SCIENCE NEWS of the week

The Road to Space Gets Steeper Still

The catastrophic May 3 failure of the third U.S. attempt this year to send a payload into space cost considerably more than just the $57.5 million GOES-7 weather satellite and its $30 million Delta rocket. Added to the Jan. 28 explosion of the space shuttle Challenger and the April 18 blowup of an Air Force Titan 34D rocket, the blast joined an improbable array of mishaps that point toward the possibility of temporarily curtailing NASA's ability to put *anything* into orbit.

The remaining shuttles, Titan 34Ds and Deltas have all been grounded while the failures are under investigation. But NASA officials this week were also acknowledging a likely delay in the scheduled May 22 launching of the agency's other large rocket, the Atlas-Centaur, which has components similar to those of the Delta and this time would be carrying a Navy communications satellite. And the smaller Scout rocket, though its next planned use (carrying an Air Force satellite called Polar Bear) is not until October, is a solid-propellant vehicle whose first stage has similarities to the "strap-on" boosters of the Titan 34D. The Titan explosion, says a government official who asked not to be identified, was "definitely a solid-booster failure."

Delta disaster.

In the most recent disaster, the Delta rocket carrying GOES-7 took off as planned, but its liquid-propellant main engine abruptly shut off about 71 seconds into the flight, sending the craft careening out of control until a safety official on the ground blew it up by radioed command some 21 seconds later. The only irregularity initially observed by NASA engineers looking back over telemetered data from the seconds before the engine stopped firing was a pair of electrical "spikes," each lasting only a few milliseconds and apparently indicating current surges that represented brief drainings of the craft's batteries. Though the cause of the surges was not certain, officials said they could have had the effect of allowing the engine's fuel valves to close prematurely.

The Delta's first stage also carried nine solid-propellant "strap-ons," but early analyses indicated that the solids had worked as planned. The first six ignited properly at liftoff and fired as expected for about a minute; then the three remaining solids ignited, and apparently were still firing when the rocket was destroyed.

Two more Deltas had been scheduled for launching later this year, one of them carrying GOES-H, next in the same series of National Oceanic and Atmospheric Administration (NOAA) satellites that was about to be joined by GOES-7. In a statement issued April 6, NOAA said the loss of GOES-7 is a serious setback to its weather-observing satellite system. GOES-7 would have enabled NOAA to monitor weather patterns over the entire United States for the first time in two years. Coast-to-coast coverage of the nation—which normally requires two satellites, one situated over the Atlantic and one over the Pacific — was lost when GOES-5, monitoring the East, failed on July 29, 1984. Since then meteorologists have been making do with GOES-6 by relocating it over the center of the United States and then shifting it east in the summer and west in the winter to focus on meteorological trouble spots. This has produced incomplete and sometimes distorted weather data.

According to NOAA, the remaining GOES-6 will have enough fuel for two more years of operation, and if the instruments continue to perform the satellite could possibly provide some coverage for two years after that. Weather observations will also be supplemented by the polar-orbiting NOAA-9 satellite, the European Space Agency's Meteosat and the Japanese National Space Agency's GMS satellite. NOAA is hoping that it will be possible to launch GOES-H later this year. The next series of satellites, GOES-I through -M, will begin to come off the assembly line in 1989 or 1990, so far planned for launch by shuttle.

—J. Eberhart and S. Weisburd

Chernobyl: Emerging data on accident

As low-level radioactive fallout from the catastrophic accident at the Chernobyl Nuclear Power Station began wafting over the West Coast of the United States on Monday, the Soviets began releasing their first, brief descriptions of what crippled a reactor in the Ukraine one week earlier. The accident began at 1:23 a.m. on Saturday, April 26, when a chemical explosion ripped apart structural elements in the building housing the reactor, said Soviet officials this week. At a press conference in Moscow on Tuesday, those officials said the accident, which occurred during a planned shutdown in the plant, was a result of "several highly improbable and therefore unforeseen failures."

No mention was made of what caused the initial explosion or of the status of a graphite fire, which Western scientists suspect is still burning in the damaged number-4 reactor's core. Although the Soviets reported on Monday that some 26,000 Chernobyl-area residents had been evacuated "in a strict and organized fashion," taking only four hours, they added at the Moscow press conference the following day that the evacuation did not begin until about 36 hours after the accident. That is long after many would have sustained substantial and potentially lethal radiation doses, Western scientists believe. First Deputy Health Minister Yevgeny Vorobyev told reporters on Tuesday that 204 had been hospitalized for "radiation disease" — 18 suffering from "extreme radiation exposure." In addition, Soviet officials reported that by May 5, radiation levels at Chernobyl had been reduced "by two- to three-fold" since April 27, to 10 to 15 milliroentgens per hour—an hourly exposure that would be equivalent to one-half to two-thirds of a chest X-ray.

Sources outside the Soviet Union continue to accumulate data on the Chernobyl accident, and last week the White House established a U.S. government interagency task force to analyze the growing body of information. Extrapolating radiation-monitoring data collected in the Stockholm area by the Swedish government, for example, the task force estimates that the whole-body radiation doses that might have been absorbed by persons in the immediate area of the plant range from 20 to hundreds of rems during the two days when radiation releases were likely highest. (A rem is a unit of absorbed radiation dose that takes into account the type of radiation.) The task force says these doses are "sufficient to produce severe physical trauma, including death."

Atomic bomb and laboratory data have indicated that thousands of rems cause the central nervous system to fail, killing within hours or days. No treatment is possible at such doses. According to radiation expert Herbert L. Abrams of Stanford University, at 700 to 1,200 rems death comes within days to weeks as a result of gastrointestinal damage. From a few hundred to 700 rems, the first medical intervention—in the form of bone marrow transplantation — is possible. Without successful transplantation, death could come within a month, usually from the destruction of the blood-