CHAPTER 2

DELAYS IN DOD'S STS EFFORTS

The operational availability of STS has been delayed 3-1/2 years from March 1979 to September 1982. 1/ This delay, attributed to technical problems and budgetary constraints encountered by NASA, caused DOD to

--acquire additional backup launch ELVs and

--delay the transition--from ELVs to STS--of some DOD space programs.

Further, the STS delay, in part, caused DOD to delay the operational availability of STS launch and landing facilities at Vandenberg.

DOD officials stated that the STS delays have not resulted in any known operational degradations, and if current schedules are met, there should be no adverse mission effects to DOD space programs. In our opinion, however, continuing uncertainties may further delay DOD's use of the full capabilities of STS, increase costs, or degrade future DOD operational capabilities in space.

ADDITIONAL ELVs NEEDED AS BACKUPS TO THE SHUTTLE

Delays in achieving an operational STS have caused the Air Force to increase its requirements for TITAN III (34)D ELVs. These ELVs are to maintain an assured launch capability for critical DOD satellites in the event of problems or delays with the Shuttle.

ELV backup strategy

The Air Force strategy for backups is to maintain an assured capability to launch critical missions during the first 2 years of operations at Kennedy and first year of operations at Vandenberg. Another part of this strategy is to maintain critical TITAN production capability until STS is operational.

Based on this strategy and with the first DOD operational launch from Kennedy planned for July 1980, the Air

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1/STS milestone dates are shown in appendix III.

Force planned to procure five backup ELVs. Subsequently, as the Shuttle was delayed to September 1981, the quantity of backup ELVs was increased to five complete vehicles and two sets of long-lead materials. This increase in backup launch vehicles served to extend the critical TITAN production capability to September 1981. However, since then, NASA delayed the Shuttle initial operating capability (IOC) to September 1982. This latest delay reopened a production capability gap.

Status of ELV procurements

As a result of the IOC delay to September 1982, the fiscal year 1981 budget contained $66 million to fully fund the assembly of two sets of long-lead materials. These materials were purchased with $44 million in reprogramed fiscal year 1980 funds. This action resulted in a total acquisition of seven ELVs as backups. However, two missions planned for Shuttle launches have--as a result of the uncertainty over the availability of the Shuttle--been rescheduled to be launched on ELVs. This rescheduling reduced the number of backup ELVs to five.

Air Force and program office officials said the Office of the Secretary of Defense has tentatively included in the fiscal year 1982 budget funds for two additional TITAN III (34)Ds to maintain the production capability. Also, $5 million in fiscal year 1981 funds is being reprogramed for long-lead materials for these TITANs. However, a firm decision has not been made on the total number of backups to be procured.

As part of the current assessment of the number of backup boosters needed, the program office identified two options which it considers viable. These options will maintain the critical production capabilities and extend the ability to launch critical satellites to at least 1986. One option considers the acquisition of three TITAN III (34)Ds at a cost of $237 million. The other option considers the acquisition of three TITAN III (34)Ds per year over several years. The cost of this latter option was estimated at $559 million through 1984.

Backup ELVs may also be needed for noncritical satellites

The present planning for backup ELVs does not provide backups for satellite programs not designated as critical. For example, during fiscal years 1983 to 1985, there are

13 noncritical satellites scheduled for launch on the Shuttle which are not backed up with ELVs.

To the degree scheduled launch dates of these satellites remain firm and the satellites are capable of being launched on ELVs, we believe the failure to provide backup launch capabilities for these satellites could lead to degradation in mission capabilities and/or delays in the operational availability of new systems. Air Force officials said that if backups were required for these satellites, DOD could probably use some of the ATLAS and DELTA launch vehicles used by NASA.

The present backup strategy also does not consider an extended Shuttle grounding or loss of a Shuttle. Probable effects of the latter two events are discussed on page 27.

EFFECTS ON OTHER DOD SPACE PROGRAMS

The uncertain availability of the Shuttle has caused two DOD space programs to delay transitioning from ELVs to the Shuttle. These two satellites were converted from planned Shuttle launches to launches on ELVs. Also, two other satellite programs may be affected if the Shuttle is delayed further.

The uncertainty and changes have increased the costs of some space programs and may degrade operational capabilities by delaying planned launches and/or delaying introduction of more capable and survivable satellites. Cost effects resulting from the above are not reflected in STS program costs but rather are included in the costs of the individual satellite programs. (See p. 31.)

Transitioning delays

Two satellite programs have delayed transition from ELVs to the Shuttle from 1 to 2 years. Both programs were scheduled to be transitioned in fiscal year 1983; one is now scheduled for transitioning in fiscal year 1984 and the other in fiscal year 1985.

Reasons for delaying the transition date and deciding to launch the first satellite on an ELV included (1) the need for an assured launch in 1983 to preclude a gap in operational capabilities during the 1983-85 time frame, (2) the need for better defined Shuttle environment data such as noise and shock levels, and (3) lower costs that would result by not designing the satellite for launch on

both the Shuttle and an ELV. In August 1980 the Secretary of the Air Force directed this satellite be launched on an ELV.

Relative to the second satellite program, the decision to delay transitioning will require (1) procurement of an old model satellite and (2) conversion of a backup TITAN III (34)D to a TITAN III B. An official of the satellite program said costs of procuring the old model satellite were estimated at about $70 million plus an additional $3 to $5 million to convert the TITAN III (34)D. Also, an AGENA upper stage would be required. The cost of the upper stage was unknown, but the official estimated it would cost about $3 million to complete the upper stage for use with this satellite. An official of the STS program office said that there would be about a $9 million reduction in the cost of the ELVs since solid rocket motor strap-ons would not be needed for the TITAN III B.

The official of the satellite program said that additional funds were not requested. Rather, they reprogramed procurement funds from a new model satellite to procure the old model satellite. These actions will result in a deferral in the introduction of the new model satellite.

Use of an old model satellite was required because the new model satellites were optimized for launch on the Shuttle. Consequently, the new models could not be made compatible for launch on ELVs without incurring significant costs.

Potential future effects

In addition to the above satellites, two other satellites may also be affected if the Shuttle is delayed further. These programs are scheduled for launch in fiscal years 1983 and 1984. Both of these satellites are Shuttle-optimized, and consequently, a Shuttle delay would delay the satellite launch dates. However, if delays are not viewed as viable alternatives, then significant costs would have to be incurred to make the satellites capable of being launched on ELVs.

These two satellites are not compatible with launch on a standard TITAN III (34)D backup vehicle. A decision to launch these satellites on ELVs would require for one satellite, development of a TITAN/CENTAUR launch capability, and for the other satellite, development of a new fairing for use on the TITAN III (34)D.

The costs of such developments are being studied, and firm costs are not known. Program officials estimated it could cost about $250 million to reactivate the TITAN/CENTAUR launch pad, acquire a CENTAUR upper stage, and integrate the satellite to the launch vehicle. The cost of developing the fairing for the second satellite was estimated to cost about $60 million.

Program officials also estimated it would take about 36 months to accomplish the tasks necessary to launch these two satellites on ELVs. Consequently, if these satellites were to be launched on ELVs, decisions would have been needed in the October-November 1980 time frame to protect the presently scheduled launch dates. In one instance, even if a decision had been made in October or November, the launch of the satellite would still be delayed approximately 6 months because of the long leadtime required to build a CENTAUR. As of January 21, 1981, a final decision had not been made.

DELAYS AT VANDENBERG LAUNCH AND LANDING SITE

The IOC date at the Vandenberg launch and landing site has been delayed 18 months from December 1982 to June 1984. 1/ In 1977 the December 1982 date was changed to June 1983 because of Air Force budget problems and a NASA delay in the delivery date of Orbiter 103, which is planned to be used on the first DOD operational launch from Vandenberg.

In commenting on a draft of our report, NASA officials said STS delays were not responsible for delays in activation of Vandenberg. We noted, however, that in March 1978 hearings before subcommittees of the House Committee on Appropriations, an Air Force official said the 6-month delay in Vandenberg activation (from December 1982 to June 1983) was to rephase the program to make it compatible with the revised NASA delivery schedule of the orbiters. Vandenberg activation was keyed to delivery of Orbiter 103 in September 1982 to support a mid-1983 IOC.

In January 1979 the IOC date at Vandenberg was postponed to December 1983 as a result of several factors, including (1) a delay in DOD satellite launch requirements and (2) the need to modify the Vandenberg launch pad design to incorporate the ability to launch a Shuttle with greater thrust than originally planned. This increase in thrust is required

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because of an expected shortfall in the Shuttle's payload carrying capabilities.

In May 1980 the Air Force announced another delay, to June 1984, before Vandenberg will be operational. This 6-month postponement was caused by a significant increase (about $82 million) over the Government estimate for construction in contractor bids received in January 1980.

DOD and Air Force officials stated the delays would not affect national security launches out of Vandenberg, provided current orbiter delivery schedules are met. The first civil and defense STS launches out of Vandenberg are presently planned for mid- to late-1984.

However, as early as March 1980, program office officials expressed concern the June 1984 date was high risk. In August 1980 the Secretary of the Air Force was told by program officials that the June 1984 date was virtually impossible to meet and that an October 1984 date was more likely. Nevertheless, the Air Force did not change the IOC of June 1984. This date does not provide for contingencies, such as labor strikes or shortages of materials, and will require installation of support equipment while construction is ongoing.

Thrust augmentation

Because of an expected shortfall in Shuttle payload carrying capability for west coast launches, NASA identified a need to increase the thrust of the Shuttle. This increase required the Air Force to incorporate into its Vandenberg launch pad design the ability to handle greater thrusts than originally comtemplated. The redesign efforts contributed to a 6-month delay (from June 1983 to December 1983) in achieving IOC at Vandenberg and increased costs by about $51 million.

The Shuttle was originally projected to have a 32,000-pound payload capability for west coast launches. However, as a result of weight increases, it was estimated that at maximum, without thrust augmentation, the Shuttle would only be able to lift about 24,000 pounds. To make up for this shortfall in performance, NASA decided in November 1979 to use a liquid boost motor concept to increase the Shuttle's thrust. This thrust augmentation was expected to increase the Shuttle's payload capabilities to about 41,000 pounds.

In August 1980 NASA informed the Air Force that it was studying other performance augmentation options. These studies are to see if greater thrust can be achieved at a lower cost than that of the liquid boost motors. According to NASA officials, the reason for evaluating other options was that the need date for thrust augmentation had slipped to June 1986.

The 1-year delay in the need for thrust augmentation at Vandenberg is not expected to have any effect on the design or construction of the launch pad. Before the delay, the program office was concerned that design of support facilities at Vandenberg would precede thrust augmentation design since NASA's schedule showed no full-scale design effort until fiscal year 1982.

Additional delay possible at Vandenberg

Because of increasing concern on the part of the Congress as to NASA's ability to meet milestone dates, the fiscal year 1981 Military Construction Appropriations bill prohibits obligation of funds for construction of Vandenberg STS facilities until after the successful rollout of the Shuttle from the Orbiter Processing Facility at Kennedy Space Center. This event was scheduled by NASA for November 23, 1980, and occurred on November 24, 1980.

The limitation will mean a 30- to 45-day delay in the advertising and contract award for construction of the runway, the solid rocket motor, and the external tank processing and storage facilities. These facilities were scheduled for advertising in November 1980 and contract award in January 1981. 1/ After rollout, when the construction packages are advertised, the program office is planning to retain the original completion dates to determine if the contractors can meet them. If the contractors indicate they cannot, the effects will be assessed at that time.

The appropriations bill also deleted $18 million in STS construction funds primarily for a solid rocket motor disassembly facility at Port Hueneme, California. The Air Force was planning to defer construction of this facility until 1982 and reprogram the funds to complete the launch pad at Vandenberg. The Air Force advised the Congress in April

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1/In January 1981 program officials said the request for bids for two critical facilities were issued on January 9, 1981, and contract award is planned for March 10, 1981.