plication of modern science. One extreme proposal worth further study, he contends, is the suggestion of Soviet scientist P. Borisov (*Can Man Change the Climate?*, 1973) to enlarge the earth's temperate climate zone, where all successful industrialization in modern times has taken place. This would be done by pumping surface waters from the Arctic Basin through the Bering Strait to the Pacific, thereby pulling the warm waters of the Atlantic through the Arctic and making worldwide ocean temperatures more uniform.

Hot Satellites in Space

"Don't Look Now But . . .: The Soviet Satellite Accident and Some Lessons from It" by Milton Leitenberg, in *Commonweal* (Sept. 15, 1978), 232 Madison Ave., New York, N.Y. 10016.

Until recently, public attention has been focused on the peaceful and scientific uses of outer space—cosmic ray research, weather reconnaissance, and exploration of the universe. The January 19, 1978, accident in which a Soviet military satellite containing a small nuclear power reactor re-entered the earth's atmosphere and spread radioactive debris over remote parts of Canada reveals the reluctance of governments to discuss candidly the dangerous side of space satellite programs.

Some 900 U.S. and Soviet space satellites are now orbiting the earth, says Leitenberg, a scholar at Cornell's Center for International Studies. Perhaps 90 percent of them serve military purposes, including reconnaissance, surveillance, and communications. The mission of the Soviet Cosmos 954, which ended over Canada's Northwest Territory, was to track the movements of U.S. Navy vessels, particularly aircraft carriers.

U.S. officials knew that Cosmos 954 was having problems remaining in orbit from four to seven weeks before it fell to earth. They queried the Russians in mid-January about the amount and nature of the radioactive material aboard and also notified NATO allies, Japan, Australia, and New Zealand. After Cosmos 954 fell, U.S. authorities released few details and, Leitenberg contends, never pointed out that at least five other space objects carrying some kind of radioactive materials have re-entered the earth's atmosphere since 1964. Three were U.S. satellites without reactors but using plutonium-238 as a power source; two were Soviet space vehicles carrying unspecified radioactive materials.

While the United States has only one satellite now in orbit containing a nuclear reactor, there are orbiting the earth between 24 and 32 U.S. and Soviet satellites that contain some sort of radioactive substance.

None of the proposals currently before the United Nations to ban nuclear reactors in space or provide "fail-safe" methods for keeping radioactive materials from re-entering the earth's atmosphere will effectively limit the number of satellites carrying some form of nuclear material. With satellite programs growing and antisatellite systems likely soon to follow, Leitenberg warns that we can expect more frequent and more serious Cosmos 954–type incidents.