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Space Medicine Branch Report

Report on the Space Shuttle from the 1981 meeting

The 52nd Annual Scientific Meeting of the Aerospace Medical Association was quite a success. One of the main themes of this meeting was space medicine. I would like to thank the members of the Space Medicine Branch who helped arrange and participated in the Space Biology Panel and the session on the biomedical results of the first Shuttle flight.

The Space Medicine Branch luncheon and business meeting attracted more than 200 national and international members and guests. The featured guest speaker was astronaut Donald "Deke" Slayton, who reported on the Space Transportation System and showed a short but spectacular movie of the Maiden flight of the Space Shuttle Columbia.

I would like to take this opportunity to highlight some of the major aspects of the first Shuttle mission, especially for the benefit of those of you who were unable to attend these sessions in San Antonio. The first Shuttle mission lasted 2.5 days and was an outstanding success for the U.S. manned spaceflight program. The principal thrust of space medicine for the Shuttle program is to assure the health of flight personnel during all segments of the missions; the program includes medical flight support systems, clinical and analytical laboratory operations, manned testing vigilance, and occupational health services at the launch and landing sites.

The Space Transportation Systems program is divided into two phases. The first phase is designated Orbital Flight Test (OFT); the second and final phase addresses mature operations. OFT is somewhat distinctive operationally. The Shuttle is launched from the

NASA Kennedy Space Center (KSC), FL, and recovered at the NASA Dryden Flight Research Center, CA. OFT emphasizes test instrumentation payloads. Mature operations, beginning with the fifth Shuttle Mission will have launches and landings at KSC. The Orbiter and Spacelab will transport predominantly scientific payloads and will also allow for the participation of non-astronaut scientists in space explorations.

While medical operations penetrate all the preparatory and actual flight activities, a climactic point is reached 7 days before launch, when the Health Stabilization Program (HSP) begins. Its purpose is to minimize and to exclude, if possible, infectious disease exposures from all flight personnel—principally the prime and backup crews. The time interval constitutes a reduction in the number of isolation days imposed for earlier space programs. Historically, 80-85% of the illnesses reported by individuals authorized crewmember contact were upper respiratory illnesses. The incubation period for most of these illnesses ranges from 3-5 days. With a 7-day isolation period, this type of crewmember illness can be detected before launch. Additional exposures to upper respiratory infection that could cause inflight crew illnesses are prevented by "primary contacts," who voluntarily withdraw from crew areas when the first sign of personal illness is detected. The prevention of illnesses with longer incubation periods depends heavily upon voluntary illness reports by "primary contacts" and by periodic medical examinations.

The excellent results obtained with the past

Health Stabilization Program attest to the outstanding motivation by the "primary contacts" to protect the flight crew. Since the inception of the HSPs, no crewmember has ever experienced an infectious illness after the isolation period started.

For the OFT phase of the Shuttle program, six types of inflight medical tests are being executed:

1. Cabin acoustical noise measurements
2. Cabin atmosphere evaluations
3. Radiation evaluations
4. Inflight motion sickness data collection
5. Anti-G suit effectiveness verifications
6. Crew exercise equipment evaluations

At landing, the medical operations team works with the Contingency Response Force if the remote need arises to assist the crew. The present post-landing schedule calls for the crew physician to enter the Orbiter after safing operations are complete to assure that the crew is ready for egress, accompany the crew during post-landing activities, conduct a brief medical examination, and certify readiness to leave the landing area.

Detailed medical evacuations to assess crew health status, as well as responses to spaceflight, were conducted at 30 and 10 days prior to launch, on the landing day, and 3 days after return. In summary, these evaluations showed the Columbia crewmembers to be in good health post-flight. All the biomedical data are currently being evaluated and will be reported in subsequent publications.

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NASA Headquarters

Sensing experiments fly on next Shuttle

When the Shuttle makes its second flight test this fall, it will carry seven experiments—primarily for remote sensing of land resources, atmospheric phenomena, and ocean conditions—in order to prove the Shuttle's usefulness for space research.

Five of the experiments will be mounted on a Spacelab pallet—a 3-meter long U-shaped structure that will fit into the Shuttle's cargo bay and will provide its own subsystems for power, command, data, and thermal interfaces for the instruments. These will include an imaging radar to help test advanced techniques in mapping the geological structures important in finding oil and gas; a multi-spectral infrared radiometer to measure the solar reflectance of mineral-bearing rock formations; a feature recognition system designed to distinguish between bare ground,

water, vegetation, snow, or clouds, and thus control sensors so they collect only wanted data; a pollution measurement experiment to measure the distribution of carbon monoxide in the middle and upper troposphere; and an ocean color scanner to map algae concentrations that may indicate feeding areas for fish or may indicate water pollution problems.

Two other experiments will be mounted in the Shuttle's crew compartment. They are a night and day optical survey of lightning storms, and a biological engineering experiment to determine the relationship between plant growth and moisture content in weightlessness.

STS-2 will be launched from the Kennedy Space Center, remain in space for 4 days, and land at the Dryden Research Center, Edwards AFB, CA.

W-P AFB expands flight control laboratory

Wright-Patterson AFB, OH, has started construction of a \$9.8 million Bldg. 146 that, together with existing Bldg. 145, will make up what the USAF calls "the most complete and sophisticated complex of its kind in the Department of Defense."

The new building, called the east wing of the Flight Control Development Laboratory at Wright-Patterson, will house 150 researchers working on modern aircraft flight control systems and how pilots interact with them.

Special facilities will include an instrumentation laboratory, cockpit fabrication and mock-up areas, a laboratory for measuring theoretical properties of cockpit displays and flight instruments, and a control science reference area.