



December 8, 1975

Program Review on  
Department of Defense Space Shuttle Utilization  
Issues, Alternatives, and Recommendations

The following is a presentation of the issues, alternatives, and recommended actions requiring decisions and approvals by the DSARC principals at the December 18, 1975 Program Review. This paper is based on the Program Memorandum on DoD Space Shuttle Utilization submitted by the Assistant Secretary of the Air Force (R&D) by memorandum dated November 21, 1975 and revised on December 5, 1975. When coordination is complete, this paper will become Section 10 of the Program Memorandum.

Funding Issues:

FY 1977. The Program Memorandum (PM) shows that adequate funds are available within the Air Force budget. There are no FY 1977 funding issues.

FY 1978. The Air Force states that additional funds are required in FY 1978 to provide added assurance of achieving a Vandenberg Shuttle initial operational capability by December 1982 (see PM par. 4.1 and 8.5). Three Alternatives are provided.

Alternative 1. Maintain the presently planned 3 year military construction program for Vandenberg starting in FY 1979. Add \$19.8 million in FY 1978 above AF TOA for long lead materials.

Discussion: The Program Decision Memorandum for the Air Force, dated 28 July 1975, directed the Air Force to (a) do all planning and engineering required to maintain the option of a Shuttle Launch Complex at Vandenberg (VAFB) in December 1982; and, (b) delay actual construction until after DSARC review of the Shuttle Program in September 1978. The Air Force now states that \$19.8 million long lead materials procurement is required in FY 1978 to partially alleviate construction concurrency and increase the probability of achieving a VAFB December 1982 IOC. It is noted that the PM as originally submitted on November 21, 1975 showed only \$2.2 million required above AF TOA in FY 1978. Air Force funding requirements shown in the PM are the best available at this time.

Alternative 2. Change to a 4 year military construction program for Vandenberg starting in FY 1978. Add \$71.3 million in FY 1978 above AF TOA to start construction.

Discussion: This alternative is recommended by the Air Force to resolve Vandenberg construction concurrency problems and assure a Vandenberg December 1982 IOC. However, this is contrary to PDM guidance. Details on how the additional funds would be used are not in the PM. These funds would start construction in 1978 on roads, bridges, airfield extension, orbiter maintenance and checkout facility, and launch pad modifications.

Alternative 3. Maintain the presently planned 3 year military construction program starting in FY 1979. Provide no funds above AF TOA.

Discussion: Air Force planning over the next several months should be directed toward defining a firm Vandenberg construction program offering reasonable assurance of meeting the December 1982 IOC. FY 1978 funding adjustments should be made within AF TOA as necessary during the FY 78 POM cycle.

Recommendation: Alternative 3.

Management Issues:

The Interim Upper Stage (I.U.S.) development costs may be high. The stage may have more capability than DoD needs. (See PM 3.6)

Discussion: The solid rocket motor I.U.S. concept was selected on the basis of low life cycle cost, high reliability, and simple interface with the Shuttle. Estimated development cost of the basic stage has grown from less than \$100 million to \$158 million in FY 1974 dollars (\$214 million escalated). \$20 million of the \$158 million is associated with achieving very high mission reliability (.97 vs. .90 for current upper stages). The unit cost of the stage remains at \$3.4 million.

The I.U.S. performance goal is based on latest payload program requirements to deliver a payload weighing 5,000 lbs to geosynchronous orbit when flown on the Shuttle. Earlier this goal was about 4,000 lbs and the heaviest payload in the Rev 4 DoD mission model requiring a geosynchronous orbit weighed only 3,200 lbs (see Annex 1). The proposed I.U.S. may be too heavy to fly on TITAN III vehicles, if necessary.

A DSARC I will be held in April 1976, prior to entering validation phase of the I.U.S. development.

Recommendation: The Air Force should consider ways of significantly reducing development costs while maintaining reasonable life cycle costs and effectively meeting DoD needs. Serious consideration must be given to optimizing the stage for use on TITAN III as well as the Shuttle. Parametric stage optimization and trade-off studies which include development, procurement, operating and support cost considerations should be submitted to DDR&E prior to DSARC.

The Air Force is budgeting for Shuttle launch services incrementally:

5% two years before launch, 35% one year before launch, and 60% in year of launch (see PM 8.1.2). Does this negate DoD full funding policies?

Discussion: The Air Force has assumed (a) that NASA will establish a Shuttle operating fund and charge user programs an average price per

Shuttle launch; and (b) that user programs would pay into this NASA revolving fund in accordance with the above schedule which is proposed by NASA. It is assumed that the DoD full funding policy for launch vehicle procurement does not prevail since Shuttle launch services are being procured. The Shuttle is a partially reusable launch system. Refurbishment services, expended tanks, motors and spares are common to all users. Rescheduling or cancelling a DoD launch would mean that the Shuttle would be reassigned to launch another payload (commercial, scientific, or foreign). Air Force I.U.S. production costs would be fully funded.

This funding approach for launch services reinforces the NASA operating fund concept which is to make the Shuttle economically attractive to early users. For example, Shuttle launch service costs to be budgeted by four DoD user programs are \$18.2 million in FY 1979 and \$20.4 million in FY 1980 assuming incremental funding. If full funding for Shuttle launch services were required two years before launch the above figures would be \$37.6 million in FY 1979 and \$94.2 million in FY 1980.

Recommendation: Approve the Air Force Shuttle launch service funding approach.

The Air Force has at best an incomplete plan to phase out current launch vehicles and to back up Shuttle launches in early years with expendable vehicles (see PM par. 3.7, 4.1, 8.4).

Discussion: The Air Force has noted that certain DoD expendable launch vehicle configurations now in service can be eliminated in the future. Details are not provided. A joint DoD/NASA consolidation study on expendable launch vehicles is to be completed in early 1976. Such consolidation studies can lead to potential savings (The DoD may spend up to \$2 billion for launches on expendable vehicles prior to full Shuttle use). The Air Force has provided no plan for ultimately eliminating essentially all current expendable space launch vehicles from inventory once the Shuttle is fully operational.

The Air Force has currently in the FY 77-81 budget \$74 million for backup expendable launch vehicles. Depending on the degree of austerity assumed, an additional \$94 million to \$267 million may be required for backup expendable vehicles. This remains an area of major funding uncertainty.

Recommendation: The Air Force should submit for OSD approval by May 1976 a recommended Shuttle transition plan that will treat consolidation of current launch vehicle configurations, phase out of current launch vehicles once the Shuttle is operational, and backup vehicles for early Shuttle launch. The backup vehicles plan will consider all DoD payload needs.

Issues with NASA:

We have yet to reach a full understanding with NASA in the following areas:

Price per Shuttle Launch (see PM par. 8.1.2)

Availability of Additional Orbiters (see PM par. 8.1.2)

Space Shuttle Operational Management (see PM par. 3.3.2)

Adequacy of NASA Mission Control Center (see PM par. 3.5.1)

Payload Bay Environment (see PM par. 3.5.1, 7.1)

Realistic National Traffic Model (see PM par. 7.2)

Discussion: SecDef in his September 30, 1975 letter to the Administrator, NASA, stated that a joint DoD/NASA understanding is needed on how the national Space Shuttle program will be managed and operated once the development is complete; that NASA should procure additional orbiters to meet national needs; and, that DoD needs assurances of a fixed moderate cost per Shuttle launch.

Price per Shuttle launch and timely availability of orbiters are perhaps of greatest concern to DoD now. NASA has displayed no feeling of urgency in these two areas. They have agreed to go to OMB advocating a NASA Shuttle operating fund, and, presumably, a fixed reasonable price per launch to DoD. However, NASA would not need to seek funds from Congress for an operating fund until FY 1979. NASA has not agreed to request funds for any additional orbiters beyond the three now budgeted. Again, if NASA requests additional orbiters from Congress it will not be until FY 1979. SecDef stated that early agreement on both of these issues is essential if we are to continue our firm support for the Shuttle program. By FY 1979 DoD will have invested \$276 million in the use of the Shuttle. Both of these issues are basic to agreeing on how the Shuttle program will be managed and operated once development is complete.

The remaining issues relating to the adequacy of the NASA Mission Control Center, the suitability of the Payload Bay Environment for DoD payloads, and the definition of a Realistic National Traffic Model should be much easier to resolve over the next few months.

Recommendation: The Air Force should take the lead with full OSD support, in negotiating an understanding with NASA at the earliest possible date in

each of the above areas. The Air Force should provide DDR&E by February 1976 a schedule of actions agreed upon by both the Air Force and NASA which will resolve these issues. A letter from SecDef to the Administrator NASA reaffirming DoD concerns should be sent after this Program Review.

We concur in the above OSD staff recommendations.

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