

GAO

Report to the Chairman, Subcommittee  
on National Security, International  
Affairs, and Criminal Justice, Committee  
on Government Reform and Oversight,  
House of Representatives

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September 1996

# NASA INFRASTRUCTURE

## Challenges to Achieving Reductions and Efficiencies



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United States  
General Accounting Office  
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National Security and  
International Affairs Division

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September 9, 1996

The Honorable William H. Zeff, Jr.  
Chairman, Subcommittee on National Security,  
International Affairs, and Criminal Justice  
Committee on Government Reform and Oversight  
House of Representatives

Dear Mr. Chairman:

The National Aeronautics and Space Administration (NASA) is facing the difficult task of fulfilling its mission with significantly fewer dollars. NASA's present strategy for absorbing its most recent funding reductions through fiscal year 2000 focuses on cutting infrastructure.<sup>1</sup> If NASA fails to find and implement sufficient infrastructure cost-reduction opportunities, meeting its budget targets through fiscal year 2000 will require program adjustments—stretching out, reducing the scope, or terminating existing efforts and/or postponing new initiatives. At your request, we reviewed the status of NASA's efforts to achieve reductions and efficiencies in key areas of its infrastructure, principally facilities,<sup>2</sup> and the challenges it faces.

## Background

In the early 1990s, NASA was planning an infrastructure to support a projected annual budget of more than \$20 billion and a civil service workforce of about 25,000 by the turn of the century. However, over the last several years, NASA has been directed by the Administration to reduce its future years' budget levels. In the fiscal year 1994 budget request, NASA's total funding for fiscal years 1994 through 2000 was reduced by 18 percent, or \$22 billion. In the fiscal year 1995 budget request, total funding was reduced again by almost \$13 billion, or an additional 13 percent. To absorb these major reductions, NASA focused on adjusting programs. For example, the Space Station program was restructured and given an annual budget ceiling of \$2.1 billion. Similarly, the scope of the Earth Observing System program was reduced, and the program is being restructured once again. Also, funding was terminated for the Space Exploration Initiative, the National Launch System, and the National Aerospace Plane, and the Comet Rendezvous and Asteroid Flyby project was canceled.

<sup>1</sup>NASA's infrastructure—the underlying foundation for agency operations—includes people, facilities, equipment, business processes, and information systems.

<sup>2</sup>NASA defines facilities as land, buildings, structures, permanently located trailers, and other real property improvements, including utility systems and collateral equipment that is essentially integrated into the facility.

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As part of the executive branch's development of NASA's \$14.2-billion budget request for fiscal year 1996, NASA was directed once again to lower its projected budget through fiscal year 2000, this time by an additional 5 percent, or \$4.6 billion. Rather than terminating or delaying core science, aeronautics, or exploration programs, NASA announced it would absorb this funding decrease by reducing infrastructure, including closing and consolidating facilities. NASA also said it would reduce its use of support contractors and decrease the size of its workforce to about 17,500 by the turn of the century—the lowest level since the early 1960s.

While NASA's actual and planned budgets and staffing levels have decreased sharply, the value of its facilities infrastructure has actually increased. From fiscal years 1990 through 1995, the current replacement value<sup>3</sup> of NASA's facilities increased by about 14 percent, not including inflation. At the end of fiscal year 1995, the agency's facilities had an estimated current replacement value of \$17 billion. The agency owned or leased about 3,000 buildings on nearly 130,000 acres of land at 71 locations. NASA's facilities range in size from small buildings to large industrial plants. Appendix I provides information about facilities at NASA's 10 field centers.

As part of its infrastructure reduction efforts, NASA is also looking at ways to cut the cost of its field center support activities. Each NASA field center operates a wide range of such activities, with some support-unique missions at particular centers. Common activities include building maintenance, fire protection, security, printing, and medical services. NASA provides these services primarily through a combination of civil service employees, contractor labor, and arrangements with the Department of Defense (DOD) where facilities are collocated.

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## Results in Brief

NASA's current facility closure and consolidation plans will not fully achieve the agency's goal of decreasing the current replacement value of its facilities by about 25 percent (about \$4 billion in 1994 dollars) by the end of fiscal year 2000. More importantly, these plans will not result in substantial cost reductions by that date. Also, although NASA is about half way to its goal of lowering the number of its full-time equivalent<sup>4</sup>

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<sup>3</sup>The current replacement value is the acquisition cost of facilities, excluding land, plus the cost of collateral equipment and incremental book value changes escalated to the current year using a 20-city average cost index for buildings.

<sup>4</sup>According to Office of Management and Budget guidance, full-time equivalent generally includes 260 compensable days, or 2,080 hours, excluding overtime and holiday hours.

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employees to 17,500 by fiscal year 2000, it faces major uncertainties in achieving additional workforce reductions. NASA has also had problems in evaluating some cost-reduction opportunities; environmental cleanup costs could affect future facility disposition efforts; and its efforts to share facilities with DOD have progressed slowly.

NASA faces barriers to accomplishing additional consolidations and closures that, to date, it has not been able to overcome on its own. Closing facilities, relocating activities, and consolidating operations in fewer locations with fewer employees have been slowed by parochial concerns about the effects of such actions on missions, personnel, and local communities. These concerns have been exacerbated by perceptions of the lack of fairness and impartiality in the decision-making process. In the face of these concerns, NASA must still reduce its infrastructure further.

Ultimately, if further progress in identifying and implementing infrastructure reductions is limited, a process that uses an external independent group similar to the Defense Base Closure and Realignment Commission may be needed. To help determine the need for an independent group to facilitate closures and consolidations of NASA facilities, Congress may wish to consider requiring NASA to submit a plan outlining how it intends to meet its reduction goals.

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## Planned Facilities Reductions Will Not Achieve Large Cost Reductions

NASA's current facility closure and consolidation plans will not fully achieve the agency's goal of decreasing the current replacement value of its facilities by about 25 percent (about \$4 billion in 1994 dollars) by the end of fiscal year 2000. More importantly, these plans will not result in substantial cost reductions by that date.

By the end of fiscal year 1997, NASA plans to have closed or converted facilities to cost-reimbursable status that have a current replacement value of \$1.9 billion. Also, as of March 1996, planned reductions through fiscal year 2000 were \$2.8 billion, or about 30 percent below NASA's goal of reducing the current replacement value of its facilities by about \$4 billion in 1994 dollars.<sup>5</sup> Agency officials noted that the \$4-billion reduction goal was a "stretch," or aggressive goal, which they were never certain could be achieved.

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<sup>5</sup>Assuming all planned reductions occur, at the end of fiscal year 2000, NASA's facilities will have a current replacement value of \$15.3 billion in fiscal year 2000 dollars.

Additional reductions are unlikely in research and development facilities, but there may be opportunities for further reductions in office space, according to NASA officials. NASA classifies building space based on its primary use, such as office space. NASA was providing general purpose office space for about 53,000 civil service and contractor personnel at the end of fiscal year 1995. Agencywide, the average square feet of office space available per person, including substandard space, exceeded NASA's standard<sup>6</sup> by nearly 43 percent and the ceiling by over 25 percent. When substandard space is not included, this average exceeded the standard by over 27 percent and the ceiling by 12 percent.<sup>7</sup> Future reductions in the number of on-site contractor personnel and NASA employees (almost 4,000) by fiscal year 2000 will make even more office space available.

NASA estimates that the planned \$2.8-billion reduction in the current replacement value of facilities will yield only about \$250 million in cost reductions through fiscal year 2000. Although some of these cost reductions are from lowering facilities' operations and maintenance costs, most result from four centers<sup>8</sup> bringing contractor personnel from off-site leased space onto the centers to fill space left vacant because of reductions in NASA personnel and support contractors. Moreover, some cost reductions may be offset by increased costs in future years. For example, according to a NASA official, about three-quarters of NASA facilities are 30 or more years old and keeping these facilities operational may lead to higher operations and modernization costs.

## Problems in Evaluating Cost-Reduction Opportunities

NASA has had problems in identifying, assessing, or implementing some cost-reduction opportunities. NASA personnel (1) did not thoroughly evaluate potential larger cost-reduction options, (2) limited the scope of consideration for consolidation, (3) performed questionable initial cost-reduction studies, (4) made inappropriate closure recommendations, and (5) substantially overstated cost-reduction estimates. Some of these problems resulted when NASA acted quickly in an attempt to achieve near-term cost reductions. NASA officials said that some cost-reduction

<sup>6</sup>NASA's allowance standard for office space is an average of 110 net square feet per person, and an average of 125 net square feet per person is the ceiling, which NASA calls the "satisfactory liberal limit."

<sup>7</sup>As of September 30, 1995, the agencywide average office density was about 157 net square feet per person, including substandard space, or 140 net square feet per person, excluding substandard space. A NASA official told us that these office space averages include space that was not intended to be used as offices, such as industrial plants and test sites.

<sup>8</sup>Goddard Space Flight Center, Johnson Space Center, Kennedy Space Center, and the Jet Propulsion Laboratory.

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estimates were “interim” estimates because NASA was pressured into prematurely providing what turned out to be imprecise savings estimates to Congress. Also, some NASA staff lacked experience in developing estimates, according to NASA officials.

Although there were problems with some evaluations, which are discussed below, others appear to have been done better. For example, the Office of Space Flight reviewed in detail a proposed consolidation of automated data processing functions at a single location before developing a plan that offered several options.

Concerns about closing facilities, relocating activities, and consolidating operations have sometimes been exacerbated by perceptions of the lack of fairness and impartiality in the decision-making process. In the past, we have expressed concerns about NASA’s ability to accurately and independently develop cost estimates to support its decisions on new and ongoing programs and projects.<sup>9</sup> Just recently, the NASA Inspector General<sup>10</sup> and NASA management have been discussing the structure required to meet NASA’s continuing need for independent, impartial, and technically credible systems analysis and program evaluation.

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### Cost-Reduction Options for Telecommunications Networks Not Thoroughly Evaluated

NASA did not thoroughly evaluate potential larger cost-reduction options for consolidating wide area telecommunications networks. NASA has five such networks operating or being developed, and they provide a variety of communications services among headquarters, field centers, major contractors, affiliated academic institutions, and international partners. Due to advances in technology, NASA no longer needs to operate multiple telecommunications networks, and consolidating network operations at a single site offers economies of scale, as well as reduced administrative overhead.

Last year, NASA’s Zero Base Review<sup>11</sup> team recommended that the field centers compete to determine which one could consolidate the five wide

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<sup>9</sup>Space Programs: NASA’s Independent Cost Estimating Capability Needs Improvement (GAO/NSIAD-93-73, Nov. 5, 1992).

<sup>10</sup>Assessment of the Relocation of NASA Independent Program Evaluation and Assessment Activities to Langley Research Center, NASA Office of Inspector General, Inspections and Assessments (July 8, 1996).

<sup>11</sup>The Zero Base Review was an agencywide budgetary and management study. Its primary purpose was to identify ways for NASA to reduce its infrastructure through fiscal year 2000 in order to meet the budget target established in the agency’s fiscal year 1996 budget request. (See app. II for a brief description of the Zero Base Review and other studies related to NASA facilities done since 1990.)

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area networks most cost-effectively. Goddard Space Flight Center, Ames Research Center, and Marshall Space Flight Center prepared consolidation proposals. NASA's Office of Space Communications, which oversees the two largest networks, decided against a competition and did not formally consider the proposals offered by Goddard and Ames. Instead, with the objective of obtaining some budget cost reductions in 1997, it endorsed the Marshall proposal without determining which of the three proposals was the most cost-effective. However, Marshall's proposal did not project cost reductions in the near term as aggressively as the others. For example, Goddard's proposal estimated potential cost reductions over the next 6 years totaling \$94.5 million more than the reductions in the Marshall proposal.

Earlier this year, we recommended<sup>12</sup> that NASA conduct an objective review of network consolidation to determine whether its chosen approach should be modified to achieve greater cost reductions. NASA agreed with this recommendation and arranged for an independent group to conduct the review. It indicated the agency's telecommunications experts were not participating in the review because they would have a "biased" perspective. The independent review is scheduled to be completed this month.

NASA's initial network consolidation efforts were hampered by the lack of clear direction within NASA to include all five wide area networks in the consolidation effort. The Office of Space Communications, which directed the consolidation effort at Marshall, does not have authority over three of the five networks. The agencywide telecommunications network consolidation or streamlining efforts did not have a strong central advocate. NASA's Chief Information Officer, who would be a logical choice to fill this role, was not directly involved in this effort.<sup>13</sup>

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## Initial Limitations in Scope of Consideration for Supercomputer Consolidation

NASA initially excluded almost 40 percent of its supercomputer systems, which were used mostly for research and development, from the scope of a supercomputer consolidation study. The agency uses supercomputers to support some space mission operations and a variety of research projects, including developing new supercomputer technologies.

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<sup>12</sup>Telecommunications Network: NASA Could Better Manage Its Planned Consolidation (GAO/AIMD-96-33, Apr. 9, 1996).

<sup>13</sup>We reported on the effectiveness of NASA's initiatives to implement a chief information officer position in NASA Chief Information Officer: Opportunities to Strengthen Information Resources Management (GAO/AIMD-96-78, Aug. 15, 1996).



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In March 1995, NASA began studying ways to cut its supercomputer costs by consolidating their management and operation. However, its initial studies considered only some of the agency's supercomputers and focused on nonresearch and development supercomputing systems. Although NASA's consolidation study team had identified 29 supercomputers, NASA management excluded 12 existing machines and some planned for future procurement from consideration because (1) some are being managed under existing contracts that could be affected by a consolidation decision and (2) others were used in research programs primarily to develop new supercomputer technologies.

We spoke with NASA program, field center, and supercomputer consolidation study officials about the reasons for, and appropriateness of, limiting the scope of NASA's consolidation study. During a series of discussions, NASA officials acknowledged our concerns about the study's limitations and expanded its scope to a phased approach that will eventually consider all of the agency's supercomputers. In commenting on a draft of this report, NASA said the review will be based on a top-down plan for agencywide management of supercomputing operations and will design an optimal supercomputer architecture as a basis for determining future directions in this area.

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### Questionable Initial Studies of Aircraft Consolidation Options

Questions about initial studies have delayed the decision-making process in NASA's attempts to consolidate aircraft. Last year, the transfer of research and operational support aircraft from five NASA centers to the Dryden Flight Research Center was proposed. NASA headquarters tasked Dryden, the center that would gain from the consolidation, with planning and performing an aircraft consolidation study. In a recent report,<sup>14</sup> the NASA Inspector General noted the Dryden study had estimated NASA could save \$12.6 million annually by consolidating aircraft at Dryden. However, internal and external questions about the scope and quality of this study have slowed the decision-making process. Subsequent reviews of the costs and benefits of aircraft consolidation by both NASA management and the NASA Inspector General staff have resulted in much lower annual savings estimates.

In light of the controversy that potentially accompanies any significant decision to consolidate, relocate, or close facilities, NASA would benefit from ensuring an adequate balance of expertise and interests for study teams, developing initial analyses that are objective and well-supported,

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<sup>14</sup>Aircraft Consolidation at the Dryden Flight Research Center (HA-96-007, Aug. 12, 1996).

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and fairly and thoroughly considering reasonable alternatives before making decisions. In this way, NASA can develop defensible decisions that will withstand external scrutiny and can be implemented in a timely manner.

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**Inappropriate  
Recommendations to  
Close Plum Brook Station**

Plum Brook Station<sup>15</sup> was inappropriately recommended for possible closure twice. In February 1995, the NASA Federal Laboratory Review recommended reviewing the station for possible closure because it was being operated primarily for non-NASA users.<sup>16</sup> At about the same time, NASA's White Paper, formally titled A Budget Reduction Strategy, suggested that Plum Brook should be closed. NASA officials could not provide the rationale for the proposed action. The Laboratory Review report did acknowledge a problem concerning the existence of an inactive nuclear reactor at the station, and the Zero Base Review subsequently recommended retaining Plum Brook on a fully reimbursable basis because of the reactor.

Plum Brook operates on a cost-reimbursable basis, with most of its operating cost covered by revenue from users of four test facilities at the station. Even if all four of the test facilities were closed, the operating cost would still be about \$2 million, primarily because the Nuclear Regulatory Commission requires that the reactor be maintained in its current state. The only way to close the location and dispose of the property would be to dismantle the reactor. However, the cost for doing this would be prohibitively expensive—about \$100 million in 1997 dollars, according to a 1990 estimate. In addition, there are no disposal sites to accommodate the radioactive waste that would be generated by the dismantling process.

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**Overstated Cost  
Reductions for Some  
Options**

In some cases, NASA's initial estimates of cost reductions were overstated. For example, the Zero Base Review estimated that \$500 million or more could be saved through 2000 by commercializing the Tracking and Data Relay Satellite System. However, NASA later determined this approach could not be implemented and that none of the projected savings would

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<sup>15</sup>Plum Brook is a field station of the Lewis Research Center, and it is located about 50 miles west of Lewis, near Sandusky, Ohio. It encompasses 6,400 acres and employs 12 civil servants and 100 contractor personnel. Its primary mission is to provide risk reduction and system development testing on space-bound hardware for a variety of customers.

<sup>16</sup>Between fiscal years 1988 and 1995, the station's customers paid \$32.9 million. NASA was the biggest customer, with 34 percent of the business. Other users included the National Aerospace Plane, 18 percent; Department of Energy, 15 percent; Air Force, 13 percent; European Space Agency, 9 percent; Martin Marietta Aerospace, the Defense Nuclear Agency, ILC Dover Company, and NASA's Jet Propulsion Laboratory, 3 percent each; and General Dynamics, Space Systems Division, 1 percent.

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materialize in the time frame targeted by the Zero Base Review. Also, the Zero Base Review claimed that consolidation of telecommunications networks would save between \$350 million and \$375 million. Subsequently, NASA officials acknowledged these cost reductions would not only be significantly lower, but the lower savings estimates had already been considered in the preparation of the networks' future budget estimates.

The estimated savings noted above were part of the total savings estimate that provided the basis for NASA's claim that the fiscal year 1996 out-year budget reductions could be covered by infrastructure decreases. To the extent the estimates were overstated, additional pressure was placed on NASA program and field center officials to find efficiencies to supplant the overstated savings. For example, after NASA determined that commercializing the Tracking and Data Relay Satellite System would not reduce costs, it began aggressively negotiating a fixed-price contract for the purchase of three additional satellites needed for the system. However, NASA estimates that the fixed-price contract produced considerably less savings than the commercializing of the system.

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## Environmental Cleanup Costs Could Affect Facility Disposition Efforts

NASA's future facility disposition decisions could be affected by environmental cleanup costs. Therefore, information about the extent and type of contamination, the cost of its cleanup, and the party who is financially responsible are relevant to such decisions. However, NASA officials do not yet fully know what the cleanup requirements will be and lack a policy for identifying other responsible parties and sharing cleanup costs.

Currently, NASA officials are still working to identify all the challenges they face as a result of environmental contamination. NASA's 1996 site inventory identified over 900 potentially contaminated sites, about half of which may require cleanup. At this time, according to NASA records, only 72 sites are classified as closed and, of these, only 15 required cleanup. Most sites are still in the early stages of the cleanup process, with almost 400 still being studied to determine the type and extent of contamination.<sup>17</sup>

NASA headquarters used selected portions of a DOD model to develop a preliminary cost estimate of \$1.5 billion for cleaning up potentially contaminated sites over a 20-year period. Subsequently, NASA's field

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<sup>17</sup>NASA officials at some of the NASA field centers we reviewed said they may not finish assessing the type and extent of contamination until 1998 or 1999.

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centers, in response to our request, developed cost estimates totaling \$636 million.<sup>18</sup> This estimate excludes some sites that have not been studied and is a projection of cleanup cost for only the next 8 years or less. Although NASA field centers have not developed cleanup cost estimates for disposing of property in the future, officials at several centers believed the cost could be as much as two to five times higher than if NASA were to retain the property. The higher cost would occur if NASA cleaned up facilities to meet more stringent standards that might be required for disposal.

Sharing cleanup costs with others could help NASA reduce its environmental cleanup costs. Environmental law holds owners, operators, and other responsible parties liable for correcting past environmental contamination. However, NASA has no policy on pursuing other responsible parties. It currently pays the cleanup costs for virtually all of its centers and other field locations, regardless of who was responsible for causing or contributing to the contamination. Although NASA has identified other responsible federal agencies, it has not generally tried to identify potentially responsible contractors or previous owners and pursue cost-sharing agreements with them.

An ongoing facility reduction effort where cost sharing may be an issue involves land at NASA's Industrial Plant in Downey, California. The city wants to acquire 166 acres of this property: 68 acres NASA has identified as excess to its needs and 98 acres it has identified as potentially excess. The city plans to use the land for economic development projects. An assessment of environmental contamination determined that 16 of the excess acres were free of contamination. Studies of the remaining excess acreage are underway. The eventual disposition of the remaining 98 acres of NASA-owned land is still unclear, and studies of their contamination status are still in the early stages.

Before NASA took over the Downey facility, it was a DOD facility operated by the predecessor organization of the contractor currently operating the facility for NASA. NASA will have to decide which potentially responsible parties it will pursue in supporting any corrective actions that may be needed to meet applicable cleanup standards. However, NASA's Johnson Space Center, which manages the Downey facility, has not yet begun to deal with the potential cost-sharing issue and, as noted above, there is no NASA-wide policy providing guidance on this issue. In commenting on a

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<sup>18</sup>These estimates excluded NASA's potential share of the estimated \$1-billion cleanup costs at locations owned and operated by NASA contractors.

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draft of this report, NASA stated it intends to complete a policy statement by the end of 1996 to address the issue of potential responsible parties at NASA facilities requiring environmental remediation.

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## Efforts to Lower Support Costs Underway, but Little Progress Made in Sharing Facilities With DOD

Among NASA's initiatives to reduce its infrastructure are efforts to lower the field centers' operations support costs. NASA spends over \$1 billion annually to support maintenance and operations at field centers. Among the actions NASA is taking to reduce this cost is consolidating its payroll functions at one center to cut payroll-related civil service and contractor staffing by about 50 percent. It is also implementing a variety of initiatives to share resources and standardize processes at its principal aeronautics centers—Ames, Langley, Lewis, and Dryden. NASA estimates that this effort—known as Project Reliance—will reduce agency costs by about \$36 million by fiscal year 2000.<sup>19</sup>

In June 1995, NASA expanded the scope of its cost-reduction search outside the agency; it teamed with DOD to study how the two agencies could significantly reduce their operations costs and increase mission effectiveness and efficiency through increased cooperation and sharing. Study teams, referred to as integrated product teams,<sup>20</sup> began work in September 1995 in seven areas. We monitored three teams: major facilities, space launch activities, and base/center support and services.

The objectives of the major facilities and space launch activities teams included assessing facilities' utilization and recommending potential consolidations and closures. The major facilities team was responsible for (1) developing recommendations on test and evaluation and research facilities with unnecessary overlap or redundancy and (2) identifying and providing the rationale for consolidations, realignments, and reductions for specific facilities. The space launch activities team focused on increasing cooperation in its area, including range and launch facilities and infrastructure. Neither team recommended specific consolidations or closures or identified cost reductions in their final briefings to the Aeronautics and Astronautics Coordinating Board.<sup>21</sup> Both teams did, however, identify barriers to increased cooperation and coordination

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<sup>19</sup>We did not review the payroll consolidation or the Project Reliance initiatives.

<sup>20</sup>Studies and activities related to NASA's facilities infrastructure, including NASA-DOD integrated product teams, are discussed in appendix II.

<sup>21</sup>The Board is a joint NASA-DOD organization for coordinating aeronautics and space activities of mutual interest to the two agencies, including potential duplication of facilities.

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between NASA and DOD,<sup>22</sup> including differences in cost accounting systems, practices, and standards.

More importantly, NASA and DOD officials noted a more general limitation: the “old paradigm”—that is, each NASA and DOD program protects its ability to maintain its own technical expertise and competence. The over-capacity situation in large rocket test facilities helps to illustrate this. Several years ago, the National Facilities Study concluded that there was excess large rocket test capacity and some facilities could be closed, but DOD and NASA officials involved in the study said no direction or funding was subsequently made available to pursue this recommendation. More recently, the major facilities team found that NASA and DOD each have excess large rocket test capacity based on both current and projected workloads. However, the team made no recommendation to consolidate facilities because comparable facilities’ cost data was not available. The team did recommend that a facility agreement in the area of rocket propulsion testing be established to identify areas where capability reductions and greater reliance between NASA and DOD would be possible in the future.

While the issue of large rocket test capacity remains unresolved, some rocket test facilities are currently undergoing or being considered for modification. A rocket test complex at Edwards Air Force Base is being upgraded by DOD at an estimated cost of \$15 million to \$17 million. In addition, NASA plans to upgrade one of its rocket engine test facilities at Stennis Space Center for about \$45 million. DOD and NASA officials believe that their respective upgrades are cost-effective, although they agreed that the agencies need to improve coordination to prevent further excess capacity. NASA believes that the rocket test facilities at Stennis and Edwards Air Force Base are not comparable. However, the National Facilities Study and the major facilities integrated product team raised the overall excess capacity issue, and it has not yet been resolved. Independent actions by DOD and NASA to upgrade their individual facilities potentially exacerbate the problem of overall excess capacity.

NASA and DOD officials acknowledged that recommending sharing and increasing reliance on each other, including consolidating or closing facilities, was difficult. These officials pointed out that, in many cases,

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<sup>22</sup>Even within DOD, past efforts to share support services have produced limited results. We recently reported that many studies identifying potential cost reductions and efficiencies through interservice cooperation were ignored because of parochial resistance to implementing them. See *Military Bases: Opportunities for Savings in Installation Support Costs Are Being Missed* (GAO/NSIAD-96-108, Apr. 23, 1996).

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such actions are “too politically sensitive” or could result in near-term costs increases, rather than cost reductions. They noted that an external, independent process, similar to the one used by the Defense Base Closure and Realignment Commission, may be needed to overcome the sensitivity and cost issues.

The base/center support and services team, which was responsible for recommending ways to increase cooperation in base/center support and services, examined existing and potential cooperative arrangements at eight NASA centers and one test facility collocated with or geographically near DOD installations. The team reported finding over 500 existing support arrangements and identified additional cooperative opportunities. The team identified changes to activities at several NASA locations, including having NASA’s Dryden Flight Research Center and the Air Force Flight Test Center jointly use space and combine certain operations; constructing one fuel facility for joint use by NASA’s Langley Research Center and Langley Air Force Base; and sharing use of contracts and services.

Although the team expects such changes to lower the agencies’ costs by millions of dollars, it cited specific barriers to accomplishing more. For example, different negotiated wage rates for support service contractors could be a barrier, since consolidations would likely require paying the higher rate, thereby substantially or totally offsetting consolidation cost reductions. In other cases, merging certain activities could complicate existing procurements in small and disadvantaged business set-aside programs. However, the team said that many more sharing arrangements are possible and should be included in follow-on studies. In developing the follow-on process, this team recommended and then provided guidance on designating lead offices, establishing and updating metrics and milestones, and sharing information.

NASA and DOD officials indicated that the work started by the integrated product teams would continue. A joint DOD-NASA report, which could be released later this month, will recommend that six alliances be established to continue the work initiated by the major facilities team,<sup>23</sup> according to a NASA official. Only two of the alliances have been organized. The official also stated that four panels of the Aeronautics and Astronautics Coordinating Board are to be established to oversee the follow-on activities. However, three of the panels have been delayed due to personnel reorganizations affecting both DOD and NASA, and it is uncertain

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<sup>23</sup>The NASA-DOD alliance teams will have the authority to shape the integration and investment strategies for six types of facilities: wind tunnels and air-breathing propulsion, rocket propulsion, space environment, hypervelocity ballistic range/impact, and arc heated facilities.

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when they will be initiated, according to the NASA official. The only panel to be established to date is the Aeronautics Panel, which met in July 1996.

The details of the follow-on processes for continuing the work of the integrated product teams have not yet been fully developed. One measure of the relevance and success of these processes will be how they handle an issue such as overcapacity in large rocket test facilities. In commenting on a draft of this report, NASA said that the NASA-DOD National Rocket Propulsion Test Alliance will strive for joint management of facilities so they can be brought on or offline and investments controlled for maximum benefit. NASA also said this alliance “will examine indepth the current and future projected workloads to achieve proper asset management and utilization of rocket test facilities.”

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## NASA Faces Uncertainty in Achieving Further Workforce Reductions

We recently reported<sup>24</sup> that NASA does not yet have fully developed plans to reduce its personnel level by about 4,000 full-time equivalent employees to meet its overall goal of decreasing the size of its workforce to about 17,500 by fiscal year 2000. Also, it may not be able to do so without involuntarily separating employees. NASA projections show that voluntary attrition should meet the downsizing goal through fiscal year 1998, but will not provide sufficient losses by fiscal year 1999. Thus, NASA intends to start planning a reduction-in-force during fiscal year 1998, if enough NASA employees do not retire or resign voluntarily.

NASA’s ability to reach its workforce reduction goal by the turn of the century is subject to major uncertainties, including the shifting of program management from headquarters to field centers and the award of a single prime contract for managing the space shuttle at Kennedy Space Center. We proposed that, in view of these uncertainties, Congress may wish to consider requiring NASA to submit a workforce restructuring plan for achieving its fiscal year 2000 personnel reduction goal. NASA estimates that civil service personnel reductions will save about \$880 million from fiscal year 1996 through fiscal year 2000.

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<sup>24</sup>NASA Personnel: Challenges to Achieving Workforce Reductions (GAO/NSIAD-96-176, Aug. 2, 1996).



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## Conclusions and Matters for Congressional Consideration

NASA faces barriers to accomplishing additional consolidations and closures that it may not be able to overcome on its own. Closing facilities, relocating activities, and consolidating operations in fewer locations with fewer employees is not easy because of concerns about the effects of such actions on missions, personnel, and local communities. NASA and DOD officials have suggested that a process similar to the one used by the Defense Base Closure and Realignment Commission may ultimately be needed to adequately deal with the political sensitivity and cost issues that inevitably accompany consolidation and closure decisions. Given NASA's limited progress to date, further opportunities to reduce infrastructure, and the agency's lack of control over some barriers to further reductions, Congress may wish to adopt the idea of having such a process if NASA's efforts fail to show significant progress in the near future in consolidating and closing facilities.

To help determine the need for an independent process to facilitate closures and consolidations of NASA facilities, Congress may wish to consider requiring NASA to submit a plan outlining how it intends to meet its goals for a reduced infrastructure through fiscal year 2000. Such a plan should include estimated cost reductions resulting from specific facility closures and consolidations.

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## Agency Comments

In commenting on a draft of this report, NASA stated that it is committed to streamlining its workforce and supporting infrastructure and is continuing to make fundamental changes in the way it operates. NASA specifically noted that it intends to meet its fiscal and programmatic challenges through efficiencies, restructuring, privatization, commercialization, out-sourcing, and performance-based contracting. NASA commented on a number of areas discussed in the report, and it provided us with some additional or updated information and suggested changes to enhance the clarity and technical accuracy of the draft. We have incorporated the agency's suggested changes in the final report where appropriate. NASA's comments are reprinted in their entirety in appendix III, along with our final evaluation of them.

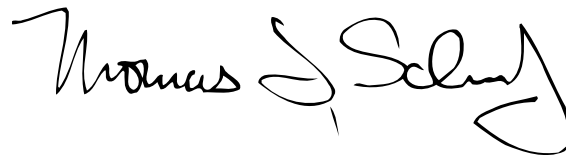
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Our scope and methodology is discussed in appendix IV. Unless you publicly announce this report's contents, we plan no further distribution until 30 days from its issue date. At that time, we will send copies to other interested congressional committees, the Administrator of NASA, and the

Director of the Office of Management and Budget. We will also provide copies to others upon request.

Please contact me on (202) 512-4841, if you or your staff have any questions concerning this report. Major contributors are listed in appendix V.

Sincerely yours,

A handwritten signature in black ink that reads "Thomas J. Schulz". The signature is written in a cursive style with a large, stylized "S" at the end.

Thomas J. Schulz  
Associate Director  
Defense Acquisitions Issues

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## Abbreviations

DOD	Department of Defense
NASA	National Aeronautics and Space Administration

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# Summary of the National Aeronautics and Space Administration Field Center Facilities

Dollars in thousands

Center	Acres	Number of buildings	Net usable square feet (thousands)	Number of trailers	Total current replacement value
Kennedy Space Center	82,943	619	7,796	172	<b>\$3,585,612</b>
Marshall Space Flight Center	1,242	246	6,186	55	<b>2,197,076</b>
Langley Research Center	788	233	2,748	131	<b>2,113,208</b>
Ames Research Center	3,411	355	2,169	88	<b>2,065,116</b>
Lewis Research Center	6,805	262	2,474	3	<b>1,990,783</b>
Johnson Space Center	3,570	332	5,320	3	<b>1,559,158</b>
Goddard Space Flight Center	10,105	402	3,112	24	<b>1,316,201</b>
Stennis Space Center	20,663	125	1,414	29	<b>1,277,093</b>
Jet Propulsion Laboratory	156	279	1,678	71	<b>760,198</b>
Dryden Flight Research Center	<sup>a</sup>	80	654	44	<b>168,049</b>
<b>Total</b>	<b>129,683</b>	<b>2,933</b>	<b>33,551</b>	<b>620</b>	<b>\$17,032,494</b>

Sources: GAO compilation of National Aeronautics and Space Administration (NASA) data as of September 30, 1995. Excludes Yellow Creek Facility, Iuka, Mississippi, which was transferred to the State of Mississippi in February 1996.

<sup>a</sup>Dryden Flight Research Center is located on Edwards Air Force Base, California.

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# Studies and Actions Related to NASA Facilities Infrastructure

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The Advisory Committee on the Future of the U.S. Space Program (Known as the Augustine Committee)

The study's purpose was to advise the NASA Administrator on the approaches the agency's management could use to implement the U.S. space program in the coming decades. Of the 15 recommendations made, 2 related indirectly to facilities infrastructure. The study was completed in December 1990.

Roles and Missions Study

At the direction of the NASA Administrator, the agency's Deputy Administrator reviewed NASA's roles and missions and suggested ways to implement the Augustine Committee's recommendations. The recommendations focused on NASA field centers' missions and project management approaches. Of the 33 recommendations, 9 were related indirectly to facilities infrastructure. The study was completed in November 1991.

Response to Roles and Missions Study

With some modification, the NASA Administrator approved all recommendations from the Roles and Missions Study and called for implementation plans from the center directors and headquarters program offices. The recommendations were approved in December 1991.

National Performance Review

This federal governmentwide review examined cabinet-level departments and 10 agencies, including NASA. One of the 19 recommendations that focused on NASA was directly related to facilities. The review was completed in September 1993.

Implementation of Roles and Missions Recommendations

This document was issued in January 1994 by the Associate Administrator for Space Flight in response to the Administrator's December 1991 call for implementation plans and the current Administrator's renewed emphasis on roles and missions. It identified a number of recommendations to implement the roles and missions recommendations and assigned follow-up responsibilities. Of 38 recommendations, 15 related to specific facilities.

National Facilities Study

The study was initiated in 1992 by the NASA Administrator to develop a comprehensive long-range plan to ensure that research, development, and operational facilities were world-class and to avoid duplication of facilities. The study group was composed of representatives from NASA; the Departments of Defense (DOD), Transportation, Energy, and Commerce;

and the National Science Foundation. Almost 200 recommendations were made, including 68 specifically related to NASA facilities. The study was completed in April 1994.

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**National Research Council  
Review of the National  
Facilities Study (Space  
Facilities)**

Contracted by NASA and DOD, the National Research Council reviewed the findings in the National Facilities Study to evaluate the requirements presented in the national facilities plan for space and research and development operations. The Board made 11 recommendations, 4 of which related to facilities in general. None of the recommendations related to specific facilities. The review was completed in 1994.

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**National Research Council  
Review of the National  
Facilities Study  
(Aeronautical Facilities)**

The Aeronautics and Space Engineering Board conducted this review at NASA's request. The study's purpose was to independently examine projected requirements for, and approaches to, the provision of needed aeronautical ground test facilities. The Board made 13 recommendations; 2 related to specific NASA facilities. The review was completed in 1994.

---

**Federal Laboratory Review**

Conducted under the auspices of the NASA Advisory Council, this study was tasked to evaluate and develop recommendations for improving the efficiency and effectiveness of the federal research and development investment in the NASA laboratory system. The review was also to consider possibilities for restructuring, consolidating, closing, or reassigning facilities. The Laboratory Review made 74 recommendations and 3 suggestions related to specific facilities. The review was completed in February 1995.

---

**NASA White Paper**

The White Paper, formally titled A Budget Reduction Strategy, was intended as a starting point for discussions on a proposed realignment of center roles and missions and reinvention in a constrained budget environment. The paper made about 40 recommendations total; 15 were related to facilities. The paper was issued February 1995.

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**Zero Base Review**

This review was a NASA-wide effort to allocate reductions in the fiscal year 1996 President's budget, set center role assignments, provide suitable guidance for the fiscal year 1997 budget, and change the way NASA conducted business. About 50 recommendations were made, of which 2 applied to specific facilities. The review was completed in June 1995.



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**NASA-DOD Integrated  
Product Teams**

NASA teamed with DOD to study how the two agencies could significantly reduce their investment and operations costs and increase mission effectiveness and efficiency through increased cooperation at all organizational levels. Study teams, referred to as integrated product teams, began work in September 1995 in seven areas. Each team addressed facilities, as appropriate, in its assigned functional area. Teams reported their recommendation to the Aeronautics and Astronautics Coordinating Board in April 1996. Additional information on this effort is presented in the body of this report.

# Comments From the National Aeronautics and Space Administration

Note: GAO comments supplementing those in the report text appear at the end of this appendix.

National Aeronautics and  
Space Administration  
**Office of the Administrator**  
Washington, DC 20546-0001



SEP 6 1996

Mr. Thomas J. Schulz  
Associate Director  
Defense Acquisition Issues  
General Accounting Office  
Washington, DC 20548


Dear Mr. Schulz:

Thank you for the opportunity to review the General Accounting Office (GAO) Draft Report, "NASA INFRASTRUCTURE: Challenges to Achieving Reductions and Efficiencies," which was provided in your letter dated August 15, 1996, to NASA Administrator Daniel S. Goldin. The draft report provided your observations regarding the status of NASA's efforts to achieve reductions and efficiencies in key areas of its infrastructure, principally facilities, and the challenges it faces.

NASA is committed to streamlining its workforce and supporting infrastructure and is continuing to make fundamental changes in the way it operates. We intend to meet our challenges, both fiscal and programmatic, through efficiencies, restructuring, privatization, commercialization, outsourcing, and performance-based contracting.

We have informally discussed a number of items with regard to the Draft Report with the GAO staff and hope they will include our comments in the final report. In addition, we have enclosed further comments for your consideration. If we can be of further assistance, you may contact Benita A. Cooper at 358-2800.

Sincerely,

  
J. R. Dailey  
Acting Deputy Administrator

Enclosure

**Appendix III  
Comments From the National Aeronautics  
and Space Administration**

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

SUBJECT: Draft GAO Report "NASA INFRASTRUCTURE: Challenges to Achieving Reductions and Efficiencies."

Now on p. 3.

1. Reference: Page 5, first paragraph, third line

The Agency has a "stretch" goal of 25 percent. Current plans indicate a reduction of the FY 1993 baseline year current replacement value by 18 percent through FY 2000. NASA will continue to seek ways to achieve the 25-percent "stretch" goal. For example, the Office of Space Flight's (OSF) current plan indicates a reduction of approximately 23 percent of its current replacement value but is studying other possibilities that may get OSF to exceed the 25-percent goal.

See comment 1.

Now on p. 4.

2. Reference: Page 6, second paragraph

The tone of this paragraph (use of words such as "overlooked," "performed questionable," "made inappropriate," and "substantially overstated") is unnecessarily negative, and the inferences are not accurate.

See comment 1.

Now on p. 5.

3. Reference: Page 7, first paragraph

Regarding the telecommunications section, GAO previously reported its concerns in a report entitled, Telecommunications Network: NASA Could Better Manage Its Planned Consolidation. NASA agreed with the report's recommendation to conduct an independent, objective review of NASA's telecommunication needs and how to best satisfy them. That review is underway; however, NASA advised GAO that we would not delay consolidation efforts, pending the results of the review so that we could exploit cost reductions as soon as practicable. Because the draft report is based on outdated information, we are providing you with the current status on the following NASA initiatives:

- a. NASA has transitioned the management of the telecommunications consolidation effort to the Space Operations Management Office (SOMO) at the Johnson Space Center. The management model by which SOMO operates requires Agencywide participation, at the Center level, in the decisionmaking and execution process. This has resulted in an Agencywide Wide Area Network (WAN) consolidation team, managed by Marshall Space Flight Center (MSFC), that is now considering all NASA WAN assets in the consolidation scheme. Aggressive privatization (commercialization) and outsourcing strategies are being implemented. The independent review has already concluded that this approach "represents a substantial change in NASA's WAN strategy." NASA's initiative has been rewarded with significant cost savings.

See comment 2.

**Appendix III  
Comments From the National Aeronautics  
and Space Administration**

2

b. The SOMO is currently preparing a statement of work and associated request for proposal which will solicit a Space Operations Architecture Plan from the private sector. A contractor will be selected to implement the chosen architecture that provides the most cost-effective method for performing space operations. Facility closures, relocation of activities, and consolidation of operations are all anticipated to be part of the selected architecture. The contractor will carry out the consolidations and closures as part of its architecture implementation and cost-reduction process. This process will reduce impacts of parochial concerns which would impede progress toward taking the necessary steps to reduce operational costs.

c. The Chief Information Officer (CIO) recently published a new operating model and has established MSFC as the Information Technology (IT) Lead Center for communications architecture. In this role, MSFC is coordinating communications initiatives with SOMO's WAN consolidation activities. SOMO is represented on the Agency's CIO Council which serves as the principal, formal IT investment planning and reviewing advisor to the Agency's Capital Investment Council (CIC). The CIC advises the Administrator on significant issues and priorities for Agencywide capital investments. The NASA CIO is a member of the NASA Operations Council, which is chaired by the Associate Deputy Administrator (Technical) and is the Agency oversight body for NASA's space operations investments, systems development, and contractor performance. This management alignment effectively integrates the CIO, other senior Agency executives, and key implementors, ensuring that NASA brings leadership and "corporate" oversight to its telecommunications strategies, assets, and initiatives.

Now on p. 6.

4. Reference: Page 8, last paragraph

Regarding the supercomputing section, we have underway a comprehensive review of the Agency's supercomputing assets and programs. The review, being conducted by the Ames Research Center under the auspices of the NASA CIO, will be based on a top-down Agency management plan for consolidated management of supercomputing operations across the Agency and will design an optimal supercomputer architecture as a basis for determining future directions in this area.

See comment 1.

To clarify GAO's concerns regarding the evolution of the scope of the review, we recommend modifying the third paragraph, first sentence, to read "NASA initially excluded predominantly R&D supercomputers, almost 40 percent of its supercomputing systems, from the scope of a consolidation study that focused on production supercomputing."

See comment 1.

Now on p. 9.

5. Reference: Page 12, first paragraph

The paragraph notes that NASA lacks a policy to address potential responsible parties for environmental cleanup. NASA is currently developing a policy to address the issue of

See comment 1.

**Appendix III  
Comments From the National Aeronautics  
and Space Administration**

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potential responsible parties at NASA facilities requiring environmental remediation. A high-level policy statement is expected to be completed by the end of this calendar year. However, we wish to point out to GAO that the identification of potential responsible parties is only one step in the process. It may not always be in the Government's interest to pursue a potential responsible party if the chance of recovery is unlikely.

Now on p. 10.

6. Reference: Page 13, last paragraph

The paragraph notes that "NASA's Johnson Space Center, which manages the Downey facility, has not yet begun to deal with the cost-sharing issue and, as noted above, there is no NASA-wide policy providing guidance on this issue." We wish to direct GAO's attention that an environmental remediation requirement has not been identified at Downey; thus, a cost-sharing issue does not currently exist.

See comment 3.

Now on p. 11.

7. Reference: Page 14, last paragraph

Modify the first sentence to read, "The objectives of the major facilities and space launch activities teams included assessing facilities' utilization and recommending potential consolidations and closures."

See comment 1.

Now on p. 12.

8. Reference: Page 15, last paragraph

The DOD-NASA Cooperation Initiative Recommendation Number 2, Finding/Issue, stated: "NASA and DOD both operate large rocket test facilities and each has excess capacity based on current and projected workloads." The National Rocket Propulsion Test Alliance (NRPTA) formed between NASA and DOD is striving for joint management so that facilities can be brought on or offline, and investments controlled for maximum benefit.

See comment 1.

Now on p. 11.

9. Reference: Page 15, footnote 17

It would be more accurate to say "NASA and DOD" rather than "agencies."

See comment 1.

Now on p. 12.

10. Reference: Pages 15 (last sentence) and 1

Some of the statements are not correct. In fact, some of these facilities are currently undergoing or being considered for modification. A rocket test complex at Edwards Air Force Base is being upgraded, at an estimated cost of \$15 million to \$17 million. In addition, NASA plans to upgrade one of its rocket engine test facilities for about \$45 million. DOD and NASA officials believe that their respective upgrades are cost-effective, although they agreed that the agencies need to improve coordination to prevent further excess capacity. A NASA official noted that these test facilities are not completely comparable. Although not all test stands are comparable in every function, the National Facilities Study and the DOD-NASA Cooperation Initiative raised serious concerns about the excess capacity in these

**Appendix III  
Comments From the National Aeronautics  
and Space Administration**

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facilities. Independent actions by DOD and NASA to upgrade their facilities potentially exacerbate the problem of excess capacity.

a. Recommendation Number 2 indicated that NASA and DOD “each has excess capacity based on current and projected workloads.” The NRPTA will examine indepth the current and future projected workloads to achieve proper asset management and utilization of rocket test facilities.

b. The statement about Edwards Air Force Base (AFB) and Stennis Space Center (SSC) rocket engine test facilities is not an appropriate comparison.

1). NASA is investing in SSC as part of the larger goal of consolidation of NASA test capability at SSC. According to the draft NASA Strategic Plan, as Lead Center for Rocket Propulsion Testing, SSC would be responsible for managing all of NASA’s rocket propulsion testing activities; for developing testing and facility investments and consolidation strategies; and for determining where tests will be performed across NASA’s Centers. Therefore, the \$45.5 million investment at SSC, being considered in NASA’s FY 1996 Operating Plan, is clearly a part of the larger objective to lower test costs. Through the National Rocket Propulsion Test Alliance (NRPTA), SSC intends to address duplicate capability between NASA and DOD. Further, with talk of upgrading the Space Shuttle and continuing the development of the Return Launch Vehicle (RLV), Evolved Expendable Launch Vehicle (EELV), and Bantam Booster, there may be a real need for multiple test sites for both engines and components.

2). The Air Force upgrade at Phillips Laboratory, Edwards AFB, California, announced in 1995, was part of the Air Force EELV program. The actual cost for multiple propellant tank upgrades at test cell 1-A was \$11 million. The other approximately \$5 million was for upgrades to test cell 2-A and was not directly associated with the EELV program. Test cell 1-A is a full-engine test cell for thrust levels up to 1.7 million pounds; test cell 2-A is for engine components only. With high local demand for testing from California-based aerospace companies (Rocketdyne has shut down its test facilities in favor of using Phillips Lab-Edwards AFB test capabilities), and the need for national backup (note the recent damage to MSFC’s test capabilities), it makes prudent sense to keep a primary and a backup capability for the RLV and EELV programs as well as many modification, recertification, and commercial needs.

11. Reference: Page 19, first paragraph

The DOD Base Closure process, that looks at thousands of bases, is not necessarily appropriate for NASA, with fewer than 20 Installations.

See comment 1.

See comment 4.

Now on p. 15.

See comment 5.

**Appendix III  
Comments From the National Aeronautics  
and Space Administration**

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Now on p. 20.

12. Reference: Page 21, Table

Most of the figures for MSFC are erroneous. The correct figures for all of MSFC, including the Huntsville location, Thiokol, Santa Susana Field Laboratory, and Michoud Assembly Facility are as follows:

Acres:	3,124
Number of Buildings:	488
Net Usable Square Feet (thousands):	5,925
Number of Trailers:	16

See comment 1.

Now on p. 23.

13. Reference: Page 25, Appendix II

Please add the following initiative to the other studies and actions in the appendix:

NASA-DOD Cooperation Initiative

The specific objective of this initiative was to achieve significant reductions in investment and operations costs and enhanced mission effectiveness and efficiencies through increased cooperation among NASA and DOD activities at all organizational levels. Work was under the auspices of the Aeronautics and Astronautics Coordinating Board (AACB). Work was organized under seven integrated product teams. Each team addressed facilities, as appropriate, integral to its assigned functional area. Teams reported their recommendations to the AACB in April 1996.

See comment 1.

---

The following are GAO's comments on NASA's letter dated September 6, 1996.

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## GAO Comments

1. The language of the report was modified where appropriate.
2. NASA provided information on activities and initiatives that occurred after the issuance of our report on Telecommunications Network: NASA Could Better Manage Its Planned Consolidation (GAO/AIMD-96-33, Apr. 9, 1996).
3. Our description of the current situation at Downey is in the context of a potential, not a known, cost-sharing issue.
4. NASA provided information on two rocket propulsion test facilities and stated that they are not comparable. However, we made no comparison of these facilities. We merely pointed out that, while the issue of potential excess in large rocket engine test capacity remains unresolved, efforts are underway or planned to upgrade such facilities. As noted in the report, such independent actions potentially worsen the problem. The overcapacity issue could benefit from a thorough, governmentwide assessment.
5. The report discusses the possible future need for a process similar to the one used by the Defense Base Closure and Realignment Commission. Such a process could be applied to individual facilities, groups of facilities, or entire agencies. There is no reason to believe that the process would be appropriate only for DOD or for numerous locations.



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# Scope and Methodology

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We reviewed the value of NASA's facilities and its budgets and staffing; facility reduction plans; real property reports; utilization data and reports; studies, including the National Facilities Study and the NASA Federal Laboratory Review; environmental law, policies, and procedures; and reports by the NASA Inspector General.

We interviewed officials at NASA field centers and in the Offices of Management Systems and Facilities, Headquarters Operations, Space Flight, Space Communications, Human Resources and Education, Environmental Management Division, and Inspector General at NASA headquarters. To discuss NASA-DOD coordination efforts, we interviewed NASA and DOD officials. We also spoke with officials from Rockwell International, Space Systems Division, about plans for the NASA Industrial Plant, Downey, California. We obtained information from all NASA field centers, including information on the value and utilization of facilities, plans for closing facilities and estimated savings through fiscal year 2000, facilities project budgets, and cleanup and cost-sharing activities. We also spoke with officials from other federal agencies, including the General Services Administration and the Environmental Protection Agency.

We obtained electronic versions of NASA's real property and major facility inventory databases and NASA's potentially contaminated site inventory database, but did not independently verify the reliability of the data in the databases. Because the National Facilities Study included aircraft in its work, we included them in our review.

We conducted our audit work at

- NASA headquarters, Washington, D.C.;
- Ames Research Center, Moffett Field, California;
- Goddard Space Flight Center, Greenbelt, Maryland;
- Wallops Flight Facility, Wallops Island, Virginia;
- Jet Propulsion Laboratory, Pasadena, California;
- Lyndon B. Johnson Space Center, Houston, Texas;
- NASA Industrial Plant, Downey, California;
- White Sands Test Facility, Las Cruces, New Mexico;
- John F. Kennedy Space Center, Florida;
- Langley Research Center, Hampton, Virginia;
- Lewis Research Center, Cleveland, Ohio;
- Plum Brook Station, Sandusky, Ohio;
- George C. Marshall Space Flight Center, Huntsville, Alabama;
- Michoud Assembly Facility, New Orleans, Louisiana;

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**Appendix IV**  
**Scope and Methodology**

- 
- Santa Susana Field Laboratory, California;
  - John C. Stennis Space Center, Mississippi;
  - Phillips Laboratory, Edwards Air Force Base, California; and
  - Vandenberg Air Force Base, California.

We conducted our work from June 1995 through August 1996 in accordance with generally accepted government auditing standards.

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