Flash Not Missed by Vela Still Veiled in Mist

To the satellite, it looked like a small nuclear blast, but no corroborating evidence has been found

A 9-year-old American satellite called the Vela created a puzzle for weapons and surveillance experts at 3 a.m. on 22 September (local time in South Africa) when it spotted a two-stage flash of light in the Southern Hemisphere that looked like a nuclear explosion. During the 2 months since then, scientists in and out of the United States have been trying to prove or disprove what the satellite's message implied: that a nuclear device was detonated in stealth, perhaps by a nation not known to possess nuclear explosives before. About half a dozen specialists (including, among others, Jack Ruina of the Massachusetts Institute of Technology, and Richard Garwin and Riccardo Giacconi of Harvard University) are working under the direction of President Carter's science adviser, Frank Press, to determine whether the satellite may have malfunctioned or recorded something other than a nuclear bomb flash. The puzzle remains unsolved because the evidence supporting the satellite observation is ambiguous, and no conclusive data have been found to contradict it.

A report from New Zealand in mid-November seemed to give new credibility to the satellite's message, although it was hedged with caveats. According to a background advisory issued by New Zealand, the Institute of Nuclear Science at Wellington has found traces of fallout in rainwater samples taken recently, described as "evidence of extremely low-level radioactivity consistent with a detonation in the Southern Hemisphere in the past 3 months." The report added, "further measurement and analysis of three elements in the sample, barium 140, cerium, and yttrium, is being undertaken before the interim results can be confirmed." New Zealand's National Radiation Laboratory (NRL) has found no evidence of fallout, a discrepancy officially attributed to the fact that the NRL is equipped to monitor only health-endangering levels of radiation, and thus may have missed the slight fluctuations picked up by the institute at Wellington. But, according to one intelligence official, scientists at Wellington are embarrassed by the attention given their early findings, for they have not been able to produce these results a second time.

Defense Department and White House officials say it will take 2 to 3 weeks to analyze the fallout data and reach a conclusion. If the Wellington findings prove correct, there will be little reason to doubt that there was indeed a nuclear blast. However, more specific details, such as the location of the blast, are not likely to be known soon, if ever. The mystery stems from two factors: the small scale of the event and the limited capability of U.S. surveillance machinery in that remote corner of the globe.

The Vela satellite that spotted the event is one of three still functioning in a system once comprising eight satellites designed to help monitor the nuclear test ban of 1963. This particular machine, launched in 1970, is said to be nearing the end of its useful life. On September 22 at 3 a.m., when the flare-up occurred, this Vela was watching a spot in the Southern Hemisphere roughly 3000 miles in diameter, encompassing the southern end of Africa, the Indian Ocean, the South Atlantic, and a bit of Antarctica.

Although the satellite was equipped to sense radiation and electromagnetic disturbances associated with a nuclear blast, these sensors either were turned off at the crucial moment or were not sensitive enough to register what happened. The optical sensor picked up, in a period of less than a second, two bursts of light which might have been caused by some very bright bolts of lightning, or by a bright lightning bolt and a meteor, or a lightning bolt and a sun glint. But, taken together, they strongly suggested a man-made event, for they followed the characteristic intensity patterns of other nuclear blasts registered by this instrument. A senior administration official explained: "What we're trying to see is whether there's something else [in terms of natural phenomena] that can do that. And it's very hard to prove a negative . . . to prove that nothing else can do it." The scale of the event was small, he said, equivalent to the flash made by a 2- to 4-kiloton bomb—or about 0.1 to 0.4 times the size of "the first tests that have been made by most countries."

Some suspected early on that the satellite may have malfunctioned, but that suspicion has not been reinforced with credible evidence. Defense officials point out that this is the 42nd time that this type of satellite has registered a nuclear blast, and in the first 41 cases, it was correct. Furthermore, it is said, the satellite's optical sensors were calibrated for accuracy a week before the sighting and immediately afterward, and did not show any sign of trouble.

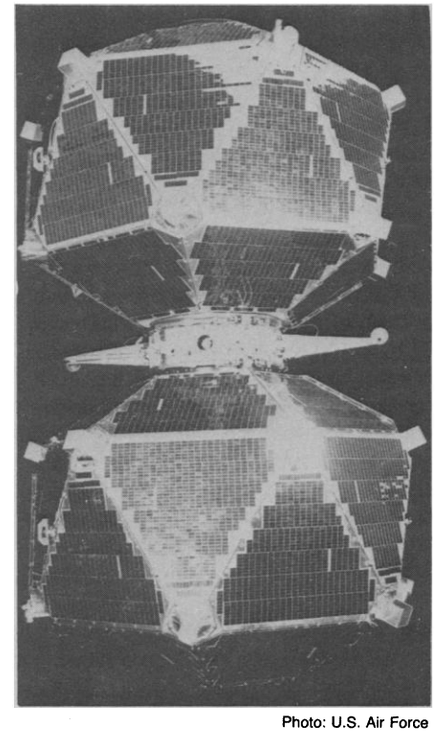

Photo: U.S. Air Force

Two Vela satellites, designed to spot nuclear blasts, mounted for launching.

Sensors deployed in the area after the sighting did not pick up any increase in radioactivity, but officials say this nega-

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tive finding is not enough to contradict the satellite. Given the vastness of the area in which the blast may have occurred, and given the smallness of the event, it is conceivable that U.S. surveillance teams simply were not able to find the fallout. A senior administration official said that there have been nuclear blasts before this, confirmed by other means, which were never confirmed by radiation sensors.

The untypically small size of the flash has caused a lot of speculation. Some suggest that it may have been a test intentionally scaled down to conceal it from monitors like the Vela. And one low-ranking defense official speculated that it might have been the signature of a "fizzle" of a large-scale test that didn't work properly—the kind one might get, he said, if one used spent reactor fuel in the bomb.

U.S. officials have refused to say who might have conducted a test, but speculation has focused from the outset on South Africa. It is the only country within the sighted area thought to have the capability to produce a nuclear weapon, and it is one of the potential nuclear powers which has refused to sign a treaty pledging not to join the nuclear club. But in 1977 the South African government, in an exchange of letters with President Carter, did pledge privately not to develop nuclear weapons. The present foreign minister, R. F. (Pik) Botha, asked about the putative nuclear test, responded: "I have no knowledge of such an event." The South African government later suggested that the Soviets, Chinese, or Americans might have set off a bomb, and a Capetown press release pointed out that a Soviet submarine was traveling near the Cape of Good Hope in September.

The mystery, which may remain unsolved indefinitely, has produced one clear finding: there is a deficiency in U.S. monitoring of weapons testing. The Department of Defense insists that the gap is not one that affects strategic policy or the SALT treaty. As one official put it, it was a technical "triumph" to have acquired the scanty data we have in this case: "Finding something like this . . . in a remote part of the world is just completely different from the problem of monitoring SALT." The United States spends several billion dollars a year watching Soviet weapons development, the official said, and only a fiftieth or a hundredth as much watching for nuclear proliferation in other parts of the globe. He was proud of the fact that the Vela spotted this flash "off in a little corner" of the world. There is no question, however, that more money will be spent in the future to watch this little corner.

—ELIOT MARSHALL

House Gives a Nod to Solar Power Satellite

But opposition to pushing the R & D pace is growing; some worry about environmental hazards and a trillion-dollar pie in the sky

Congress is still disposed to think big about high technology, as witnessed by the hundreds of millions appropriated each year for nuclear fusion R & D. But now comes the Solar Power Satellite (SPS), a proposed energy technology that poses an extreme test of congressional willingness to support a venture involving potential costs and economic and environmental risks that could be enormous.

On 16 November, the House of Representatives passed by a vote of 201 to 146 a bill to authorize the spending of $25 million to push exploratory R & D on the SPS concept at a faster pace. But the opposition was much stronger than it was last year when the House approved a similar measure by a vote of 267 to 96. Moreover, prospects for Senate passage are doubtful.

The SPS is still more of a concept than a program, and cost estimates vary wildly. Deployment by the United States of 60 satellites each capable of producing 5000 megawatts—this is the "reference system" now used in SPS studies—could cost from $500 billion to $1 trillion, with the front-end R & D costs amounting to at least $40 billion and maybe twice that.

An SPS program would involve building a new rocket five times larger than the Saturn V used in project Apollo, a powerful space tug, and two new super-duper shuttle-type spacecraft capable of ferrying many engineers and technicians into low earth orbit and from there into geosychronous orbit 22,000 miles above the earth where the satellites would be assembled. To complete the vast and complicated task of assembling the entire SPS system (which would satisfy perhaps one-tenth of U.S. energy needs), some 500 rocket launchings would have to be carried out every year for 30 years.

Each satellite would be an immense structure, about the size of Manhattan Island, with a 55-square-mile surface covered with photovoltaic cells. It would convert solar energy first to electricity, then to microwave energy to be beamed to its own receiving antenna, or "rectenna," on earth. At the rectenna, which together with its buffer zone would require a 74-square-mile site, the microwave energy would be reconverted to electricity for movement to distant population centers over a web of transmission lines. The SPS is, as some observers have commented, the stuff of science fiction.

The SPS concept was first proposed in 1968 by Peter E. Glaser, vice president of engineering sciences at Arthur D. Little, Inc. In 1973, Glaser was awarded a patent for the concept, which became the subject of a feasibility study sponsored by the National Aeronautics and Space Administration (NASA) as early as 1974. By the middle of 1980, the Department of Energy (DOE) and NASA are to report the results of the latest 3-year SPS study.

This "concept development and evaluation" study, on which some $20 million will have been spent, has—according to a DOE policy statement—had the modest aim of achieving "an initial understanding of the technical feasibility, economic practicality, and social and environmental acceptability of the SPS concept." At most, the study is expected to find that no insurmountable obstacles have been identified and that further investigation is in order—or, conversely, that such obstacles do exist and that the SPS should be dropped as an energy option.

The principal sponsor of the bill just passed by the House is Representative Ronnie G. Flippo (D-Ala.), whose district includes the Marshall Space Flight

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