

Cosmos 1900's Unplanned Return

A Soviet spy satellite powered by a small nuclear reactor is expected to reenter Earth's atmosphere in late September or early October. Its imminent return to Earth is causing concern because Soviet controllers have lost radio contact with the satellite and have been unable to activate a safety mechanism designed to separate the reactor from the spacecraft and boost it into a higher orbit. Radioactive material will thus reenter the atmosphere along with the spacecraft.

Soviet officials who briefed a delegation of U.S. scientists in early September said that when the spacecraft, known as Cosmos 1900, drops to an altitude of about 100 kilometers, heat generated during reentry should trigger a signal to eject the core of the reactor. This should cause the radioactive material to disintegrate and be widely dispersed in the upper atmosphere. The particles would gradually settle to the ground, where their contribution to background radiation would be undetectable.

The core-ejection mechanism was added to Soviet nuclear-powered satellites after a mishap a decade ago. In January 1978, Cosmos 954, a reconnaissance satellite similar to Cosmos 1900, reentered the atmosphere intact, broke up, and scattered pieces of radioactive debris across northern Canada. Relatively large fragments survived because they were protected by the reactor's heat shield; jettisoning the core early in the reentry process should prevent this from happening with Cosmos 1900—if the triggering mechanism works properly.

Daniel Hirsch, a professor of nuclear policy at the University of California at Santa Cruz, who was one of the scientists briefed about Cosmos 1900 by Soviet officials, says that although radio contact has been lost, the spacecraft is apparently functioning normally and the reactor is still operating. This is unfortunate. According to Hirsch, the Soviet officials said that the reactor would automatically separate from the satellite and be boosted into a higher orbit if electrical power were disrupted, or reactor pressure were lost, or the spacecraft started tumbling.

Cosmos 1900 is one of a series of Radar Ocean Reconnaissance Satellites, or RORSATS, that the Soviets use to track U.S. warships. They are placed in low orbits in order to obtain close-up radar images, but this means that they experience some atmospheric drag and their orbits decay relatively rapidly. Consequently, the RORSATS return to Earth a few weeks after launch.

The RORSATS are the only satellites with nuclear reactors currently being

launched, but the U.S. Department of Energy is developing a reactor called the SP-100 that is being designed initially to power spacecraft as part of the Strategic Defense Initiative.

In part because of the potential hazards of putting reactors in space, and in part to constrain military applications of space nuclear power, the Federation of American Scientists (FAS) and the Committee of Soviet Scientists Against the Nuclear Threat have called for a ban on orbiting reactors. Hirsch and two colleagues from the FAS were in Moscow to discuss the proposal when they were briefed on Cosmos 1900. (The proposed ban would not affect the use of nuclear-powered thermal generators, which use the decay heat of plutonium-238, for the propulsion systems of deep-space missions, such as the upcoming U.S. Galileo and Ulysses probes.) On 13 September, Representative George Brown (D-CA) introduced legislation that would prohibit launching U.S. reactors into orbit as long as the Soviet Union also desisted.

A prime target of the proposed ban is the SP-100. Because it would be far more powerful and operate considerably longer

than the reactors used to power the RORSATS, it would accumulate much higher levels of radioactive products—at least 150 times the amount of long-lived isotopes, according to calculations by Stephen Aftergood of the Los Angeles-based Committee to Bridge the Gap.

Satellites powered by the SP-100s are, however, expected to be placed in relatively high orbits, which means that they should remain in space for several hundred years and their radioactivity would consequently decay to low levels before they reenter the atmosphere. The defense department has not ruled out placing the reactors in low orbit, however, and critics of space nuclear power point out that malfunctions and collisions with space debris could send them back to Earth prematurely.

Dennis Bitz, assistant secretary for space and defense power systems in the Department of Energy, testified last week before a Senate energy subcommittee that even if an SP-100 were to reenter the atmosphere intact, it is designed to remain in one piece and “bury itself upon impact in soil or pavement.” This would confine the radioactivity, rather than disperse it in the atmosphere, as happens when the Soviet reactors come down, Bitz said.

■ COLIN NORMAN

Fetal Research Morally “Acceptable”

“Is an induced abortion of moral relevance to the decision to use human fetal tissue for research?” Robert Windom, assistant secretary for health, asked a federal advisory panel on fetal research. The panel met last week at the National Institutes of Health to study the legal and ethical issues that pertain to the use of tissues from dead fetuses.

The panel, chaired by retired federal judge Arlin Adams, had a tough time with this key question and never answered yes or no. However, after 3 days of hearings, the 19 of the 21 panelists voted yes to the proposition that the use of fetal tissue in biomedical research and therapy is “acceptable” and should be allowed to proceed if certain guidelines are adhered to. Some even argued that, in light of the potential benefits of fetal research to victims of Parkinson's disease, diabetes, paralysis, AIDS, and other diseases, investigators have a moral obligation to conduct studies with fetal tissue for the benefit of humanity.

The fetal research panel was convened after Windom issued a moratorium on all federally funded work on tissue taken from fetuses after an induced abortion. It met just

days after the White House attempted a preemptive strike in this controversial area by declaring that the President might simply ban all fetal research outright by means of an executive order (*Science*, 16 September, p. 1423).

The panel, whose members required informal White House approval, included people who are committed to a pro-life, antiabortion philosophy that includes opposition to any use of tissue obtained from what they see as an unequivocally immoral act. The panel also had members, Judge Adams among them, who are known opponents of abortion but are open to discussion about the use of tissue from a fetus once it is dead.

The panel heard gripping testimony from more than a dozen researchers and representatives of health groups about the benefits that might be expected from fetal research—an area that is poised for expansion. Only a couple of pro-life advocates came to the hearing to argue the case against. And in the end, nearly everyone was persuaded that if ethical guidelines are observed, the use of fetal tissue should be allowed. (Judge Ad-