert Ebeling, the manager of solid rocket assembly; Arnold Thompson, supervisor of the booster structures section; and Allan McDonald, the solid rocket motor program manager.

Mulloy and others challenged Thiokol's presentation, claiming that it was insufficient to support a conclusion that gasket performance would sharply decline at low temperatures. Apparently, no direct pressure was applied to Thiokol to reverse its judgment. Instead, aspersions were cast on the soundness of the company's technical judgment, and a request was made that its engineers reexamine their data. "It was a pro-launch meeting, and this tone was recognized by our management," one engineer told *Science*.

After a heated internal debate, and consul-

tations with other corporate officials, Thiokol's Joseph Kilminster, the vice president of space booster programs, decided to reverse the initial recommendation for a postponement. In a document transmitted to Marshall and the Kennedy Space Center at 11:45 p.m. (EST), he took the agency's viewpoint and called the data "not conclusive on predicting primary O-ring blow-by [gasket failure]." Although the cold would clearly slow the movement of the gaskets into the joints, a backup would operate even if the primary fails, he said. Moreover, it would do so before pressures from the booster begin to force the joint apart, a phenomenon first discovered in 1982.

The presidential commission investigating the shuttle accident has reported that details of these disputes were never reported up the line to senior NASA officials, including Jesse Moore, who was then the agency's associate administrator for space flight. (Moore has since been replaced by Rear Admiral Richard Truly, the former head of the Naval Space Command and twice a shuttle pilot.) "Over time, we have found them to be one of the most conservative groups in the world," a Thiokol official says. "But on the night before that launch, they had a lapse of corporate memory." ■

R. JEFFREY SMITH

CERN Agrees to Independent Review Committee

The governing council of the European Laboratory for Particle Physics (CERN) in Geneva has accepted a proposal from the British government to set up an independent review committee to look at the implications of "alternative levels of funding" from its present budget.

This proposal had been made by Britain's minister responsible for science and higher education, George Walden, following last year's report by a separate committee chaired by Sir John Kendrew, which suggested that Britain should reduce its contribution to CERN by 25 percent in order to free up funds for other areas of research (*Science*, 17 January, p. 216).

The CERN review will be carried out by a group of five to seven members, to be appointed by council president Wolfgang Kummer after consultation with its 14 member states. The committee has been asked to report its findings and recommendations within a year.

A resolution passed unanimously by the council last week stated that the members