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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

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NOVEMBER 26, 1980

To the Cognizant Congressional
Committees and Subcommittees:

Subject: Need for the National Aeronautics and
Space Administration to Provide the
Congress More Complete Cost Information
on its Projects (PSAD-81-7)

This report discusses our observations on the need for the National Aeronautics and Space Administration (NASA) to provide the Congress more complete cost information in its annual budget justification documents. Our observations arose during a study we made of NASA's cost estimating process.

As you know, NASA has underestimated the costs for some of its major projects--for example, the space shuttle and the Landsat-D project. As a result, NASA has had to request supplemental appropriations to continue the development of the space shuttle program and is anticipating a cost overrun of about \$100 million in the Landsat-D project. Consequently, we made this study to determine if there were weaknesses in NASA's cost estimating process which, if corrected, would result in more accurate and reliable estimates.

Our study was limited to three projects at two NASA centers--the Space Telescope and the High Energy Astronomy Observatory at the Marshall Space Flight Center, Huntsville, Alabama, and the Dynamics Explorer at the Goddard Space Flight Center, Greenbelt, Maryland. We did not include either the space shuttle or the Landsat-D project in our study because NASA was conducting its own cost study of those two projects.

For the three projects included in our study, we found no major problems regarding those costs which NASA included in its project estimates. However, as discussed on page 2, NASA does not include certain major categories of costs in its estimates. Also, as we have reported in the past, the

(952254)

practice is consistent with NASA's longstanding policy of excluding these costs because, in its view, these costs are relatively fixed and are not sensitive to the impact that any one project will have on the NASA budget. We believe that civil service salaries have a definite impact on the NASA budget, and excluding them from the cost estimates is misleading as to the total cost of a project. The following example, using the Dynamics Explorer (DE) project, is a good illustration of how the treatment of civil service salaries can affect a project cost estimate.

The DE project consists of 2 spacecraft carrying 15 instruments that will investigate the interactive processes coupling the hot, connecting plasmas of the magnetosphere and the colder, denser plasmas and gases in the Earth's ionosphere, upper atmosphere, and plasmasphere. It is basically a scaled-down version of an earlier planned project titled the Electrodynamics Explorer (EE) which was estimated to cost about \$60 million. A cost review of the EE project by NASA Headquarters concluded that the cost of the proposed EE was too high for the budget of the overall Explorer program. Accordingly, NASA Headquarters advised Goddard Space Flight Center that it would reconsider the project if the Center could restructure the project within a cost goal of \$45 million.

Subsequently, the Center restructured the program to meet the \$45 million cost goal by, among other things, deciding to use civil service staff rather than contractor staff. This increase in the use of in-house personnel committed to the project amounted to about \$3 million, which was not included in the revised cost estimate. Upon submission of the revised estimate, Headquarters agreed to use civil service personnel as a means of staying within the \$45 million cost goal.

Although the cost estimates provided to the Congress do not include civil service salaries, the internal estimates used by NASA management do include civil service requirements, albeit in terms of staff requirements as opposed to dollar costs. For example, the project plans (the basic documents supporting project approval) as well as the Center's monthly status reports to NASA management include civil service requirements.

In discussing its review of NASA's fiscal year 1979 budget request, the Office of Management and Budget (OMB) suggested to NASA that future decision packages for the

Explorer Development

	1979	1980		1981
	<u>actual</u>	<u>Budget estimate</u>	<u>Current estimate</u>	<u>budget estimate</u>
----- (thousands) -----				
DE	\$11,022	\$11,100	\$11,900	\$12,600
All other explorers	<u>20,266</u>	<u>19,300</u>	<u>20,400</u>	<u>20,400</u>
Total	<u>\$31,288</u>	<u>\$30,400</u>	<u>\$32,300</u>	<u>\$33,000</u>
Mission operations and data analysis	\$12,350	\$13,000	\$13,707	\$14,783
Expendable launch vehicle program	8,600	-	800	-
Space transportation system operations	-	3,700	1,900	4,200

In addition to the project funding data, the narrative portion of the budget justification discusses the (1) objectives and status of the project/program, (2) changes in the current year estimate, and (3) basis for the budget year estimates. With few exceptions (notably the Gamma Ray Observatory Program and the National Oceanic Satellite System in the fiscal year 1981 budget request), a project's total development cost is not shown.

We believe that the Congress should be routinely provided the total estimated development cost for all projects for which funds are being requested. In fact, NASA does provide this information for selected projects for which it prepares semiannual project status reports (PSRs). In terms of project costs, PSRs compare the planning estimate or development estimate, if available, with the current cost estimate and provide a variance analysis between the two estimates. This information has made PSRs a very useful tool to the congressional committees, and they could continue to use PSRs in conjunction with the information in the budget justification when reviewing NASA's programs.

However, at present PSRs are prepared for only seven NASA projects, leaving at least that many other projects for which none are prepared. While we are not suggesting that PSRs be prepared for all projects, we believe that NASA's budget justification for those projects for which no PSRs are

The information in the previous table is readily available within NASA and, in our opinion, could be compiled with minimal effort for inclusion in NASA's budget justification documents.

In addition to including the foregoing information in the budget justification, we believe it would be useful to the committees if NASA expanded its budget presentation to show (1) total funds used on a project up to the current year and (2) projected funding through completion of a project. This information could be arrayed, as illustrated in enclosure I, using a hypothetical project and fiscal year 1981 as the budget year.

This information coupled with the explanatory notes that would be included in the cost history table (see p. 6) would give the Congress a complete picture of significant changes in the estimated cost of a project, the total funds spent to date, and the projected funding requirements. Providing this information to the Congress will not overly burden NASA because this same information is currently provided to OMB for analysis and formulation of the President's annual budget.

CONCLUSIONS AND RECOMMENDATIONS

The project cost estimates that NASA provides the Congress should include the civil service salaries directly associated with a project. Also, there is cost information readily available within NASA which, if it were included in its budget justification documents, would give the Congress better information on total project costs and a more complete explanation of changes in a project's estimated cost. This information will highlight any real or potential major problems and provide a basis for the Congress to request more detailed information from NASA either through testimony or less formal means.

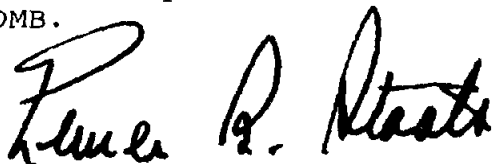
Accordingly, we recommend that your committee or subcommittee, in conjunction with the other congressional committees with responsibility for NASA programs, require NASA to include in its cost estimates the cost associated with the direct civil service personnel requirements.

We also recommend that you require NASA to include the following in its budget justification documents.

- For those projects for which no PSR is prepared, a project cost history that includes all project-related costs and a comparison of each project's

- Subcommittee on Science, Technology and Space, Committee on Commerce, Science and Transportation, United States Senate.
- Committee on Governmental Affairs, United States Senate.
- Committee on the Budget, United States Senate.
- Subcommittee on HUD-Independent Agencies, Committee on Appropriations, House of Representatives.
- Subcommittee on Space Science and Applications, Committee on Science and Technology, House of Representatives.
- Subcommittee on Government Activities and Transportation, Committee on Government Operations, House of Representatives.
- Committee on the Budget, House of Representatives.

Also, we are sending copies of this report to the Administrator, NASA, and the Director, OMB.



Comptroller General
of the United States

Enclosures - 2

HYPOTHETICAL ILLUSTRATION OF HOW TOTAL PROJECT FUNDING
COULD BE ARRAYED IN NASA'S ANNUAL BUDGET REQUEST

<u>Project</u>	<u>FY 1978</u> <u>and</u> <u>prior</u>	<u>1979</u> <u>actual</u>	<u>1980</u>		<u>1981</u> <u>budget</u> <u>estimate</u>	<u>FY</u> <u>1982</u>	<u>FY</u> <u>1983</u>	<u>FY</u> <u>1984</u>	<u>Cost</u> <u>to</u> <u>complete</u>	<u>Estimated</u> <u>total</u> <u>cost</u>
			<u>Budget</u> <u>estimate</u>	<u>Current</u> <u>estimate</u>						
----- (millions in real-year dollars) -----										
Project X	\$35	\$50	\$90	\$100	\$115	\$125	\$135	\$130	\$310	\$1,000

National Aeronautics and Space Administration

COMMENTS ON
GAO DRAFT REPORT:
NEED FOR THE NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION TO PROVIDE THE CONGRESS
MORE COMPLETE COST INFORMATION ON ITS PROJECTS
(CODE 952254)

GAO undertook this study "to determine if there were weaknesses in NASA's cost estimating process . . .". The GAO comment was that "For the three projects included in our study, we found no major problems . . .". However, GAO is using this report to recommend, once again, their position that NASA should provide, routinely, more detailed data to the Congress. The report basically makes three recommendations:

- (1) Require NASA to include civil service personnel costs when estimating total direct project costs.
- (2) Require NASA to provide for all projects without Project Status Reports (PSR) a cost history comparing the original cost estimate with current estimates encompassing all project-related costs.
- (3) Require NASA to change the budget justification format to include estimates of all direct and "related" funds, by year, for the life of the project.

The GAO has on several occasions since 1975 recommended that NASA include civil service personnel costs in presenting estimated total direct project costs. Our position remains the same. These costs are relatively fixed and are not directly affected by excluding or including any one project. The direct association of these estimates with the project would tend to distort the effect of the project on the budget.

NASA provides project cost information to the Congress in the form of Project Status Reports similar to the Department of Defense Selected Acquisition Reports. The criteria used in preparing these reports have been agreed to by the requesting Congressional Committee. NASA also regularly provides cost estimates for the GAO-published report on major systems acquisitions. In addition, the agency has always responded to individual Congressional requests for information and will continue to respond to those requests promptly.

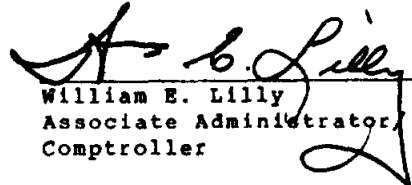
The recommendation on the NASA budget justification books comes as a complete surprise, as the GAO representatives never discussed with NASA officials or questioned the formulation of this presentation.¹/We believe that the format of these justifications should be considered as part of the total justification process and that GAO should not make

¹/[See GAO note, p. 4.]

recommendations based only on a simple inspection of the budget books. The format that NASA utilizes in presenting its budget justification to the various Congressional committees has been determined as appropriate and satisfactory by all interested parties. We, of course, would consider altering our present justification format if requested to do so by our Congressional committees.

8-29-80

Date


William E. Lilly
Associate Administrator,
Comptroller

GAO note: Our study which led to this report consisted of analyzing NASA's cost-estimating process from the time an estimate was prepared for a proposed project, through in-house approval, and finally through submission of the project to the Congress for approval via the budget justification documents. Our recommendations for revising the budget justification format were developed during our review of the budget documents for the projects included in our study. These recommendations were discussed with NASA officials at the end of our study before we sent our draft report to NASA for its written comments.



National Aeronautics and
Space Administration
Washington D.C.
20546

AUG 29 1980

Report Attached L

Mr. W. H. Sheley Jr.
Acting Director
Procurement and Systems Acquisition
Division
U.S. General Accounting Office
441 G Street, NW
Washington, DC 20548

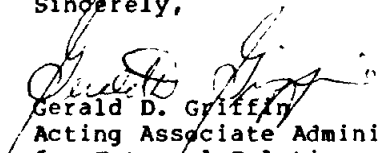
Dear Mr. Sheley:

Thank you for the opportunity to review GAO's draft report entitled, "Need for the National Aeronautics and Space Administration to Provide the Congress More Complete Cost Information on its Projects," which was forwarded with your letter dated July 29, 1980. As you know, the report evolved from your survey of NASA's cost estimating process (Code 952254).

We were pleased that GAO found no major problems with respect to costs included in our project estimates. However, we are concerned that the report goes beyond our cost estimating process and addresses issues that have been raised by your office in the past. As we have stated previously, in regard to the need to provide more information to the Congress, NASA has and will continue to respond to Congressional requests for information. Our detailed comments on your draft report are presented in the enclosure.

If we can be of further assistance, please let me know.

Sincerely,



Gerald D. Griffin
Acting Associate Administrator
for External Relations

Enclosure

planning or development estimate with the current estimate and an explanation of the differences between the two estimates.

--An expanded format to show the total funds used on a project as well as projected funding requirements through completion of a project.

AGENCY COMMENTS AND OUR EVALUATION

NASA disagreed with our recommendation that it be required to include direct civil service costs in its project estimates. In commenting on our draft report (see enc. II), NASA stated that it was concerned that this report again addresses this issue because we have made this recommendation in the past. NASA restated its position that the civil service costs are relatively fixed and are not directly affected by excluding or including any one project.

We continue to believe that these costs should be included in individual project cost estimates. While it may be true that NASA's total civil service costs are relatively fixed, to the extent that these costs are not included in project cost estimates, the estimates do not disclose a project's true cost. Regarding NASA's concern that we are again raising this issue, we believe our recommendation is appropriate because our office and NASA have reached an impasse in resolving it. Consequently, resolution of this issue can only be achieved through the actions of the Congress.

Our other recommendations were that NASA be required to include in its budget justification documents (1) a project cost history and (2) an expanded format to show the total funds used on a project as well as projected funding requirements through completion of a project. NASA stated that it would consider altering its justification format if requested to do so by the congressional committees which oversee NASA programs. For this reason, we are directing these recommendations to the cognizant congressional committees and subcommittees.

We are sending this report today to the Chairmen of each of the following committees and subcommittees:

--Subcommittee on HUD-Independent Agencies, Committee on Appropriations, United States Senate.

prepared should contain cost information similar to that contained in PSRs. The DE project--a project for which no PSR is prepared--can be used to illustrate how this additional cost information would give a more complete picture of a project's cost history.

The DE cost estimate has increased from the 1977-approved estimate of \$45.6 million to an estimated \$52.3 million--exclusive of tracking and data analysis, launch vehicle costs, and civil service salaries. There is no detailed explanation in NASA's budget justification clearly showing the reasons for this cost increase. We believe a much more realistic and accurate picture of the project would be shown if the information contained in the following table was included in NASA's budget justification.

DE Cost History

	Development estimate (1977)	Current estimate (1980)	<u>Variance</u>
------(millions)-----			
Project cost	\$45.6	\$52.3	\$6.7
Tracking and data analysis	2.8	3.5	.7
Launch vehicle (Delta)	9.2	8.5	-.7
Civil service costs (direct manpower)	16.9	19.5	2.6
Facilities construction	-	-	-
Total	<u>\$74.5</u>	<u>\$83.8</u>	<u>\$9.3</u>

Explanation of differences between
development and current estimated
project cost

The delay of fiscal years 1979 and 1980 funding to help solve problems in the Infrared Astronomical Satellite caused (1) a schedule slip of 5 months and a resultant increase of \$3 million in the project cost and (2) a 34-staff year increase in civil service direct manpower. The additional \$3.7 million is due to a 3-month delay in project approval (\$.7 million) and an increase in inflation (\$3 million) over what was originally anticipated.

zero-based budgeting process would be significantly improved if direct staffing requirements were identified for each program or project. However, our discussions with OMB officials indicated that NASA chose not to accept this suggestion. We recognize that the decision packages are used by OMB to develop the President's budget and not to prepare NASA's budget justifications to the Congress. However, we believe that just as OMB would find this information useful in preparing the President's budget, so too would the congressional committees as they review NASA's annual budget request.

NASA'S BUDGET JUSTIFICATION
COULD PROVIDE MORE INFORMATION
ON TOTAL PROJECT COSTS

Generally, the Congress does not routinely receive information on the total project cost, or changes in the cost, for all NASA projects. We recognize that NASA is willing to make these costs available to any Member of Congress on a request basis, but we believe that this information should be routinely included in NASA's annual budget justification so the Congress will have a better picture of the cost of individual projects.

NASA's budget justification shows the project funding requirements for only the immediate prior year, the current year, and the budget year. Funding requirements for mission operations and data analysis and launch vehicle costs are shown as nonadd items. These two cost elements are authorized and appropriated under other budget line items and are shown with the project funding for information only. The NASA format is illustrated by its fiscal year 1981 budget request for the DE project (see p. 5), which is one of several projects in the Explorer Development Program.

justification that NASA provides the Congress in support of its projects still does not identify the total NASA resources which will be required for the projects. Specifically:

- Civil service salaries of personnel directly assigned to the projects were not included in the cost estimates for any of the three projects included in our study.
- The budget justifications do not normally provide and compare a project's planning or development estimate with the current cost estimate.
- The budget justifications show only the funding requirements for the budget year and the current and immediate prior year with no data showing funds used in other prior years or estimates of funding requirements through the completion of a project.

In our past reports we have discussed the need to include civil service salaries in NASA's cost estimates. 1/ While NASA disagrees with our position, we continue to believe that these costs should be consistently included in project cost estimates. The additional cost information that this report suggests be included in NASA budget justification documents will enable the Congress to make more informed decisions regarding these projects. This is particularly important in today's environment of striving for a balanced budget.

This report recommends some actions that your committee or subcommittee should require of NASA to insure that you receive complete cost information on NASA's projects. At our request, NASA provided written comments on our draft report. Those comments are discussed on page 8 and are included in their entirety as enclosure II to this report. Details of our study follow.

EXCLUSION OF CIVIL SERVICE SALARIES

NASA did not include the cost of civil service salaries for any of the three projects included in our survey. This

1/"NASA Should Provide the Congress Complete Cost Information on the Space Telescope Program" (PSAD-80-15), "NASA Should Provide the Congress More Information on the Pioneer Venus Project" (PSAD-77-65), and "Improved Reporting Needed on NASA Projects" (PSAD-77-54).