IG-97-040

# AUDIT REPORT

## FACILITY COST RECOVERY POLICIES AT NASA'S AERONAUTICS CENTERS

September 30, 1997

National Aeronautics and Space Administration

OFFICE OF INSPECTOR GENERAL

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## ACRONYMS

| | |
|---|---|
| ARC | Ames Research Center |
| CFO | Chief Financial Officer |
| DARPA | Defense Advanced Research Projects Agency |
| DFRC | Dryden Flight Research Center |
| DoD | Department of Defense |
| FMM | Financial Management Manual |
| JSF | Joint Strike Fighter |
| LaRC | Langley Research Center |
| LeRC | Lewis Research Center |
| MOU | Memorandum of Understanding |
| NAPA | National Academy of Public Administration |
| NASA | National Aeronautics and Space Administration |
| NMI | NASA Management Instruction |
| NTF | National Transonic Facility |
| OMB | Office of Management and Budget |
| OASTT | Office of Aeronautics and Space Transportation Technology |
| RAR | Rapid Action Report |
| ZV | Zealous Vaulter |

National Aeronautics and
Space Administration

**Headquarters**
Washington, DC 20546-0001

Reply to Attn of: W

September 30, 1997

TO: R/Associate Administrator for Aeronautics and Space Transportation Technology

FROM: W/Acting Assistant Inspector General for Auditing

SUBJECT: Final Audit Report
Facility Cost Recovery Policies at NASA's Aeronautics Centers
Assignment No. A-LA-96-002
Report No. IG-97-040

We have completed an audit of the facility cost recovery policies at Aeronautics Centers.

We evaluated NASA's policy and procedures for recovering costs associated with using aeronautical research facilities to do tests for non-NASA customers. NASA has taken some positive actions to increase cost recoveries to help offset declining budgets. NASA is acquiring a new accounting system that should capture the costs of providing services to customers and establishing a facility charging policy for aeronautics facilities. However, we identified several areas requiring management's attention including (1) making interim improvements to accounting systems, (2) removing impediments to completion of the facility charging policy, (3) developing proper billing methods for the Department of Defense (DoD) Joint Strike Fighter (JSF) program, and (4) executing adequate agreements to protect NASA's interests.

During the audit, we issued a Rapid Action Report (RAR) to identify concerns related to selecting a proper billing method and executing an agreement to recover the costs of tests done for the JSF program. Because management had not completed their corrective actions when we finished our field work for the entire audit, we incorporated the RAR recommendations into this final report.

We issued a discussion draft report on July 16, 1997, and discussed the issues with your representatives at an exit conference on August 6, 1997. You provided a written response to the discussion draft on September 11, 1997, in which you concurred with all our recommendations. We have included the applicable response after each recommendation and the entire response as Appendix 5.

In accordance with NASA Management Instruction 9910.1B, we wish to be included in the concurrence cycle for Recommendations 2 through 7. We consider Recommendations 1 and 8 closed with the issuance of this report.

If you have any questions or need additional information, please call Mr. Lee Ball, OIG Program Director for Aeronautics and Space Transportation Technology, at 757-864-8500 or me at 202-358-1232.

Robert J. Wesolowski

Robert J. Wesolowski

Enclosure

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# FACILITY COST RECOVERY POLICIES AT NASA'S AERONAUTICS CENTERS

## EXECUTIVE SUMMARY

***BACKGROUND***

For many years, industry and other Government agency customers have used the NASA Office of Aeronautics and Space Transportation Technology (OASTT) facilities primarily in cooperative programs with NASA without reimbursement. NASA is now developing policies where more users will pay a proportionate share of facility costs. Appendix 1 contains additional background information.

***OBJECTIVES***

OASTT management requested this audit. The purpose of the audit was to evaluate NASA's policy and procedures for recovering costs associated with the use of facilities operated by OASTT. Specifically, we evaluated the:

- ability of the existing and planned accounting systems to provide the data necessary to charge customers accurately for use of OASTT's test facilities;
- various options OASTT used and considered for recovering the facility costs; and
- adequacy of the existing and/or planned agreements and arrangements that cover the use of OASTT's facilities by others.

We did most of our field work at NASA's Langley Research Center (LaRC) in Hampton, Virginia. However, we also conducted limited work at Ames Research Center (ARC) in Mountain View, California; Lewis Research Center (LeRC) in Cleveland, Ohio; and NASA Headquarters in Washington, DC. We provide additional information on objectives, scope, and methodology in Appendix 2.

***RESULTS OF AUDIT***

The following issues require management attention:

- Reviews of LaRC agreements to conduct cooperative experiments showed the LaRC accounting system did not capture the costs of doing the work. The system allowed LaRC to bill other agencies for costs incurred on unrelated work. (Page 6)

- An Aeronautics Central Facilities Management Team has been working for some time to develop a policy for recovering some costs of conducting tests in aeronautics facilities. However, progress has been slow at least partially due to the number of laws and regulations that control reimbursements. (Page 9)

- As the OASTT coordinator for the Department of Defense (DoD) Joint Strike Fighter (JSF) program, LaRC had, at the time of our review, developed a cost-recovery method that was inconsistent with existing laws and cost accounting standards. (Page 13)

- OASTT Centers sometimes performed tests without executing adequate agreements to protect NASA's interests. (Page 17)

***RECOMMENDATIONS***

In order to correct these conditions, we recommend:

- The Associate Administrator for Aeronautics and Space Transportation Technology should determine when OASTT organizations can use fixed-price agreements and encourage their use where appropriate.

- LaRC's Chief Financial Officer (CFO) should ensure the Center accurately records obligations and costs incurred in performing work and avoids unsupported transfers among jobs.

- The Aeronautics Central Facilities Management Team should coordinate closely with the NASA CFO to establish a firm position as to when NASA can and should recover and retain the costs of doing facility tests. The team should ensure its position is supportable under the applicable laws and regulations and resolve questions regarding civil service labor costs.

- The Aeronautics Central Facilities Management Team should complete the interim aeronautics facility charging policy.

- In the process of developing the JSF estimate, LaRC's JSF Project Support Office should estimate full costs for conducting the JSF tests to exclude "additive" costs.

- When the JSF agreement is finalized, LaRC's JSF Project Support Office should ensure the agreement specifies that JSF will provide funding for either the full or partial costs of doing the JSF tests.

If LaRC cannot capture the actual costs, it should attempt to negotiate a fixed price (or fixed-rate-per-occupancy-hour) based on best estimates as allowed by Financial Management Manual (FMM) 9090.

- The Associate Administrator for Aeronautics and Space Transportation Technology should develop criteria for approving agreements for nonreimbursable tests. The criteria should help ensure that OASTT's non-NASA customers and partners contribute an appropriate share of the costs of conducting cooperative tests in OASTT's facilities and appropriately document the basis for approval to provide an audit trail.

- ARC's Patent Counsel should review agreements created prior to the issuance of the Space Act Agreements Manual to determine if they should be modified to meet current standards.

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## OBSERVATIONS AND RECOMMENDATIONS

***OVERALL EVALUATION***

OASTT will begin charging customers for facility costs. However, OASTT management has not yet established an adequate facility charging policy. During the audit, we issued a Rapid Action Report (see Appendix 3) that addressed cost recovery concerns on the demonstration phase of the JSF program. In their response to the report, management cited plans to complete an interim aeronautics facility charging policy that had been in process for some time. We endorsed those plans. However, as addressed in Recommendation 4 of this report, management needs to complete the policy.

To date, efforts completed by NASA to establish Agency-wide policy for charging customers have been limited primarily to the revision of FMM 9090. This policy requires recovery of full costs on new orders, unless designated financial officials approve exceptions. LeRC is ahead of the other OASTT Centers in carrying out the policy's requirements. Its written procedures apply FMM 9090 requirements to all types of agreements and trained personnel apply the procedures. We believe the LeRC procedures could serve as a guide for beginning needed improvements at the other OASTT Centers.

Our conclusions concerning the audit objectives are:

- NASA's accounting systems do not capture data needed to accurately charge customers, especially where civil servants perform reimbursable services. However, NASA is procuring a new system that should correct most of the problems. Meanwhile, the CFOs should take action to better account for the costs of reimbursable activities.

- OASTT management needs to develop a supportable position on NASA's ability to retain and use the amounts collected from the various cost recovery options. They need to complete the facility charging policy based on that position.

- Management needs to execute an agreement with JSF that includes a valid cost-recovery method in particular and strengthen the process for executing agreements for use of NASA's facilities.

The following sections discuss our specific findings.

## *CUSTOMERS' FUNDS USED FOR UNRELATED WORK*

LaRC used funds provided by customers to do unrelated work because Center personnel did not accurately record costs for reimbursable work. As a result, LaRC did not comply with statutes and regulations and cannot properly support all charges to customers under reimbursable agreements or orders.

In a review covering five reimbursable projects, we found two with improper obligations made against the customers' funds.

1. **Zealous Vaulter (ZV) research project orders.**

   NASA received reimbursable authority totalling $100,000 from Defense Advanced Research Projects Agency (DARPA) in September 1992 and $10,000 from the Navy in December 1994 to cooperate in the ZV research project. LaRC obligated the entire reimbursable program authority received from these customers on contracts which had no relation to the ZV project. Subsequently, it billed the customers based on costs accrued on the unrelated contracts. LaRC paid for the ZV effort with a combination of internal NASA funds and reimbursable funds provided by the Air Force for a different project. These actions did not comply with the Economy Act because LaRC billed the customers for expenses incurred for other work. We provide more details in Appendix 4.

2. **Fatigue crack growth rate test program agreement.**

   In FY 1996, NASA received numerous short-term funding resolutions due to delays in passage of its FY 1996 appropriations. LaRC obligated more internal funds than it had direct program authority because the unusual short-term funding overburdened its normal fund controls. To ensure it had not obligated more than its total program authority, LaRC had to temporarily transfer the excess obligations to reimbursable programs having unused program authority. It intended to reverse the transfer after preparing a report to Headquarters, but had overlooked the correction until our review identified the error.

   For example, LaRC received a $100,000 advance payment from Lockheed Martin to cover the cost of specimen machining, operation of automated mechanical test machines, liquid cryogens used during testing, and support contract personnel time. Because of the transfer discussed previously, LaRC, at the time of our review, had obligated $90,720 of the customer's funds on a

contract for computer equipment that was not required for or related to the agreement. Although LaRC had obligated all the customer's funds, it had not done any work on the agreement. The research engineer responsible for the agreement was unaware that LaRC had obligated any of the customer's funds.

***Practice violates generally accepted accounting principles***

LaRC accounts for the costs of programs by assigning unique program numbers to capture the obligations and costs incurred against the program authority allotted from Headquarters. Generally accepted accounting principles require that financial transactions be recorded in the accounts to which they relate. When LaRC permits obligations and costs to be recorded against unrelated program numbers even for a temporary period, it weakens the system integrity and violates proper accounting practice.

NASA has recognized deficiencies in its accounting systems, including LaRC's, and is acquiring a new system for Agency-wide use that will provide full-cost accounting. Although we were unable to confirm its capabilities, the new system should enable all NASA Centers to more accurately account for the costs of services they perform for customers.

***LaRC needs to make interim improvements***

Until NASA activates the new full-cost accounting system, we believe LaRC should adopt interim methods for charging non-NASA customers for services under reimbursable agreements. Implementation of the planned facility charging policy may create many more reimbursable agreements. Therefore, LaRC needs to set up procedures to ensure it can recover the amounts due as specified in these agreements.

One option that may benefit LaRC, as well as other Centers, is to use fixed-price reimbursable agreements based on best estimates. FMM 9090 allows Centers to charge a fixed price where cost accounting for individual agreements is not practical. We believe OASTT should examine the use of fixed-price agreements and encourage their use where accounting systems cannot reasonably capture the actual costs. Where agreements must recover actual costs, however, Center CFOs must ensure that obligations made against reimbursable authority and the related bills rendered are for services requested in the orders and agreements.

***RECOMMENDATION 1***

The Associate Administrator for Aeronautics and Space Transportation Technology should determine when OASTT

organizations can use fixed-price agreements and encourage their use where appropriate.

***Management's Response***

We concur with this recommendation.

***Evaluation of Management's Response***

Management's agreement with the recommendation to encourage the use of fixed-price agreements where appropriate is responsive. This recommendation is closed.

***RECOMMENDATION 2***

LaRC's CFO should ensure the Center accurately records obligations and costs incurred in performing work and avoids unsupported transfers among jobs.

***Management's Response***

We concur with the recommendation. The Langley CFO has taken steps to review obligation and cost procedures with CFO employees. This action will ensure that employees are aware that obligations and costs must be recorded accurately in the accounting system and unsupported transfers among jobs will not be processed.

***Evaluation of Management's Response***

The LaRC CFO's plan to review the obligation and cost procedures with CFO employees is responsive to the recommendation. We plan to examine a sample of transfers made by CFO employees after the CFO's planned actions have been implemented.

### *FACILITY CHARGING POLICY HAS BEEN DELAYED*

OASTT has been developing an aeronautical facilities charging policy for some time with only limited success. OASTT needs a policy to ensure the Aeronautics Centers consistently and properly charge customers. Many complex and inconsistent laws and regulations control how much NASA can charge customers and how NASA should dispose of any collections. An OASTT team has been attempting to establish policy without having a clear supportable position as to how the various and inconsistent regulations apply to NASA. As a result of not having a facility charging policy, OASTT Centers continue to do most tests free of charge, reducing funds available for NASA programs.

#### *OASTT has not been able to complete the policy*

OASTT management recognizes the need for a facility charging policy but has been unable to complete work on the policy. In May 1995, an ad hoc team (Team April) examined various options for recovering costs from customers who used the OASTT facilities. They proposed several steps needed to develop a facility charging policy. In the spring of 1996, management named an Aeronautics Central Facilities Management Team and gave them responsibility for developing the policy. By February 1997, OASTT management still had not agreed on the policy. Work was continuing on a number of issues.

#### *Why OASTT needs a policy*

OASTT needs a facility charging policy to ensure agreements:

- recover actual full or partial costs for the services provided,
- comply with new regulations,
- treat customers consistently across Centers, and
- recover costs consistent with NASA's new accounting systems.

#### *Reasons for policy delay*

The following issues have contributed to the policy delay.

##### *Potential loss of customers and opportunities*

First, management is concerned that facility charges will drive away potential customers or partners. They fear NASA may lose the opportunity to participate in and contribute to important research projects. They also fear that existing facilities will deteriorate because customers will be unwilling to pay enough to maintain and upgrade them. OASTT management has concluded that NASA must provide some level of core funding for facilities above the amount that it will obtain from customers. However, they have not yet established the amount of core funding needed.

##### *Applicable laws and regulations not fully understood*

Second, OASTT is attempting to develop policy without fully understanding the controlling authorities. Several statutes,

regulations, and guidelines control the ability of the Agency to (1) recover costs of doing services for others and (2) dispose of the collections. These rules contain different requirements for charging industry customers than for charging other agencies. Some require recovery of full costs of providing the services while others allow partial or no-cost recovery. For example:

- The Space Act authorizes NASA to do tests for others with or without reimbursement but is silent on whether NASA can retain the amounts collected. Yet, the team had not sought a legal opinion on whether this statute provided NASA the authority to retain the collections.

- The Economy Act authorizes Federal agencies to do work for other agencies. The Act requires the performing agency to bill its costs to do the work and allows it to retain and use the amounts collected. This statute does not apply to services provided to industry customers. The team had not addressed how the Economy Act would affect facility charges.

- Office of Management and Budget (OMB) Circular A-25 requires Federal agencies to assess user charges based on full costs when they provide services to non-Federal entities. Unless a statute includes other provisions, the Circular requires agencies to return amounts collected to the U.S. Treasury. The team had not clearly determined whether the Space Act or any other statute provided NASA the authority to retain the collections from non-Federal customers.

- FMM 9090 was revised in September 1995 to require NASA to recover full costs on all new customer orders unless a Center's CFO or the Director, Financial Management Division at Headquarters, grants an exception. It specifies amounts collected will be retained or returned to the U.S. Treasury as appropriate. The team had not determined when collections could be retained and when they must be returned to the U.S. Treasury.

The facility charging policy team will have a legal review conducted after they complete the policy. We believe their lack of a firm legal opinion to clarify the impact of the various and inconsistent authorities contributed to the delay in developing the policy. Team members and management officials had differing views as to what costs could and/or should be recovered from Government and industry customers

and whether or not the collections could be retained. These uncertainties made it difficult to find common ground on which all parties could agree.

***Questions about disposition of civil service labor cost recoveries hampered policy development***

Third, officials were uncertain as to when NASA can recover and retain civil service labor costs. These uncertainties have also hampered policy development. Yet, the team had not requested rulings from the General Counsel and CFO to establish a clear position on treatment of civil service labor costs incurred in doing tests for customers.

Charging outside customers for tests will help to alleviate the impact of reduced appropriations if NASA can retain the collections. The potential cost recoveries are significant. On the JSF program alone, the estimated recoveries of direct costs could exceed $20 million over about 4 years. While programs like JSF that require dozens of tests are infrequent, it is not unusual for single tests in the large facilities to cost hundreds of thousands of dollars. If NASA recovered more costs from non-NASA customers and retained them to offset the costs NASA incurred, it could use its appropriated funds for internal programs.

***OASTT management has made a strong start but needs to finish the job***

OASTT management recognizes the need to address facility use charges. They are committed to pursuing both development of an Agency-wide facility charging policy and legislative changes needed to allow retention of any collections. The facility policy team has addressed and answered several complex issues. However, management needs to complete the interim aeronautics facility charging policy that has been under development for nearly 2 years. Although OASTT has moved to recover part of the JSF costs, it will likely continue to conduct many lower profile tests without reimbursement until a facility charging policy is set up.

***RECOMMENDATION 3***

The Aeronautics Central Facilities Management Team should coordinate closely with the NASA CFO to establish a firm position as to when NASA can and should recover and retain the costs of doing facility tests. The team should ensure its position is supportable under the applicable laws and regulations and resolve questions regarding civil service labor costs.

***Management's Response***

We concur with the recommendation.

***Evaluation of Management's Response***

At the exit conference, the team leader advised us that the team had prepared a background paper that addressed some issues involved with the recovery and retention of the costs of doing facility tests. The paper included tentative recommendations based on the conclusions the team had reached. A legal review of the paper was still in process. We will examine the team's conclusions and recommendations after the legal issues, if any, have been addressed.

***RECOMMENDATION 4***

The Aeronautics Central Facilities Management Team should complete the interim aeronautics facility charging policy.

***Management's Response***

We concur with the recommendation.

***Evaluation of Management's Response***

At the exit conference, the team leader advised us that the team had prepared a preliminary facility charging policy and submitted it, together with the background paper, for legal review. We will review the policy when it has been finalized.

### *JSF Charges Are Not Tied to Cost of Performing Work*

At the time of our review, LaRC had not estimated the costs the JSF program should reimburse NASA for wind tunnel tests according to NASA's financial procedures. Instead, LaRC based the estimate and the proposed billing method on costs of replacing civil servants who moved to new jobs to support the JSF tests. As a result, LaRC did not base the amount it would charge JSF on costs that it could directly trace, assign, or allocate to work done for JSF. Also, by using the proposed billing method, the costs could vary significantly from the estimate though the work done for JSF remains the same.

As discussed previously, OASTT plans to charge DoD for wind-tunnel tests requested by JSF contractors. On February 10, 1997, OASTT notified JSF that the estimated cost covered by JSF funding was $5.57 million, including $2.44 million for tests at LaRC. We examined the estimate for tests in the LaRC 14' x 22' Subsonic Tunnel that comprised $2.2 million of the total.

***LaRC estimated costs to replace civil servants moved to support JSF, not the costs to do the JSF tests***

At LaRC, the JSF tests significantly increased the workload. LaRC had to expand its 14' x 22' Tunnel operations from a 2-shift to a 3-shift schedule to handle the additional JSF tests and work transferred from the closed 30' x 60' Tunnel. Because NASA employees operate wind tunnels at LaRC, many civil servants moved from other jobs to run the tunnel. To do the jobs vacated by the civil servants, LaRC modified existing contracts to supply additional contractor employees or scheduled overtime in departments that did not receive replacements. At the time of our review, LaRC considered the estimated costs for the contracts and overtime as "additive" costs that resulted from doing the JSF tests.

In its $2.2 million estimate for JSF work in the 14' x 22' Tunnel, LaRC excluded the civil service labor and allocable overhead costs it will expend to do the JSF tests. It replaced those costs with the following additive costs.

| Description | Estimate |
|---|---|
| Contractors | $650,000 |
| Overtime | $110,000 |
| Fab Rate Stabilization | $400,000 |
| Total | $1,160,000 |

- "Contractors" is the cost of hiring additional contractor employees to replace civil servants moved to the 14' x 22' Tunnel. For the most part, these contractor employees will not be working on JSF.

- "Overtime" is the cost of overtime that departments which lost employees to JSF will incur to do the same work with fewer employees. This overtime will not be worked on JSF tasks.

- "Fab rate stabilization" reflects the cost of contracting for fabrication work that civil servants would have done if LaRC had not transferred them to support JSF. The amount is not the cost of additional fabrication work that JSF may require.

***Governing Laws and Regulations***

Several laws and regulations control the amounts that the Agency can charge for services provided to other agencies and what it must do with the collections.

***The Economy Act***

The Economy Act authorizes the head of an agency to place an order with another agency for goods or services. It specifies that reimbursements are credited to the appropriation or fund against which charges were made to fill the order. It allows an agency to use the reimbursements for a purpose specified for the appropriation or fund credited.

***OMB Circular A-34***

OMB Circular A-34 establishes the system for apportionments to an agency. Agencies include anticipated reimbursements with direct appropriations in determining the amounts available for apportionment. It further specifies that allotments of the apportioned amount will not be made until there is reasonable assurance that such items will be collected and deposited to the credit of the appropriation or fund that incurred the obligation.

NASA obtains funds to pay its employees and other expenses either through direct appropriations from Congress or through reimbursements from other agencies or non-Federal entities. OMB apportions amounts from both sources based on requests submitted by NASA.

***NASA financial procedures***

NASA's FMM 9090 specifies financial requirements for entering into reimbursable agreements to do work for others. It specifies full cost recovery as a NASA policy. It defines full cost as all cost unique to a project. The FMM requires all exceptions from full cost recovery to be concurred in by the Center CFO or the Director, Financial Management Division, at NASA Headquarters.

***LaRC considered billing "additive" costs to avoid the potential loss of funds to pay its civil servants***

LaRC officials did not attempt to recover the full or partial costs of actually performing the JSF tests partly because they did not want to disturb the separate direct appropriation that funds civil service costs. NASA's funding consists primarily of direct appropriations from Congress and reimbursements from other entities. To properly fund the JSF work, LaRC could have requested that Headquarters reduce the appropriated funds and increase reimbursable funds by the amount required to pay the civil servants working on JSF. Instead, the officials felt compelled to attempt to recover additive costs to allow the more stable direct appropriation to provide the funds needed to pay civil servants.

Although the Economy Act and Circular A-34 enable NASA to retain cost recoveries that OMB has apportioned as reimbursables, unexpected changes can occur. A recent review of NASA's Reimbursables Programs by the National Academy of Public Administration (NAPA) showed NASA often has not received many of the orders it expected from other agencies. LaRC officials were concerned that they would not have sufficient funds to pay civil servants if Congress subsequently canceled the JSF program. Therefore, to lessen the financial risks, LaRC decided to charge JSF the costs of replacing the civil servants whom it moved from other jobs to support JSF tests rather than for the civil servants doing the JSF tests.

***"Additive" method not proper means to charge for reimbursables***

The additive method creates three concerns for NASA. First, this method does not follow the Economy Act. Under the Economy Act, NASA cannot charge JSF for additive costs or retain recoveries of such costs. NASA can charge DoD only the costs of doing the work. Even if NASA could charge additive costs, it could not retain them and comply with the Economy Act. That Act only authorizes NASA to credit reimbursements to the appropriation or fund charged when it did the work. NASA cannot credit reimbursements to an appropriation against which it did not make charges in conducting the tests.

Second, the proposed method is not consistent with good accounting practices. Statement of Recommended Accounting Standards Number 4, "Managerial Cost Accounting Concepts and Standards for the Federal Government," states that reporting entities should report the full costs of their outputs. The full cost of an output is the total amount of resources used to produce the output. LaRC is not complying with this standard when it attempts to assign costs that are directly traceable to other outputs as costs of services done for JSF.

Third, a problem may arise when LaRC attempts to identify the actual incurred additive costs that the draft agreement provides as the basis for billing JSF. For example, if NASA cancels or cuts other programs, the additional contractors and overtime may no longer be needed. Consequently, the contractor costs, overtime costs, and fabrication costs could decline significantly or disappear. Under this scenario, the actual additive costs LaRC would charge JSF would decrease sharply without any change in the JSF workload. In effect, NASA would have to fund from its appropriations most of the costs of the JSF tests done for DoD.

***RECOMMENDATION 5***

In the process of developing the JSF estimate, LaRC's JSF Project Support Office should estimate the full costs for conducting the JSF tests to exclude the additive costs.

***Management's Response***

We concur with the recommendation. The final JSF estimate estimates the full cost of conducting the JSF tests. Additive costs are not included in this estimate.

***Evaluation of Management's Response***

Management's plan to include the full cost of conducting the tests and exclude additive costs is responsive to the recommendation. We will review the estimate when it is finalized.

***RECOMMENDATION 6***

When the JSF agreement is finalized, LaRC's JSF Project Support Office should ensure the agreement specifies that JSF will provide funding for the costs of doing the JSF tests. If LaRC cannot capture the actual costs, it should attempt to negotiate a fixed price (or fixed-rate-per-occupancy-hour) based on best estimates as allowed by FMM 9090.

***Management's Response***

We concur with this recommendation. One of the major purposes of the JSF agreement is to recover part of the cost of conducting the JSF tests. A rate per occupancy hour is one of the guiding principles of the agreement.

***Evaluation of Management's Response***

Management's plan for the JSF agreement is responsive to the recommendation. We will evaluate the agreement when we are notified that it has been completed.

### *PROPER AGREEMENTS NOT ALWAYS EXECUTED*

OASTT and its Centers sometimes agreed to enter cooperative programs with industry and Government partners to conduct research tests without following Agency guidelines and instructions. These situations occurred because OASTT did not have well-defined procedures for executing agreements. As a result, the OASTT Centers funded most of the costs of doing tests for non-NASA customers. They often did not document the required evaluation to ensure the agreements support a NASA program and the other parties contributed adequate resources. Furthermore, the lack of proper agreements exposed NASA to potential liabilities and forfeiture of intellectual property rights.

We found examples of weaknesses in the process for approving tests and executing agreements both at OASTT Headquarters and at the three Research Centers. However, we found fewer problems at LeRC. As discussed earlier, LeRC had developed procedures for processing agreements that pulled together and clarified the existing financial and administrative requirements from various sources. We provide some examples of the weaknesses in the following paragraphs.

#### *Early tests for DoD's JSF program performed without proper agreement*

As discussed in our rapid action report, OASTT Centers committed NASA resources to perform wind-tunnel tests for three competing contractors during the concept phase of the JSF program. They committed the resources without having consistent agreements to establish the responsibilities, liabilities, and resource contributions of the parties. At the beginning of the program, OASTT and DoD's JSF program office had executed a general agreement to cooperate on activities of mutual interest. But, the agreement did not mention wind-tunnel tests. The agreement required the parties to document the objectives and responsibilities for the cooperative activities as addenda to the agreement. Yet, the parties never executed any addenda to define the wind-tunnel tests.

Without any addenda to define the JSF tests, each Center did tests on models provided by one contractor (Lockheed) under varying or nonexistent agreements. ARC did a test on a Lockheed model under a related but separate partially-reimbursable agreement with the DARPA, which was also a participant in the JSF program. LeRC executed a nonreimbursable Space Act Agreement with Lockheed to do another test. Meanwhile, LaRC conducted several Lockheed tests under an unsigned draft addendum to the OASTT/JSF agreement. In effect, LaRC had no agreement establishing the responsibilities and liabilities of the parties involved in the tests. Because of not having

data rights specified in an agreement, LaRC considered the test results as contractor proprietary data and unavailable for use by NASA. The different arrangements made by each Center show that OASTT needs to develop standard procedures.

***LaRC executed an agreement exceeding the Center's authority***

LaRC did not obtain required Headquarters approval of a nonreimbursable agreement. LaRC performed three tests costing more than $7.1 million in the National Transonic Facility (NTF). It did the tests for McDonnell Douglas Corporation under SAA 244, a nonreimbursable agreement approved by Center management. Because LaRC's cost estimate covered only part of the tests, the approving official was not aware of the total resources NASA was committing when he signed the agreement. As a result, the nonreimbursed costs to NASA exceeded the $5 million threshold above which a designated Headquarters official must approve a nonreimbursable agreement according to NASA Management Instruction (NMI) 1050.9A. Because LaRC did not specifically identify the planned tests, management did not have an estimate of the total resources committed to the agreement.

We also examined a test costing $0.3 million that LaRC did in the 0.3 Meter Cryogenic Tunnel for McDonnell Douglas. An LaRC official told us he did the test under the same SAA 244 discussed previously, though the agreement covered testing only in the NTF. Nothing tied this test to SAA 244; therefore, LaRC in effect did this test without an agreement. By doing so, the Center increased its exposure to liabilities for injury, death, or damage to persons and/or property. Also, it did not adequately protect its rights to intellectual property.

***ARC continued to do tests under old MOU***

ARC performed two wind-tunnel tests in 1996 for McDonnell Douglas under a Memorandum of Understanding (MOU). In 1991, ARC executed the MOU, which remained in effect to completion of the test program. NASA's Space Act Agreements Manual, which was issued in 1993, states that an MOU:

- should not involve a commitment of NASA resources;
- is not intended to create legally enforceable rights, remedies, or responsibilities; and
- should not exceed 3 years in duration.

Because the NASA General Counsel issued the Space Act Agreements Manual after ARC executed the MOU and stated the purpose was not intended to invalidate any existing MOU, the Center was not required to revise the agreement to meet the new guidelines. But, ARC increased its financial risk by performing the tests under an agreement type that the General Counsel determined was not intended to create legally enforceable rights. Therefore, we believe ARC needs to amend or revisit and revise older agreements that do not meet current standards. To ARC's credit, other 1996 tests we examined were performed under proper Space Act Agreements with 1-year terms.

***NMI requires an official evaluate other party's contribution to agreement***

The National Aeronautics and Space Act of 1958 grants the NASA Administrator broad authority to enter agreements. NMI 1050.9A contains a general delegation to named NASA officials to enter Space Act Agreements. This NMI requires the official delegated to enter nonreimbursable Space Act Agreements to determine that (1) there is a demonstrable NASA mission or program requirement for entering into the agreement and (2) the contribution of the other party is adequate compared to NASA's contribution. But, the NMI does not specify criteria for making or documenting this determination and does not require such a determination for partially reimbursable agreements.

***Cost/benefit analyses should be performed***

OASTT, ARC, and LaRC had not developed formal procedures to guide managers in preparing agreements and to require managers to do cost/benefit analyses. Such procedures would help to ensure managers prepare proper agreements to define responsibilities, limit liabilities, and protect rights to intellectual property generated under the agreements. Also, they would help to ensure NASA and outside customers contribute appropriate shares of the overall cost of the Interagency and Space Act Agreements. On the other hand, LeRC developed its procedures to comply with FMM 9090 and included required steps to make the comparison required by NMI 1050.9A. It applied the same processes to fully reimbursable, partially reimbursable, and nonreimbursable Space Act Agreements and to Interagency Agreements. Although these procedures still require subjective judgment by management, the process ensures management considers the cost/benefit relationship and documents the decision-making process.

***NASA subsidized Government and industry partners***

NASA's aeronautics program may be unduly subsidizing its industry and Government partners on cooperative research programs and paying for tests which do not relate to its highest priority programs.

The planned facility charging policy will still allow Centers to do some tests free of charge under cooperative programs. Consequently, OASTT needs to set up standard procedures to limit tests done free of charge to those that:

- benefit a significant NASA program, and
- have an adequate contribution by the other party.

We believe LeRC's procedures could serve as a basis for the OASTT-wide procedures.

***RECOMMENDATION 7***

The Associate Administrator for Aeronautics and Space Transportation Technology should develop criteria for approving agreements for nonreimbursable tests. The criteria should help ensure that OASTT's non-NASA customers and partners contribute an appropriate share of the costs of conducting cooperative tests in OASTT's facilities and appropriately document the basis for approval to provide an audit trail.

***Management's Response***

We concur with this recommendation.

***Evaluation of Management's Response***

At the exit conference, the Deputy Associate Administrator for Aeronautics and Space Transportation Technology indicated that OASTT would develop criteria for approving agreements. We will evaluate the criteria after they are developed.

***RECOMMENDATION 8***

ARC's Patent Counsel should review agreements created prior to the issuance of the Space Act Agreements Manual to determine if they should be modified to meet current standards.

***Management's Response***

Concur. Our review revealed only one agreement, created prior to the issuance of the Space Act Agreements Manual, remaining in effect. This is an agreement with McDonnell Douglas Helicopter, identified by the IG, which has been in effect since October 1991. It has been modified to terminate the agreement as of September 30, 1997. A follow-on agreement in line with the SAA guidelines will be negotiated.

***Evaluation of Management's Response***

Management has taken appropriate action to correct the problem. We have closed this recommendation.

## Background

OASTT operates and staffs many research facilities to support research programs. Most facilities are used primarily for NASA research. However, laws require NASA to make particular wind tunnels available primarily to industry for development work. For many years, industry and other Government agency customers have used OASTT facilities primarily in cooperative programs with NASA without reimbursing NASA. OASTT management recognized that reduced budgets made review of the past practice of not charging some customers for use of OASTT's research facilities necessary. They believed they needed a consistent and equitable facility charging policy. However, this position is not universally supported. Several managers believe that the only purpose for the aeronautics program's existence is to provide aeronautical technology to the country and to industry, so that the country can maintain a position of leadership in both commercial and military aviation. As one manager stated, "Perhaps the largest contribution the NASA aeronautics program could make to the economic well being of the country would be to provide wind tunnel testing to industry free of charge." But, after discussions over several months, management directed a Central Facilities Management Team to develop a new policy proposal.

OASTT established the Central Facilities Management Team under the new organizational structure set up in 1995 to achieve greater strategic management of major aeronautical facilities. This structure divided the aeronautical facilities into six classes and established a Facility Group Director position for each class. The Facility Group Director has responsibility for strategic and operational policy matters for the facilities within the designated class located across the Aeronautics Centers.

During our audit, we determined that OASTT was attempting to begin recovering facility use costs from DoD on the JSF program. Yet, it had not decided the facility charging policy on which to base the user fees. JSF contractors required significant use of NASA's research facilities beginning soon after award of the demonstration phase contracts in November 1996. Due to the significance of the potential cost recoveries, we issued an RAR dated November 14, 1996 (see

reference in Appendix 3). We recommended OASTT management complete the facility charging policy and execute proper agreements. Management concurred with our recommendations. At the time we prepared this final report, the team had not yet completed the facility charging policy. OASTT had established a JSF Project Support Office at LaRC to coordinate the JSF tests at the Aeronautics Centers. That office was identifying the costs JSF would pay and the billing methods.

## Objectives, Scope, and Methodology

***OBJECTIVES***

OASTT requested this audit. The purpose of the audit was to evaluate NASA's policies and procedures for recovering costs associated with the use of facilities operated by OASTT Centers.

We restated the audit objectives during the review; first, to better address management concerns and later, to focus on weaknesses identified in our survey.

Our overall objectives were to evaluate the:

- *ability of the existing and planned accounting systems to provide the data necessary to charge customers accurately for the use of OASTT's test facilities,*

- *various options being used and considered for recovering the facility costs, and*

- *adequacy of the existing and/or planned agreements and arrangements that cover the use of OASTT's facilities by others.*

We performed a survey by obtaining information from ARC, the Dryden Flight Research Center (DFRC), LaRC, and LeRC. Our survey showed the following results for each restated objective:

- *What were the policies of the OASTT and Research Centers regarding the recovery of facility costs from users?*

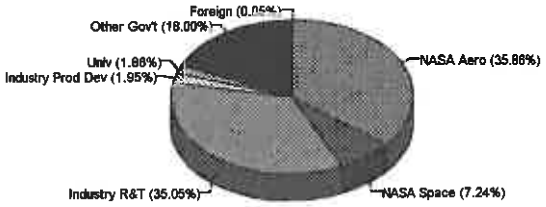
  OASTT did not have a policy but had recently established a team to develop one. ARC, DFRC, and LaRC also did not have formal policies in place. LeRC had developed a policy based on new requirements established by FMM 9090 in October 1995.

- *What was the extent of facility use by non-NASA customers?*

  LaRC provided data for FY 1994 showing non-NASA customers made significant use of its major research facilities.

## Objectives, Scope, and Methodology

**LaRC Major Facilities Utilization**
FY 1994




Nearly 57 percent of the FY 94 facility operations costs are subject to recovery from outside NASA

ARC provided data for FY 1995 showing similar use.

**ARC Major Facility Utilization**
FY 1995

| Facility | Industry | Other Agencies | NASA |
|---|---|---|---|
| NFAC | 48% | 16% | 36% |
| Unitary | 65% | 23% | 12% |
| VMS | 65% | 20% | 15% |
| CVSRF | 55% | 30% | 15% |

These data show a potential for large amounts of cost recoveries in the future.

- *What amount of costs were recovered from customers versus what could have been recovered?*

At LaRC, an unaudited list of active Space Act Agreements as of January 29, 1996, showed 135 agreements with only 5 having reimbursements, totalling $87,000. The total estimated cost of LaRC contributions on the 135 agreements was $43.4 million.

## Objectives, Scope, and Methodology

- *What were the various options being used and considered for recovering the facility costs (full cost, direct cost, marginal costs, etc.)?*

  OASTT usually did not recover costs of performing tests for DoD programs or cooperative programs with industry. The OASTT team evaluating facility charging was considering various charges composed of several different combinations of cost elements for different customer categories.

- *Were the existing and/or planned agreements and arrangements that covered the use of OASTT's facilities by others adequate?*

  We noted several deficiencies in agreements. For example:

  - Centers did not always execute written agreements to protect the Government's interests;

  - Centers executed agreements covering many years or indefinite periods that were not revised to account for program, organizational, and facility changes;

  - Centers executed agreements that included use of NASA's wind tunnels but were not specific enough to be tied to particular tests that the Centers performed.

- *Did the accounting system capture and break out the costs of facilities to permit application of the various recovery options?*

  Some agreements required users to reimburse NASA's actual costs, but NASA did not or could not determine the actual costs.

Based on the survey results, we again restated the objectives to confirm and evaluate the impact of problems identified. Specifically, we wanted to answer the following questions:

## Objectives, Scope, and Methodology

- *Did Aeronautics managers ensure customer contributions on nonreimbursable and partially reimbursable agreements were adequate compared to NASA's contributions?*

  Neither ARC nor LaRC documented their basis for ensuring customer contributions were adequate compared to NASA contributions. LeRC attempted to document the contributions of each party in their justifications for not recovering full cost.

- *Were Centers complying with existing agreements that required customers to pay actual costs for services provided by NASA on a reimbursable basis?*

  The NASA accounting systems cannot capture some cost elements. Therefore, Centers do not always recover the actual costs of performing the work.

- *Were Centers preparing accurate estimates of the full costs of providing services to non-NASA customers?*

  LeRC generally prepared accurate estimates of full costs for all agreements. ARC did not prepare estimates for most nonreimbursable agreements. LaRC often did not prepare estimates for nonreimbursable interagency agreements.

- *Was NASA properly disposing of reimbursables obtained from customers for use of its aeronautical facilities?*

  Centers properly retained receipts from reimbursable agreements processed according to FMM 9090. Nevertheless, two Centers generally avoided recovery of civil service labor and related costs because they believed those cost recoveries would have to be returned to the U.S. Treasury. For user fee agreements processed under FMM 9080, the Centers deposited receipts in the U.S. Treasury as required by the FMM.

## Objectives, Scope, and Methodology

***SCOPE AND METHODOLOGY***

Our work focused on NASA's policies and procedures for recovering the costs incurred in doing wind-tunnel tests for, or in cooperation with, non-NASA customers. To determine the policy and procedures, we interviewed the Aeronautics Facility Manager, Facility Group Director for Wind Tunnels, the NASA coordinator for a major Department of Defense (DoD) program, wind-tunnel managers, research engineers, test engineers, financial management personnel, budget personnel, and others. We reviewed agreements, cost estimates, cost records, tentative test schedules, and existing and planned policy directives and procedures.

***POLICIES AND PROCEDURES REVIEWED***

We examined policies and procedures for entering agreements involving the use of NASA's aeronautical facilities, complying with agreement terms, and disposing of receipts obtained from performing activities required by the agreements. Also, we examined laws and regulations related to user fees and reimbursable agreements.

***AUDIT FIELD WORK***

We conducted our audit from February 1996 to March 1997 according to generally accepted government auditing standards. We did the bulk of our field work at LaRC but also did limited work at ARC, LeRC, and NASA Headquarters. We obtained information from DFRC during the survey, but we did not conduct any detailed audit work there.

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## Summary of Prior OIG and Other Reviews

| | |
|---|---|
| ***OIG RAPID ACTION REPORT*** | Charges for Use of NASA's Facilities by DoD's Joint Strike Fighter (JSF) Program Contractors, IG-97-006, November 14, 1996 |
| ***AGENCY SPONSORED REVIEW*** | A Review of NASA's Reimbursable Programs, Report by the National Academy of Public Administration for the National Aeronautics and Space Administration, February 1996 |

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## DARPA/Navy Zealous Vaulter (ZV) Project

### *CUSTOMERS' FUNDS USED FOR UNRELATED WORK*

LaRC's project to design, fabricate, and test a ZV wind-tunnel model in cooperation with the Navy demonstrates problems with LaRC's accounting for project costs and reimbursable funds:

- In September 1992, NASA requested and received reimbursable program authority of $100,000 from DARPA to cover in-house technical engineering, management, administrative and travel costs to participate in the DARPA ZV Technology Study. NASA's request stated the effort would run between mid-September and late-October 1992. LaRC obligated these funds on an unrelated contract because the DARPA funds would expire for obligation in November 1992. LaRC began billing DARPA in November 1992 for costs that accrued on the unrelated contract. By September 1993, it had billed the entire $100,000 to DARPA, before design and fabrication of the ZV model started. Because LaRC used the DARPA funds for other work, we cannot determine if LaRC did any work in 1992 related to the ZV study.

- In November 1993, LaRC began working a task to design and fabricate a Navy ZV configuration missile model. LaRC had started this work before it executed an agreement with the Navy in March 1994 to perform the work. It paid for the services with NASA internal funding and with reimbursable authority obtained from the Air Force for other work. The agreement for the ZV model stated the Navy was responsible for providing NASA sufficient funding to design and construct the model. It stated NASA would fund the wind-tunnel testing with its own discretionary funds. The agreement was not to be used as a funding document.

- In October 1994, the Navy issued an order to provide $10,000 funding authority to NASA to complete the ZV model work identified in the March 1994 agreement. The order stated the $10,000 would fund the balance between the amount required to complete the model and the funds provided earlier by DARPA. LaRC had completed the design and fabrication of the model in September 1994, before it received the funding authority.

## DARPA/Navy Zealous Vaulter (ZV) Project

Because it had already paid for the model with NASA and Air Force funds, LaRC obligated the Navy funding authority on a contract for unconnected support services. Later, it billed the Navy as costs accrued on the support services contract.

***LaRC's methods did not comply with the Economy Act***

The Economy Act provides that payments from one agency to another for furnishing a service will be based on estimated or actual costs of performing the service. Furthermore, it states that an order placed under its authority obligates an appropriation of the ordering agency (DARPA in this case). The amount obligated must be deobligated to the extent the agency filling the order has not incurred obligations in providing the services before the appropriation expires. LaRC did not comply with the Economy Act in two ways. First, instead of billing for costs of designing and fabricating the Navy missile model, LaRC billed both DARPA and the Navy based on expenditures for unrelated work. Second, because LaRC had obligated the DARPA funds to do other work, it did not permit DARPA to deobligate the funds when they expired in November 1992.

***LaRC improperly obligated and costed funds to compensate for inadequate accounting system***

We believe LaRC obligated the DARPA funds on other work to avoid losing the funds. Although NASA requested funds from DARPA to cover in-house technical engineering, management, and administrative costs, LaRC had not established a means to obligate civil service labor costs against reimbursable authority. When received by LaRC in September 1992, the DARPA order allowed only 2 months to obligate the funds. The Economy Act required the agency filling the order to obligate the funds before the appropriation of the ordering agency expired. Therefore, LaRC erroneously obligated the funds on an unrelated contract to ensure DARPA would not have to deobligate the funds. It disregarded the requirement that the obligation be incurred in providing the ordered services. Subsequently, it billed DARPA for costs accrued under the improper obligation.

LaRC obligated the Navy funds on unrelated work because it had already done most of the work with in-house and Air Force reimbursable funds before it received the Navy order.

# Management's Response to Audit Recommendations

National Aeronautics and
Space Administration
Headquarters
Washington, DC 20546-0001

Reply to Attn of: RB

SEP 11 1997

TO: W/Assistant Inspector General for Auditing

FROM: R/Deputy Associate Administrator for Aeronautics and Space Transportation Technology

SUBJECT: Responses to Discussion Draft Report for Facility Cost Recovery Policies at NASA Aeronautics Centers, A-LA-96-002

We have reviewed the subject report and appreciate the opportunity to respond.

Enclosed for your review are the comments to the recommendations of this discussion draft report. If you have any questions, please contact Tina Kearney at 358-4730.

Richard A. Reeves

Enclosure

cc:
RB/Mr. Fuller
RT/Mr. Yee
JX/Mr. Stamper
ARC/200-9/Ms. Coleman
LaRC/292/Mr. Ball
292/Mr. Hess
109/Mr. Struhar
136/Mr. Taylor

# Management's Response to Audit Recommendations

***Facility Cost Recovery Discussion Draft Report***
***A-LA-96-002***

**Recommendation 1:**
The Associate Administrator for Aeronautics and Space Transportation Technology should determine when OASTT organizations can use fixed price agreements and encourage their use where appropriate.

**Response:**
We concur with this recommendation.

**Recommendation 2:**
Langley's Chief Financial Officer (CFO) should ensure the Center accurately records obligations and costs incurred in performing work and avoids unsupported transfers among jobs.

**Response:**
We concur with this recommendation. The Langley CFO has taken steps to review obligation and cost procedures with CFO employees. This action will ensure that employees are aware that obligations and costs must be recorded accurately in the accounting system and unsupported transfers among jobs will not be processed.

**Recommendation 3:**
The Aeronautics Central Facilities Management Team should coordinate closely with the NASA CFO to establish a firm position as to when NASA can and should recover and retain the costs of doing facility tests. The team should ensure its position is supportable under the applicable laws and regulations and resolve questions regarding civil service labor costs

**Response:**
We concur with this recommendation.

**Recommendation 4:**
The Aeronautics Central Facilities Management Team should complete the interim aeronautics facility charging policy.

**Response:**
We concur with this recommendation.

Enclosure

# Management's Response to Audit Recommendations



**Recommendation 5:**
In the process of developing the Joint Strike Fighter (JSF) estimate, Langley's JSF Project Support Office should estimate full costs for conducting the JSF tests to exclude additive costs.

**Response:**
We concur with this recommendation. The final JSF estimate estimates the full cost of conducting JSF tests. Additive costs are not included in this estimate.

**Recommendation 6:**
When the JSF agreement is finalized, Langley's JSF Project Support Office should ensure the agreement specifies that JSF will provide funding for either full or partial costs of doing JSF tests. If Langley cannot capture the actual costs, it should attempt to negotiate a fixed price (or fixed rate per occupancy hour based on best estimates as allowed by FMM 9090).

**Response:**
We concur with this recommendation. One of the major purposes of the JSF agreement is to recover part of the cost of conducting the JSF tests. A rate per occupancy hour is one of the guiding principles of the agreement.

**Recommendation 7:**
The Associate Administrator for Aeronautics and Space Transportation Technology should develop criteria for approving agreements for nonreimbursable tests. The criteria should help ensure that OASTT's non-NASA customers and partners contribute an appropriate share of the costs of conducting cooperative tests in OASTT's facilities and appropriately document the basis for approval to provide an audit trail.

**Response:**
We concur with this recommendation.

**Recommendation 8:**
ARC's Patent Counsel should review agreements created prior to the issuance of the Space Act Agreements Manual to determine if they should be modified to meet current standards.

**Response:**
We concur with this recommendation. The ARC Patent Counsel review revealed only one agreement, created prior to the issuance of the Space Act Agreements Manual, remaining in effect. This is an agreement with McDonnell Douglass Helicopter, identified by the IG, which has been in effect since October 1991. It has been modified to terminate the agreement as of September 30, 1997. A follow-on agreement in line with the SAA guidelines will be negotiated.

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Special Counsel, Subcommittee on National Security, International Affairs, and Criminal Justice

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