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~~(S)~~ NATIONAL RECONNAISSANCE OFFICE
WASHINGTON, D.C.

THE NRO STAFF

MEMORANDUM FOR DR. MARK

SUBJECT: NRP Plans for Use of the Shuttle

Attached is the draft material you requested concerning the Shuttle plans for [redacted]/ZEUS, for use in the PD/NSC-42 Shuttle Enhancement Study report. The sources for this material include:

a. Your 2 May 79 statement to the HAC Subcommittee on Defense, HUD-Independent Agencies and Military Construction, subj: Intelligence Applications of the STS.

b. NRO responses to the HAC S&I Report on the Shuttle.

c. NRO FY-80 Congressional Budget Justification Book.

d. Twx traffic, 17 Aug 79, from Maj Gen Kulpa and [redacted]

[redacted] (b)(1) (b)(3)

1 Attachment
Draft Material

ACTION OFFICER: [redacted]

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NATIONAL RECONNAISSANCE PROGRAM (NRP)
PLANS TO USE
SHUTTLE CAPABILITIES

The programmed capabilities of the Space Shuttle provide new opportunities for improvement in reconnaissance systems. For satellites placed in low earth orbit (LEO), as well as those destined for geosynchronous altitude, the Shuttle will permit the replenishment of consumables, which can lead to extended mission durations. With man on board, the final checkout can be accomplished in space, with repairs on-orbit or return to earth possible. If there is a technical or current intelligence problem that can better be solved by man physically interacting with a satellite, experts may be ferried to the scene.

Modularized systems will facilitate on-orbit repair. Astronauts will be able to construct accurately configured SIGINT antennas. The Shuttle will also allow deployment [redacted] than is now possible. (b)(1) (b)(3)

Full use of this new national capability will permit the

NRP to continue to perform its mission efficiently, despite the increasing challenges of the collection problem.

Both Congress and the President have expressed considerable interest in National Reconnaissance Program plans to utilize the unique capabilities of the Space Shuttle. As NRP plans to use the Shuttle have been developing, the results of a recent, comprehensive review of these Shuttle plans revealed:

(1) All programs have appropriate plans, based on the current development of the Shuttle, for transition.

(2) The National Reconnaissance Program plans are keyed to Shuttle development milestones. As the development milestones in the Shuttle program are met, costs associated with the maintenance of backup expendable launch vehicles can be avoided.

(3) New programs, such as [redacted] /ZEUS are being specifically designed to exploit the unique capabilities of the Shuttle. (b)(1) (b)(3)

(4) The NRP transition plans are sound and the Nation will benefit greatly from the new dimension that this space launch vehicle will provide.

The operation of the Shuttle will be dominated by the presence of man. Each flight will be manned, and this fact will change the way we do things in very fundamental ways. To exploit the capabilities of man the National Reconnaissance Office (NRO) has instituted a Payload Specialist program. In mid-summer 1979, the NRO selected individuals to fill payload specialist positions for each of our spacecraft programs. Spaceflight training is being arranged with NASA for the payload specialists, and, in addition, the NRO is also using experienced NASA astronauts as consultants on the program to select those personnel who will serve as the Shuttle crew technical experts for the payload. Thus, the payload specialists will provide the NRO with the capability to exploit the man-in-the-loop aspect of Shuttle operations.

Recent space operations experience has revealed that most spacecraft which fail prematurely experience these failures right after launch. Very probably it is the launch environment that is the source of most of these failures. The Shuttle will make it possible for payload specialists to check out spacecraft before they are deployed from the

Shuttle, thus hopefully decreasing the effects of the launch environment as a source of problems. Once deployed, the spacecraft can fly in parallel with the Shuttle for a brief period and can be checked out to determine whether it is operating properly. Should problems develop during this test period, it might be possible to either fix the spacecraf on-orbit, or to retrieve the spacecraft and return to earth so that it can be repaired and refurbished.

The following discussion of specific reconnaissance programs, and their Shuttle employment plans, will illustrate the unique features which this national resource will afford.

(b)(1)
(b)(3)

for Shuttle on-orbit checkout, retrieval and refurbishment. What this means is that, as a launch vehicle, the Shuttle

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will stand by to perform spacecraft health checks to ensure that any mission limiting anomalies have not occurred during the Shuttle launch sequence. If a severe

mission limiting failure has occurred, the Shuttle will retrieve [redacted] and return it for servicing and re-launch. The retrieval feature will also permit (b)(1) (b)(3)

[redacted] its useful mission lifetime. Current NRO studies of the retrieval capability, to include subsequent factory refurbishme and reuse of the satellite vehicle, may produce significant program savings. (b)(1) (b)(3)

A final unique capability of the Shuttle, now under study [redacted] is that of Extra Vehicular Activity (EVA) by the Shuttle astronauts. EVA could potentially result in increased [redacted] performance and improve the probability for mission success. The EVA studies include, for instance, (b)(1) (b)(3)

[redacted] (b)(1) (b)(3)

In addition, these studies address [redacted] (b)(1) (b)(3)

Emergency EVA servicing is also being studied with less certainty as to the design and mission efficiencies that may result.

[redacted] (b)(1) (b)(3)

[redacted] is maximizing the benefits provided (b)(1) (b)(3) by the Shuttle to achieve maximum cost effectiveness while maintaining a high probability of mission success. [redacted] (b)(1) (b)(3) will benefit significantly from the Shuttle through on-orbit support, satellite retrieval, and satellite vehicle refurbishment. [redacted] (b)(1) (b)(3) In addition to reducing development costs, this approach affords inherently high Shuttle utility as [redacted] is specifically designed for Shuttle deployment, (b)(1) (b)(3) retrieval and on-orbit servicing. The [redacted] baseline (b)(1) (b)(3) calls for the satellite vehicle [redacted] (b)(1) (b)(3) Retrieved vehicles will be refurbished and returned to the inventory for reuse. [redacted] vehicles which fail (b)(1) (b)(3) on-orbit will be retrieved in the same manner. This program represents a significant savings over launching new vehicles on a periodic basis.

Further utility could potentially be achieved by making maximum use of the on-orbit servicing capabilities of the

[redacted] (b)(1) (b)(3) the life of the satellite vehicle could be extended. Therefore, full scale retrieval and refurbishment could be conducted [redacted] (b)(1) (b)(3) Savings would result both in refurbishment and also by the fact that the modules required for on-orbit refurbishment would only make up a partial load for the Shuttle bay and, therefore, the mission could be shared with another user.

On-orbit checkout capabilities of the Shuttle will be fully utilized by [redacted] Satellite vehicle tests will (b)(1) (b)(3) be conducted in the orbiter bay prior to vehicle deployment, after satellite vehicle deployment, but while the vehicle is still attached to the orbiter, and on-orbit after release. This sequence of test events allows for on-orbit trouble-shooti and repair of post-launch malfunctions by remote means or through EVA, if necessary. After injection of the [redacted] (b)(1) (b)(3) vehicle into orbit, the Shuttle will remain in the vicinity until a complete operations checkout of the satellite vehicle is accomplished. If any given malfunction cannot be isolated and repaired in orbit, the [redacted] vehicle will be retrieved (b)(1) (b)(3) and returned to earth for repair. This capability significantl

decreases the risk of placing into orbit a satellite that is inoperative due to a failure sustained during the launch sequence.

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lessons learned will apply to all NRO missions. It will tell us a great deal about integrating payloads onto the Shuttle and the Shuttle operational environment from a technical point of view (b)(1) (b)(3) that can only be verified with an actual mission. It will also teach us a lot about the procedural and administrative issues involved in Shuttle missions that are best resolved in planning and conducting an actual mission. Additionally, the advantages of the Shuttle system to are considerable. Design and development of is far less expensive as compared (b)(1) (b)(3) (b)(1) (b)(3)

[redacted] assuming reasonable Shuttle (b)(1) (b)(3)
mission extension costs. (b)(1) (b)(3)
[redacted]

[redacted] will use the Shuttle [redacted] attain (b)(1) (b)(3)
orbit, but also will [redacted] (b)(1) (b)(3)
[redacted]

Specific [redacted] Shuttle on-orbit experiments will (b)(1) (b)(3)
include [redacted] (b)(1) (b)(3)
[redacted]

[redacted] associated Shuttle studies have already (b)(1) (b)(3)
provided insight into further uses of the Shuttle subsystems.

Use of [redacted] (b)(1) (b)(3)

[redacted] and to retrieve for factory refurbishment, provides unique mission opportunities.

[redacted] (b)(1) (b)(3)

[redacted] program is planning [redacted] (b)(1) (b)(3)

[redacted] to take advantage of the unique capabilities of the Shuttle. The current schedule, based [redacted] (b)(1) (b)(3)

The capabilities of the STS have been exploited in [redacted] (b)(1) (b)(3)

These characteristics have [redacted] (b)(1) (b)(3)

improvements:

(A) [redacted]

[redacted] (b)(1) (b)(3)

(B) [redacted]

[redacted]

(C) [redacted]

[redacted]

[redacted] (b)(1) (b)(3)

The on-going capability of the Shuttle will

also

(b)(1)
(b)(3)

Approved for Release: 2017/02/27 C05094699