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EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

NOV 10 1979

ACTION

MEMORANDUM FOR: THE PRESIDENT
FROM: James A. Lynn
SUBJECT: 1977 Budget decisions: National Aeronautics and Space Administration

The agency request and my recommendations with respect to FY 1977 budget amounts for the National Aeronautics and Space Administration are presented in the tabulation attached (Tab A). A summary of the principal budget decisions reflected in my recommendation is provided as background information (Tab B).

A single key issue has been identified for your consideration (additional detail at Tab C).

Space Shuttle Program

In response to the initial planning ceiling of \$3,805 million in outlays for FY 1977, NASA requested \$1,383 million for the development of the Space Shuttle--an increase of \$224 million above the 1976 level. This increase is consistent with your decision in the FY 1976 budget to continue with the development of the Space Shuttle on its current schedule.

In response to the FY 1977 outlay cutback which reduced NASA's overall FY 1977 outlay ceiling by \$305 million (from \$3,805 M to \$3,500 M), NASA has argued that:

- (1) in order to maintain reasonable and defensible balance in the overall space program, the Space Shuttle (which accounts for nearly half of the NASA budget) would have to bear the brunt of the FY 1977 outlay reductions;
- (2) the programmatic impact of a major cutback in the Space Shuttle program would be quite severe because the program is very near the peak level of development activity; and

- (3) recognition should be given to large prior-year cutbacks in NASA's programs which make it difficult for NASA to achieve its FY 1977 outlay reduction target without major disruption of its programs.

If, however, NASA is still required to meet its revised FY 1977 outlay ceiling, the agency would plan to achieve this by a deliberate schedule slippage (18 months) in the shuttle development program. This would result in a \$265 million outlay reduction from NASA's initial 1977 request, out of a total NASA reduction of \$305 million.

OMB agrees with NASA that the Space Shuttle is the key to achieving large NASA outlay reductions in FY 1977, unless major on-going R&D projects are to be arbitrarily cut back. (Without any reduction in the shuttle in 1977, a reasonable reduction among other NASA programs would be about \$80 million.)

We are most concerned about the large potential out-year cost increases (on the order of \$350-500 M) that would result from a major slippage of the Space Shuttle program as envisaged in NASA's outlay cutback solution. We are also concerned how such cost increases might be interpreted by the Congress--i.e., the wisdom of trading 1977 outlay savings for much higher costs in future years.

We also agree with the need to preserve program balance in the space program during the peak period of shuttle funding requirements. This requires that at least the highest priority unmanned satellite initiatives should be approved in the FY 1977 budget (no new project starts were allowed in NASA's FY 1976 budget). Otherwise, the Administration is vulnerable to Congressional criticism on two counts:

- (1) worthwhile new projects in space science, space applications and aeronautics are being sacrificed because of the Space Shuttle; and

- (2) the Space Shuttle is being developed without developing missions to be flown.

Other than no reductions at all in the shuttle program (which we consider unrealistic in the light of your 1977 budget strategy), there are three alternatives for your decision (discussed more fully in the issue paper):

- First, cancel the Space Shuttle program outright (which would result in outlay savings of about \$1.4 billion in FY 1977 and potentially about \$1.6 billion per year in later years).
- Second, slip the Space Shuttle schedule by 18 months essentially to solve the FY 1977 NASA outlay reduction problem.
- Third, maintain Space Shuttle development and attempt to minimize the out-year cost increases (that would result from the FY 1977 outlay cutback) by foregoing \$119 million of the 1977 outlay reduction target.

In the issue paper attached, OMB recommends on balance that the Space Shuttle program should be continued as the vehicle for continued U.S. manned space flight. Since a deliberate slippage of the Space Shuttle schedule would involve very large out-year cost increases (\$350-500 M), the preferred alternative is to accept an overall NASA outlay reduction in FY 1977 of \$186 million (rather than the original target of \$305 million). This solution, while not achieving the desired NASA outlay reduction would reduce shuttle out-year cost increases to about \$70-80 M in FY 1977 dollars. Furthermore, this alternative has the advantage of allowing NASA to stick to its September 1976 "roll out" date for the first orbiter at Palmdale, California, and planned mid-1979 date for the shuttle's first orbital flight.

Decision: Cancel space shuttle _____

Slip the shuttle schedule
by 18 months to achieve
\$305 M FY 1977 outlay
reduction _____

Maintain the shuttle
schedule and accept \$186 M
FY 1977 outlay reduction _____

Attachments

TAB A

National Aeronautics and Space Administration
1977 Budget

Summary Data

	(In millions)		Employment, end-of-year	
	<u>Budget authority</u>	<u>Outlays</u>	<u>Full-time Permanent</u>	<u>Total</u>
1975 actual	3,231	3,267	24,333	25,763
1976 February budget	3,539	3,498	24,316	25,711
enacted	3,535	3,498	xxx	xxx
agency request	3,535	3,498	24,316	25,711
OMB recommendation	3,535	3,498	24,316	25,711
OMB employment ceiling	xxx	xxx	24,316	25,711
TQ February budget	959	901	xxx	xxx
enacted	925	901	xxx	xxx
OMB recommendation	925	901	xxx	xxx
1977 planning target	3,850	3,805	xxx	xxx
1977 reduction target	xxx	3,500	xxx	xxx
agency request	3,865	3,806	24,316	25,711
OMB recommendation (under planning target)	3,780	3,744	24,316	25,711
OMB recommendation (under cutback target)	3,635	3,620	23,816	25,211
1978 OMB estimate	3,504	3,570	23,800	25,200

TAB B

1977 Bud
National Aeronautics and Space Administration
Summary of Recommended Program Reductions
(\$ in millions)

	1976		TQ	1977			1978	
	<u>0</u>	<u>FTP Employ</u>	<u>0</u>	<u>BA</u>	<u>0</u>	<u>FTP Employ</u>	<u>0</u>	<u>FTP Employ</u>
Current base/request	3,498	24,316	901	3,865	3,806	24,316	3,808	24,316
Recommended level	<u>3,498</u>	<u>24,316</u>	<u>901</u>	<u>3,635</u>	<u>3,620</u>	<u>23,816</u>	<u>3,570</u>	<u>23,800</u>
Reduction	--	--	--	-230	-186	-500	-238	-516
Program reductions:								
Reduce FY 1977 funding for Space Shuttle								
Current base/								
request	1,159	--	326	1,432	1,383	--	1,349	--
Recommended level ..	<u>1,159</u>	--	<u>326</u>	<u>1,330</u>	<u>1,292</u>	--	<u>1,237</u>	--
Reduction	--	--	--	-102	-91	--	-112	--

The Space Shuttle is discussed in a separate issue paper.

Defer certain elements of
NASA's proposed aircraft
efficiency R&D program

Current base/request	4	--	2	43	30	--	47	--
Recommended level	<u>4</u>	--	<u>2</u>	<u>29</u>	<u>17</u>	--	<u>32</u>	--
Reduction	--	--	--	-14	-13	--	-15	--

NASA has proposed FY 1977 initiation of an Aircraft Energy Efficiency Program. The program requires a major refocusing of NASA's ongoing aeronautical research activities toward development of fuel conservative aircraft. OMB recommends that NASA's request for refocusing of its ongoing aeronautics program should be approved, but certain elements of the proposed Aircraft Energy Efficiency Program should be deferred, primarily because of concerns over proper balancing of Federal-industry roles and the need for industry cost-sharing of certain activities.

	<u>1976</u>		<u>TQ</u>	<u>1977</u>		<u>1978</u>		
	<u>0</u>	<u>FTP Employ</u>		<u>0</u>	<u>BA</u>	<u>0</u>	<u>FTP Employ</u>	<u>0</u>
Defer certain proposed new space satellites and Space Shuttle/ Spacelab payloads								
Current base/request	18	--	7	96	60	--	139	--
Recommended level	<u>18</u>	<u>--</u>	<u>7</u>	<u>61</u>	<u>40</u>	<u>--</u>	<u>102</u>	<u>--</u>
Reduction	<u>--</u>	<u>--</u>	<u>--</u>	<u>-35</u>	<u>-20</u>	<u>--</u>	<u>-37</u>	<u>--</u>

NASA proposed in the FY 1977 budget the initiation of an advanced astronomy project, called the Space Telescope, designed to substantially increase scientific knowledge about the origin and evolution of the universe. Although the project has widespread support in the scientific community, OMB and NASA are in agreement that due to budget constraints in FY 1977 the project can be deferred. OMB and NASA would also defer several other smaller flight projects and reduce FY 1977 efforts for development of experiments for the Space Laboratory (being developed by the Europeans). The Spacelab will be flown inside the shuttle cargo bay. Other projects which would develop uses for the shuttle (e.g. materials processing in space and biomedical research) would be reduced or deferred.

Defer major modifications
to a Large Wind Tunnel
and other construction

Current base/request	49	--	6	101	75	--	70	--
Recommended level	<u>49</u>	<u>--</u>	<u>6</u>	<u>82</u>	<u>67</u>	<u>--</u>	<u>57</u>	<u>--</u>
Reduction	<u>--</u>	<u>--</u>	<u>--</u>	<u>-19</u>	<u>-8</u>	<u>--</u>	<u>-13</u>	<u>--</u>

Two aeronautical test facility projects were proposed by NASA for FY 1977 funding. Both projects are included in a "National Wind Tunnel Plan" which was developed jointly by NASA and DOD. OMB recommends that construction of the higher priority National Transonic Facility, at Langley Research Center in Virginia, should be approved for FY 1977 funding. Both OMB and NASA are currently in agreement that modifications to the 40x80-Foot Wind Tunnel, at Ames Research Center in California, should be deferred. In addition, OMB is recommending deferral of certain small new construction projects.

	<u>1976</u>		<u>TQ</u>	<u>1977</u>			<u>1978</u>	
	<u>0</u>	<u>FTP Employ</u>	<u>0</u>	<u>BA</u>	<u>0</u>	<u>FTP Employ</u>	<u>0</u>	<u>FTP Employ</u>
Eliminate NASA's direct funding for non-aeronautical energy R&D								
Current base/request	5	--	1	9	7	--	9	--
Recommended level	<u>5</u>	<u>--</u>	<u>1</u>	<u>--</u>	<u>--</u>	<u>--</u>	<u>--</u>	<u>--</u>
Reduction	<u>--</u>	<u>--</u>	<u>--</u>	<u>-9</u>	<u>-7</u>	<u>--</u>	<u>-9</u>	<u>--</u>

The objective of this program is to identify technology within NASA's space program which is applicable to energy and to relate these technologies to national energy needs. OMB recommends that direct NASA funding for this effort should be eliminated and that NASA's activities related to the development of energy sources for terrestrial applications should fall under the cognizance of ERDA. ERDA is now funding some energy research in NASA centers, and OMB believes that all such research should be funded through ERDA.

Reduce other NASA R&D and R&D support activities								
Current base/request ...	1,487	--	345	1,382	1,449	--	1,392	--
Recommended level	<u>1,487</u>	<u>--</u>	<u>345</u>	<u>1,351</u>	<u>1,422</u>	<u>--</u>	<u>1,377</u>	<u>--</u>
Reduction	<u>--</u>	<u>--</u>	<u>--</u>	<u>-31</u>	<u>-27</u>	<u>--</u>	<u>-15</u>	<u>--</u>

The action recommended would result in minor reductions throughout NASA's programs. Reductions and deferrals would be made in R&D support activities such as studies related to future space stations, definition of future flight projects (e.g., planetary missions), and advancements in technology for future programs. The principal programmatic impact would fall upon long-range research and technology. NASA has proposed similar across-the-board reductions in order to achieve FY 1977 outlay reductions.

	1976		0	1977			1978	
	0	FTP Employ		BA	0	FTP Employ	0	FTP Employ
Reduce civil service and support contractors at NASA's field installations and constrain operating costs								
Current base/request	776	24,316	214	802	802	24,316	802	24,316
Recommended level	776	24,316	214	782	782	23,816	765	23,800
Reduction	--	--	--	-20	-20	-500	-37	-516

As a result of the completion of the Apollo and Skylab programs, NASA's work force has been reduced significantly: from 33,500 civil servants in 1966 to 24,316 in 1976; and from 50,000 support contractor personnel (including the contractor-operated Jet Propulsion Laboratory) to 24,000 in 1976. Thus, despite these reductions NASA's in-house work force and physical plant (with 10 field centers) is still relatively large.

As part of NASA's continuing review of its institutional requirements, the agency has concluded that its work force can be further reduced and that more agency work can be performed by private industry and universities (rather than by NASA laboratories). The agency tentatively plans to reduce 800 support contractor work-years in FY 1977 and 500 civil service positions also in FY 1977. A total reduction of 3,000-4,000 work-years is planned by the end of FY 1979 (both civil service and support contractor positions).

Although NASA is making progress in reducing personnel, sizable cost savings will not result for several years. The OMB reduction proposed in this area (which is \$8 million larger than the NASA proposed FY 1977 reduction) could be viewed by NASA as unwarranted in view of the actions which NASA is already undertaking in response to OMB urging. OMB believes that the reduction recommended can be accommodated without disrupting NASA's overall mission on the assumption that it is possible to obtain some increase in productivity from the extensive NASA work force.

TAB C

Issue Paper
National Aeronautics and Space Administration
FY 1977 Budget

Space Shuttle Development Program

Statement of the Issue

- What cost and schedule adjustments should be made in the Space Shuttle program to achieve sizable outlay reductions in NASA's FY 1977 budget?

Background

- The Space Shuttle program was approved in January 1972. Current plans are for the shuttle to be operational in the early 1980's. Development is proceeding rapidly and the first Space Shuttle "Orbiter" is planned to be "rolled out" in September 1976 at Palmdale, California. The initial manned orbital flight is planned for mid-1979.
- The total development cost of the Space Shuttle is estimated to be \$6.6 billion in FY 1977 dollars, of which about \$2.2 billion has been spent to date.
- During the formulation of the FY 1976 budget, a range of options was presented for your consideration including the possibility of canceling the Space Shuttle program and discontinuing U.S. manned space flight activities altogether.
- The FY 1976 budget decision was to continue with the Space Shuttle program on the assumption that it provides the only feasible means for continuing a U.S. manned space program that offers the potential for cheaper and more effective long-term utilization of space for a variety of applications. In arriving at this decision, it was also decided to seek to avoid arbitrary changes in annual funding levels for the shuttle program because of the adverse impact of such changes on NASA's ability to manage the program effectively.

- ° There remain major uncertainties about the future space program that the Space Shuttle will support and the projected economic advantages of the shuttle are very sensitive to assumptions about the overall level of future U.S. space activity (civilian, military and commercial).
- In the case of the military uses of the shuttle, there are particular uncertainties. While there are some proponents for the shuttle program in the Department of Defense, the Departmental and Air Force view can be characterized as one of reluctant support. DOD is skeptical that the shuttle will prove to be a cost-effective means for carrying out DOD missions. DOD's posture has been to express support publically for the shuttle, but to delay as long as possible making major financial investments in the program. Secretary Clements has recently informed Dr. Fletcher that NASA should be responsible for providing the two Space Shuttle orbiters which had previously been assumed would be funded by Defense in future DOD budgets (not an FY 1977 requirement). NASA is concerned that if DOD fails to support the program, it will undermine the economic rationale for the program and could conceivably result in cancellation of the shuttle by the Congress.
- In addition to the economic arguments for the shuttle, there are intangible benefits involving such considerations as the maintenance of the U.S. technological image (particularly with respect to the Soviet Union).
- ° In order to achieve major FY 1977 outlay reductions in NASA, it will be necessary to reduce funding for the Space Shuttle program. There is no possibility of reducing NASA outlays by as much as \$305 million (NASA's overall outlay reduction target) unless the Space Shuttle program schedule is slipped. How much to slip the shuttle schedule is the key issue in the NASA budget for FY 1977.

Alternatives

- 1.-Continue NASA's current plans for the Space Shuttle, with "roll out" of the first orbiter in September 1976 and first orbital flight in mid-1979.
- 2.-Cancel the Space Shuttle and discontinue all U.S. manned space flight for the foreseeable future.
- 3.-Continue Space Shuttle development, but undertake a deliberate schedule slippage (18 months) sufficiently large to allow NASA to meet its \$305 million FY 1977 outlay reduction target.
- 4.-Continue Space Shuttle development but slip the program schedule to the maximum extent possible without incurring large out-year cost penalties resulting from the need to renegotiate major development contracts.

Analysis

This table provides OMB estimates of the total runout costs of the civilian space program for the four alternatives:

	(Total NASA outlays in millions of constant FY 1977 dollars)				
	<u>FY 76</u>	<u>FY 77</u>	<u>FY 78</u>	<u>FY 79</u>	<u>FY 80</u>
Alternative 1	3,498	3,806	3,810	3,600	3,200
Alternative 2	3,400	2,400	2,200	2,200	2,200
Alternative 3	3,498	3,500	3,680	3,380	3,140
Alternative 4	3,498	3,620	3,570	3,300	3,100
Potential Savings from Cancellation of Manned Space Flight (2-1)	-98	-1,406	-1,610	-1,400	-1,000

- The alternatives can be assessed as follows:
 - Alternative 1 is the initial NASA request and is not feasible if large outlay reductions are to be accomplished in NASA in FY 1977.
 - Alternative 2 would cancel the Space Shuttle program and yield the largest outlay savings (an estimated \$1.5-1.6 B per year in later years compared with a constant NASA budget at the initial request level). Major impacts that would result include:
 - total employment reduction of about 55,000 contractor and civil service jobs, some of which would have to occur in 1976.
 - would eliminate U.S. manned space flight capability.
 - could result in international problems, particularly with the Europeans who are investing about \$500 M in a manned Spacelab to be flown on the Space Shuttle.
 - could result (in the long-run) in a more aggressive and technologically ambitious unmanned space program.
 - Alternative 3 would continue Space Shuttle development, but undertake an 18 month slippage in the first orbital flight of the shuttle (from mid-1979 to late 1980). Would result in FY 1977 outlay savings of about \$265 million in shuttle-related activities. Other considerations include:
 - incurs \$350-500 M in out-year cost increases related to the need to renegotiate major shuttle contracts.
 - would result in loss of about 10,000 jobs.

- has the advantage of sparing other NASA science, applications and aeronautics programs ("good program balance").
- has negative impact on NASA's ability to manage and control shuttle contractor cost and technical performance.
- Alternative 4 would continue Space Shuttle development on essentially its current schedule but defer certain program elements (particularly the production of a 3rd orbiter which would be slipped by about a year) and increase overall cost and schedule risks. Would result in FY 1977 program outlay reductions of only \$104 million for shuttle. Other considerations include:
 - has minimal impact on 1976 employment levels (some reductions in planned increases would result).
 - incurs cost penalties of \$70-80 million in FY 1977 dollars (or about \$150 million if out-year inflation is considered). About 1/3 as large as the penalty for alternative 3.
 - is favorable in terms of overall program "balance" (highest priority new NASA initiatives would go forward).
 - does not meet overall NASA outlay reduction target (short-fall of about \$120 M in overall NASA outlay reduction target of \$305 M).

NASA Recommendation:

- NASA would clearly favor alternative 1 (the initial NASA ceiling request). The agency has argued that it should be exempted from any outlay reductions below its initial ceiling because of overall restraints on the NASA program in prior years, and the heavy financial pressures now being exerted on NASA by the shuttle program.
- Alternative 3 represents NASA's solution to the FY 1977 outlay cutback ceiling. If the agency is required to reduce total agency outlays by \$305 million (below the initial ceiling), NASA would clearly prefer that the brunt of the reductions should fall on the Space Shuttle rather than on other NASA space and aeronautics programs in order to retain some program balance.

OMB Recommendation:

- OMB would recommend alternative 4 unless a decision is made to cancel the Space Shuttle program and to redirect fundamentally the overall U.S. space program, even though it requires an add-back of \$120 million to NASA's outlay reduction target of \$305 million. We accept the basic NASA position that the Space Shuttle program should not be spared from reduction at the expense of other ongoing and proposed high-priority new projects in aeronautics, space science, and space applications. At the same time, recognition should be given to the overall tightness of NASA's budget, and to the reductions in prior years which have affected NASA's ability to absorb further cuts. We also believe that it is desirable to minimize the out-year cost increases that would result from a major schedule slippage in the shuttle program.
- Although NASA would no doubt prefer alternative 1 (the initial request) over alternative 3 (the NASA cutback solution), we expect that the agency might be willing to settle for OMB's proposed compromise solution (alternative 4).