LA-96-002

AUDIT REPORT

ADEQUACY OF THE RESEARCH & TECHNOLOGY BASE

LANGLEY RESEARCH CENTER

May 28, 1996

National Aeronautics and Space Administration

OFFICE OF INSPECTOR GENERAL

National Aeronautics and
Space Administration

Headquarters
Washington, DC 20546-0001

MAY 28 1996

Reply to Attn of: W

TO: R/Associate Administrator for Aeronautics

FROM: W/Assistant Inspector General for Auditing

SUBJECT: Final Report
Adequacy of the Research & Technology Base
Assignment No. A-LA-95-001
Report No. LA-96-002

We have completed an audit of the Adequacy of the Research & Technology (R&T) Base program. The purpose of the audit was to determine if the research efforts on contracts and grants funded by the R&T Base were clearly within the purposes and goals identified in the R&T Base program plans.

R&T Base funds were used primarily for research efforts that were consistent with the program plans. However, the R&T Base program funds many activities which are not clearly identified in the research goals defined in the plans. An estimated $128 million of fiscal year 1995 R&T Base obligations were for activities that were not tied directly to goals included in the Level I program plan. As a result, Agency managers were hindered in their efforts to improve program efficiency and effectiveness. Consequently, recommendations were made in several areas to improve program planning. These issues are discussed in detail in the Observations and Recommendations section of the report.

A discussion draft report was issued on February 6, 1996, and an exit conference was held at the NASA Headquarters Office of Aeronautics (OA) on February 26, 1996. Because OA officials concluded the discussion draft report accurately portrayed the status of the R&T Base program, a draft report was not required. Management provided written comments on the discussion draft report on April 22, 1996. These comments are summarized after each recommendation and are included in their entirety in Appendix 2.

Management concurred with the intent of all recommendations and has identified appropriate plans for corrective actions. We do not require concurrence on closing any of the report recommendations. However, please provide us with written notification of closure so we can update our records.

If you have any questions, please call Mr. Robert Wesolowski, Director, Audit Division-A, or me at 202-358-1232.

Debra A. Guentzel

Enclosure

cc:
JM/Mr. P. Chait
W/Mr. L. Ball

INTRODUCTION

What is the R&T Base and where does it fit in NASA's management strategy?

The NASA Strategic Plan identifies aeronautics as one of its five externally focused strategic enterprises. The Aeronautics Enterprise has six strategic goals or "thrusts." Four of these thrusts – subsonic aircraft, high-speed civil transports, high-performance aircraft, and hypersonic vehicles – involve developing technologies for specific vehicle classes. The fifth thrust develops critical technologies – advanced concepts; physical phenomena comprehension; and theoretical, experimental, and computational tools – for advanced aerospace systems. The sixth involves developing, maintaining, and operating critical national aeronautical research facilities.

The Aeronautics Enterprise research programs are categorized as either systems technology (focused) programs or the Research and Technology (R&T) Base program. Although the types of research performed in these categories may overlap, researchers working on focused programs generally perform applied research that responds to near-term national issues within a specific strategic thrust. These focused programs have a defined start and end point. Current examples of focused programs are the Advanced Subsonic Technology (AST) program under the subsonic thrust and the High-Speed Research (HSR) program under the high-speed civil transport thrust. The R&T Base program supports the strategic thrusts at varying levels over time. When the focused programs within a thrust receive increased emphasis, the R&T Base research efforts within the thrust are usually decreased or eliminated. Conversely, the level of R&T Base research within the thrust may be increased as the focused programs are completed or terminated. Researchers working in the R&T Base program generally perform fundamental and applied research to provide the enabling technologies that lead to future focused programs and advanced systems development by U.S. industry. Both the near-term focused research programs and the long-term R&T Base research program are important elements of the Aeronautics Enterprise. Maintaining a proper balance between the two is essential.

The NASA Office of Aeronautics (OA) manages the Aeronautics Enterprise. At the time of our review, OA was organized by thrusts with a division chief assigned to each thrust. Under this thrust management concept, division chiefs were responsible for the focused programs within the thrust and the research tasks in the R&T Base program which supported that particular thrust. No manager

was assigned the overall responsibility for the R&T Base program operations.

NASA has decreased its investment in the R&T Base program in recent years and increased the emphasis on focused programs and "commercially important" technologies. Figure A shows the budget for the R&T Base has decreased significantly in recent years.

Budget for R&T Base is Decreasing

Annual Budget

FY	($M)
1993	$452
1994	$394
1995	$366
1996	$355

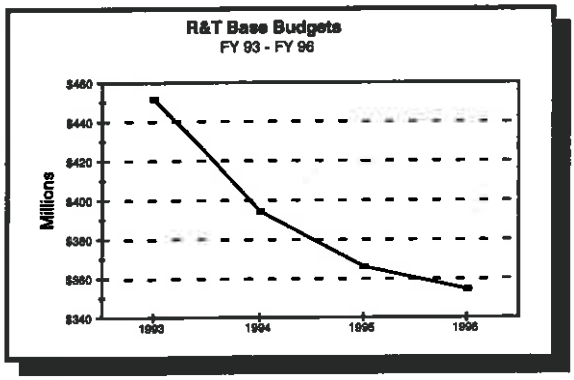

Figure A

At the end of fiscal year (FY) 1995, research performed in the R&T Base was categorized by the following aeronautics disciplines and Work Breakdown Structure element numbers:

Aerodynamics	505-59
Propulsion and Power	505-62
Materials and Structures	505-63
Controls, Guidance and Human Factors	505-64
Flight Systems	505-68
Systems Analysis	505-69
Hypersonics R&T	505-70
Interdisciplinary Tech	505-90
Code B Requirements	505-98
AA Reserve	505-99

These elements provide the basis for budgeting and program management. The Interdisciplinary Technologies (refer to Exhibit 1 for components), Code B Requirements (primarily OA's tax for implementation of a new accounting system), and AA Reserve (set-aside for unknown contingencies) elements were not included as

separate elements in either the budget passed by Congress (Congressional Budget) or the Aeronautics Research and Technology Base Level I Program Plan (refer to Appendix 1 for more information on program plans). Hypersonics R&T was in the Congressional budget submittal as a separate focused program. It was transferred to the R&T Base program during FY 1995 after the focused program was terminated. Figure B shows the relative significance of the elements in terms of funds in the Congressional budget after the transfer of Hypersonics R&T to the R&T Base program.

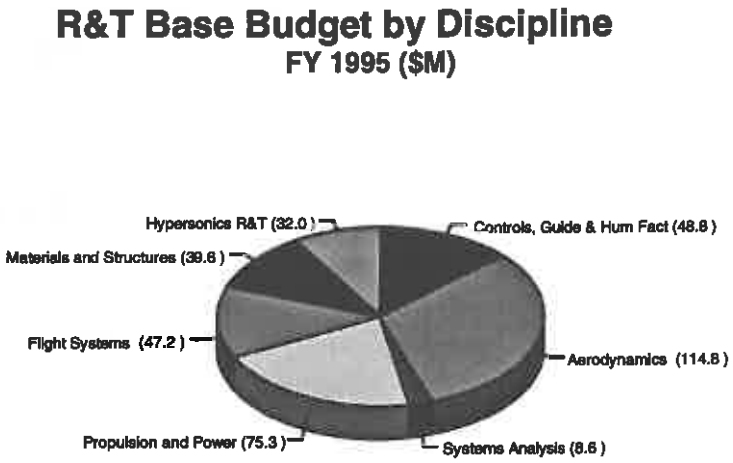

Figure B

Figure C shows the internal budget guidelines developed by OA for R&T Base program management. The internal guidelines included significant dollars for an Interdisciplinary Technologies element that was not separately identified in the Congressional budget or the Level I program plan.

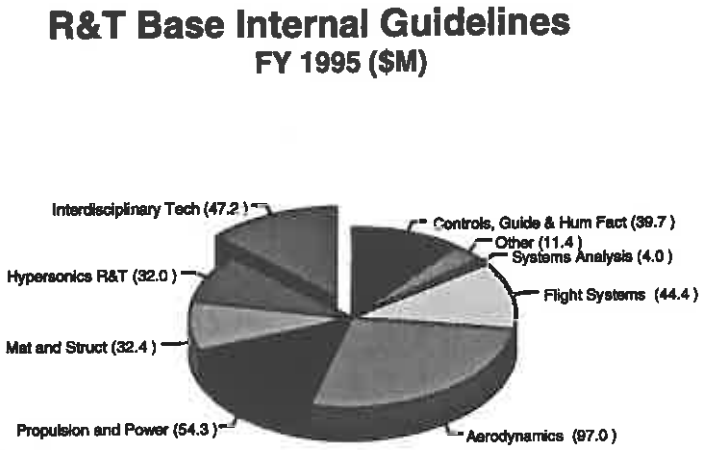

Figure C

OBJECTIVES, SCOPE, AND METHODOLOGY

OBJECTIVES

The objectives of the audit were limited to answering the following questions:

Are the research efforts on contracts and grants funded by the R&T Base clearly within the purposes and goals identified in the R&T Base program plans?

a. If research is being conducted which is outside the identified goals, why is this occurring?

b. If research is being conducted which is outside the identified goals, what is the impact?

SCOPE AND METHODOLOGY

We interviewed OA and Langley Research Center (LaRC) management officials to obtain an understanding of the purpose for the R&T Base and the management processes and controls.

To determine if the research efforts on contracts and grants funded by the R&T Base were clearly within the purposes and goals identified in the R&T Base program plans, we examined 50 sample obligations of fiscal year 1995 R&T Base funds made by LaRC from October 1994 through early May 1995. OA management stated that obligations by LaRC would be representative of the other research centers.

Obligations on classified contracts were not reviewed. Instead, we selected and reviewed additional sample items to replace the obligations on the classified contracts.

MANAGEMENT CONTROLS REVIEWED

We reviewed significant management controls related to development and use of program plans to ensure research is focused on the technology developments that are considered top priority by NASA's management and customers.

INDICATIONS OF FRAUD, WASTE, ABUSE, OR ILLEGAL ACTS

During the audit, one matter came to our attention that was discussed with the OIG Investigations staff for possible further action and is not included in this report. The matter was not considered significant enough for formal referral. A subsequent investigation and/or audit report may be issued once the investigation is complete.

AUDIT FIELD WORK

Audit field work was conducted from December 1994 through September 1995. The audit was performed in accordance with generally accepted government auditing standards.

OBSERVATIONS AND RECOMMENDATIONS

OVERALL EVALUATION

Research and Technology (R&T) Base money was used primarily for research efforts that were consistent with the program plan. However, the R&T Base program funds many activities in addition to the research goals defined in the plan. As a result, an estimated $128 million of direct R&T Base obligations were for activities which were not directly tied to goals included in the Level I program plan. Although the obligations generally complied with the current policy and procedures, opportunities exist to clarify the purpose and content of the R&T Base and to improve its management.

Significant Improvements in Planning and Management of the R&T Base Have Been Made or Are Planned . . .

Noteworthy actions taken or planned by the OA and research center officials to improve the R&T Base include:

- For FY 1995, a comprehensive "Aeronautics Research & Technology Base Level I Program Plan" was developed for the first time. The plan explained the program content and organization and established goals, milestones, and deliverables for the program elements. This action was a major first step toward improving management and control of the R&T Base.

- The OA has begun efforts to revise its organizational composition and restructure the R&T Base program. Management's plans will assign clearer management responsibility for program planning and implementation and clarify the purpose and content of the R&T Base.

. . . But Some Additional Improvements Are Needed

To help ensure resources are used to address the issues considered to be the highest priority by NASA's management and customers, the R&T Base program operations need to be further improved. Primarily, the program planning process needs to be strengthened as follows:

R&T BASE PROGRAM PLANNING COULD BE IMPROVED

Although most of NASA's obligations of aeronautics R&T Base program funds were tied directly to goals identified in the Aeronautics R&T Base Level I Program Plan, some were for activities that were not directly tied to goals set forth in the plan. This situation occurred because the program plan did not articulate performance goals and measures for about $128 million of direct research and non-research activities paid for with program funds (See Exhibit 2). The lack of performance goals for some activities

weakened the plan's effectiveness as a management tool. Also, the plan is not fully compliant with the Government Performance and Results Act of 1993 (GPRA), which requires agencies to develop performance plans to help Federal managers ensure program efficiency and effectiveness. Contributing factors were:

- the program included many varied research projects and other activities and program management responsibilities were spread among several thrust managers,

- lower level program plans that were needed to ensure all research tasks were consistent with the top level goals had not yet been fully developed,

- management policies for non-major programs had not been documented,

- the Work Breakdown Structure (WBS) for the program was not product- or task-oriented, and

- the R&T Base includes both direct and indirect payments for operation and maintenance of facilities. It also pays most of the facility costs because the accounting system does not capture these costs and equitably allocate them to Agency programs.

As a result, some Agency managers, customers, and stakeholders do not fully understand the make-up of the R&T Base and its importance to the NASA aeronautics program. For this reason, some managers believe its funding is more vulnerable to cuts than the more well-defined focused programs.

The GPRA requires an annual performance plan to be developed for each program activity set forth in the budget beginning with FY 1999. The plan must establish performance goals and a basis for comparing actual program results with the goals. To fully comply with this statute, the R&T Base program needs to be clarified and its program planning improved.

A sample of obligations of R&T Base funds at LaRC showed most obligations examined were used for purposes tied to obtaining goals, milestones, and deliverables identified in the Level I program plan. However, weaknesses in program planning and the structure of the

accounting system allowed some obligations that were not directly aligned with program goals as shown in the following four examples:

R&T Base Funds Were Obligated To Pay For HSR Program Work

1. Three obligations of R&T Base program funds totalling $2 million were partial payments on a contract for the High Speed Research (HSR) program. HSR is a focused program separate from the R&T Base. In FY 1994, NASA reallocated aeronautics funding within several program elements to complete early payment for a Boeing 757 aircraft. Initially, funds to purchase the aircraft were identified in the Advanced Subsonic Technology (AST) program over 3 years because AST was the primary user of the aircraft. NASA subsequently decided to purchase the aircraft in 1 year and have all benefitting programs share the costs. After properly notifying Congress that HSR program funds were being reallocated to support the aircraft procurement, NASA obligated $4.4 million of FY 1994 HSR funds for the aircraft. However, an effort to reimburse the HSR program in FY 1995 resulted in nearly $4.4 million ($2 million were included in our sample) of R&T Base funds being inappropriately obligated to pay for HSR focused program tasks. R&T Base funds were used because work was shifted from the R&T Base to the AST program to free the R&T Base funds to pay for the HSR tasks.

OA's thrust management concept permits some shifting of funds from the R&T Base to the focused programs within the same thrust to ensure the highest priority research needs are being worked. It is difficult, if not impossible, to clearly distinguish the cutoff between work falling under the focused programs and that being done in the R&T Base within the same thrust. This concept was cited as the basis for using the R&T Base funds for HSR work. Using R&T Base funds for other programs could help to promote the mistaken belief that the R&T Base is overfunded or that its research projects are less important than the focused programs. Obligations of R&T Base funds should be restricted to activities required to obtain the goals set forth in the program plan.

R&T Base Funds Were Used For Hypersonics Research When The R&T Base Program Plan Did Not Include Hypersonics

2. An obligation of $900,000 was made to operate and maintain a Cray 2 supercomputer dedicated to hypersonics research applications even though the Level I program plan indicated no hypersonics thrust effort would be done in the R&T Base. During FY 1995, OA management transferred the hypersonics budget from the Hypersonics System Technology Program (HYSTP) to the R&T Base program when the Air Force decided not to fund its part of the joint HYSTP focused program. The action by the Air Force effectively eliminated the focused program and favored inclusion of the remaining NASA hypersonic research effort in the R&T Base. However, when OA moved hypersonics research to the R&T Base, the Level I program plan was not revised to establish goals, milestones, and deliverables for the hypersonics element to direct and control the research efforts. As a result, the obligation was not consistent with the performance goals and measures identified in the program plan.

Some Facility Costs Are Charged Direct To Unique Projects Within The R&T Base Program

3. Five obligations of R&T Base funds were direct charges for facility costs. LaRC obligated:

- $1.4 million for operation of the National Transonic Facility (NTF), an LaRC wind tunnel.
- $900,000 to paint the exterior of the 16-foot wind tunnel test section.
- $696,000 for lead paint containment in the Transonic Dynamics Tunnel.
- $172,000 of Facility Maintenance Augmentation (FMA) funds to replace the air conditioning system in Building 1146.
- $150,000 of FMA funds to repair streets throughout LaRC.

The program plan indicated most facility costs were contained within the R&T Base program funding but did not identify performance goals and measures for these program elements. Consequently, the direct cost obligations for facility costs could not be tied to the accomplishment of any goals or performance measures included in the plan.

While the obligations complied with existing accounting policy, the current policy distorts the true costs of the Agency's programs. When the R&T Base program pays the entire cost of certain facility costs that benefit many programs, its program costs are overstated.

At the same time, the costs of the other Agency programs that should have absorbed part of those costs are understated.

NASA is working to develop a concept of full cost accounting to be included in the Agency's new accounting system. Costs of operating and maintaining facilities should be captured and allocated to programs and other cost objectives based on use of the facilities. The move to full costing will cause an equitable share of facility costs to be allocated to the R&T Base based on usage by the R&T Base research projects. The new accounting procedures should resolve the present inconsistency and help to clarify the content of the program.

A Major WBS Element Was Not Included In The Program Plan

4. Four sample obligations were for subelements of WBS element 505-90, "Interdisciplinary Technologies" (IT). LaRC obligated:

- $437,000 for Institute for Computer Applications in Science and Engineering (ICASE).
- $426,000 for ICASE.
- $75,941 for Old Dominion University's Institute for Scientific and Educational Technology (ISET).
- $696,000 for lead paint containment in the Transonic Dynamics Tunnel.

The R&T Base Level I program plan did not establish goals for most of the IT WBS element. In January 1995, OA records showed an internal budget of $47 million for IT element of the R&T Base program's WBS. Although the WBS included the IT element with numerous subelements, the Level I program plan discussed only the Advanced Concepts subelement which was budgeted at $5 million. (See Exhibit 2 for a listing of the subelements not covered in the Level I program plan.) As a result, the controls provided by the program plan did not exist to ensure the IT funds were used for the high priority aeronautics research projects.

According to OA management, funding for the IT element was reduced significantly during FY 1995 and is much less in FY 1996. Therefore, the amount of program funds not addressed in the program plan will be much less.

Issues Identified Resulted From Several Causes:

The issues identified from reviewing the sample of obligations of R&T Base program funds at LaRC and from holding discussions with OA and LaRC managers point to several aspects of program planning that should be strengthened.

R&T Base Program Contains Many Varied Elements

First, the R&T Base program lumped together in one program varying types of research projects and other activities. The program included research projects that supported several thrusts and varied from fundamental research activities to applied research projects that were similar to small focused programs. The program also included directly funded facility operations and maintenance and numerous activities under Interdisciplinary Technologies, including academic programs, joint university institutes, and new initiatives in aeronautics for which no performance goals or measurements were identified in the Level I program plan. Coupled with OA's thrust management concept which spread the management responsibilities for the R&T Base program among several program managers, this practice resulted in NASA's top management, stakeholders and customers not fully understanding the purpose, content and significance of the R&T Base program. It caused the program to be viewed as a "slush fund" which could be cut without significant impact on the overall aeronautics program.

At the time of our review, OA management was planning two actions which will help to clarify the content and purpose of the R&T Base program. They plan to restructure the R&T Base into at least three separate programs to better define and manage its varied elements. Also, they have begun to reorganize OA and will assign managers responsibility for each of the new programs.

Level II and Level III Program Plans Were Not Developed

Second, the Level II and Level III program plans called for in the Level I program plan were not developed as intended in FY 1995. These lower level plans establish the commitments of the performing organizations to the strategic managers and the researchers to the performing organization managers. Because R&T Base research activities generally continue for several years, definition of much of the research being done in FY 1995 was provided by the FY 1994 research plans. However, without the formal commitments and implementation plans provided by the Level II and III program plans to help ensure the research efforts are directed toward accomplishing Level I goals, the efficient and effective use of resources is less certain.

Management Policies For Non-Major Programs Like The R&T Base Were Not Documented

Third, management policies and responsibilities have not been documented for non-major programs like the R&T Base. While NASA management has documented the management policies and responsibilities for major system programs and projects in NASA Management Instruction (NMI) 7120.4, and its implementing policies and processes contained in NASA Handbook (NHB) 7120.5, similar documents have not been prepared for non-major programs. The absence of management policies and responsibilities for the R&T Base likely contributed to the program plan not being revised when hypersonics research was transferred from systems technology to the R&T Base in mid-1995.

WBS Is Not Product Or Task Oriented

Fourth, a product- or task-oriented Work Breakdown Structure (WBS) as specified in NASA's Work Breakdown Structure Manual has not been established for the R&T Base. According to the manual, the WBS should be product- or task-oriented and include all tasks. The purpose of the WBS is to provide for planning and control by subdividing the work into smaller increments until a manageable unit is reached. A top down approach is used to insure that the total program or project is fully planned and all derivative plans contribute directly to the desired end objectives. The existing WBS is organized by work discipline (aerodynamics, propulsion and power, etc.) in lieu of products or tasks. Also, the WBS has not been fully coordinated with the program plans. For example, a WBS element was established for Interdisciplinary Technologies, but it was not addressed in the top level program plan. The OA team working to restructure the R&T Base is considering the changes needed in the WBS to make it compatible with the new structure. This effort provides an excellent opportunity to develop a proper product- or task-oriented WBS and coordinate it with the program plans.

Accounting System Does Not Handle Facility Costs Consistently

Fifth, the inclusion of some facility costs as direct cost elements in the R&T Base and an imprecise system for taxing research programs for program support funds to pay other facilities costs causes the R&T Base to pay most of the facility operation and maintenance costs at the research centers. The R&T Base subsidizes the focused programs; but, due to the inadequate accounting system, the extent of the subsidies is not known. A managerial accounting system is needed to accurately and consistently spread the costs of facilities to the Agency's programs.

NASA management recognizes the need to improve the accounting system. Currently, the Chief Financial Officer (CFO) is heading the procurement of a new Commercial-Off-The-Shelf (COTS) accounting system and the Administrator has endorsed full-cost accounting. The Administrator established a team to develop a concept for timely, effective implementation of full-costing at NASA. That team is now preparing its final report. OA management cannot initiate actions on their own to develop a new accounting system to meet their needs. However, they have an excellent opportunity now to make their needs known and help ensure the system that is obtained will, among other things, properly capture facility costs and equitably allocate them to programs that use the facilities.

RECOMMENDATION 1 Office of Aeronautics managers responsible for the R&T Base and aeronautics managers at the research centers should ensure the Level II and Level III program plans described in the Aeronautics Research & Technology Base Level I Program Plan are developed.

Management's Response Concur with intent. The objective of developing Level I and II program plans is the Lead Center's responsibility. Lower level plans are not an Agency or OA requirement. In light of the R&T Base restructuring and the transition to Lead Center program management, the requirement for Level III Program Plans will be re-examined.

Evaluation of Management's Response The break-out of the R&T Base into six structured categories along the lines of Center Missions and Centers of Excellence and making the development of Level I and Level II program plans the Lead Center's responsibility may make Level III plans unnecessary. The actions taken and planned are reponsive to the intent of the recommendation.

RECOMMENDATION 2 The Associate Administrator for Aeronautics should develop management policies and responsibilities for aeronautics research programs including the R&T Base. These policies would provide guidance for managing programs and projects which are outside the scope of NMI 7120.4, "Management of Major System Programs and Projects" and its implementing policies and processes contained in NHB 7120.5.

Management's Response Concur. The R&T Base is long-range research work -- not a major system "program" or "project." Management policies and

responsibilities have existed that are appropriate for this type of level-of-effort activity. Code R will continue to provide guidance on management policies and responsibilities for the R&T Base to the Centers, but not in NMI form. Agency policies do not require NMI-like documentation research work. In light of the R&T Base restructuring and the transition to Lead Center program management, all OA management policies will be re-examined in their new context.

Evaluation of Management's Response

We continue to believe that management of the R&T Base would be strengthened by having a policy to establish standards for program management. However, management's plan to restructure the R&T Base and re-examine all OA management policies is considered responsive to the recommendation.

RECOMMENDATION 3

The leader of the OA team established to restructure the R&T Base should ensure that the revised WBS being developed for the restructured program is product- or task-oriented.

Management's Response

Concur. The WBS you reviewed is a remnant of the Research & Technology Objectives and Plans (RTOP) system. Consistent with the philosophy set out in the Administrator's discussion draft of February 2, 1996, we have further refined the structure along the lines of Center Missions and Centers of Excellence for implementation in FY 1997.

Evaluation of Management's Response

Management's intention to revise the WBS along the lines of the new structure of the R&T Base is responsive to the recommendation.

RECOMMENDATION 4

The Associate Administrator for Aeronautics should ensure performance goals and measures for all significant program elements are included in the program plans for the R&T Base or its successor programs.

Management's Response

Concur. This was done in our FY 97 Level 1 Program Plans which were submitted as part of the Agency Zero Base Review (ZBR) budget exercise.

Evaluation of Management's Response

This action is responsive to the recommendation.

RECOMMENDATION 5	The Associate Administrator for Aeronautics should provide the CFO with OA's cost accounting needs including consistent accounting for facility costs, full costing of research programs and program elements, and other information required by program managers for effective and efficient program management.
Management's Response	Concur. Code R has representatives on the Code B cost accounting working group and Steering Council to ensure that our needs are addressed in this regard.
Evaluation of Management's Response	Management's actions are responsive to the recommendation.

Exhibit 1

R&T Base WBS Elements Not Tied to Goals in Level I Plan

January 1, 1995, Internal Budget Amounts

Element Number	Description	Net Research & Development (R&D)	Direct Charge Program Support	Total	Notes
505-59-70	Advanced Aircraft	$5,200,000		$5,200,000	
505-59-85	NTF Operations	9,861,000		9,861,000	
505-59-88	Facility Maintenance Augmentation		$18,149,000	18,149,000	1
505-62-20	Supersonic Cruise	500,000		500,000	3
505-62-70	Advanced Aircraft	14,150,000		14,150,000	
505-62-82	Aero Facility	4,269		4,269	
505-62-88	Facility Maintenance Augmentation		10,284	10,284	1
505-64-20	Supersonic Cruise	4,370,000		4,370,000	3
505-64-70	Advanced Aircraft	1,069,000		1,069,000	
505-68-20	Supersonic Cruise	1,202,000		1,202,000	3
505-68-70	Advanced Aircraft	7,390		7,390	
505-68-88	Facility Maintenance Augmentation		866,000	866,000	1
505-90-	**Interdisciplinary Technologies**				
51	Fund for Independent Research	352,000			
52	Graduate Program in Aeronautics	2,283,000			
53	Joint University Institutes	1,889,000			
54	Program Support	2,443,000			
55	Minority Universities	1,600,000			
56	Hist Black Colleges and Univ	2,400,000			
57	OA Headquarters Support	2,102,000			
58	Hi-Mate	1,364,000			
60	New Initiative Effort	6,000,000			
70	Hypersonics Wind Tunnels	1,500,000			
80	Interdisciplinary Operational Services	8,925,000			
82	Interdisciplinary Studies	2,996,000			
84	Interdisciplinary Technology System	6,965,000		40,819,000	
		$77,182,659	$19,025,284	$96,207,943	
505-70-	Hypersonics			32,000,000	2
				$128,207,943	

Notes:

1. At LaRC, Facility Maintenance Augmentation funds are handled as Net R&D even though the funds are shown as program support in the OA internal budget. They are charged directly to the program element in lieu of being allocated.

2. Hypersonics R&T was transferred from systems technology to the R&T Base in mid-1995.

3. The R&T Base Level I program plan showed no thrust 2 (high-speed) research would be done in the R&T Base. All high-speed research was to be done in the HSR focused program.

R&T BASE PROGRAM PLANS

Program plans define the interrelationships of the various WBS elements that comprise the program and tie the elements together. For the R&T Base, the program plans have been evolving over several years, but the final formats have not yet been determined. As explained in the Level I program plan, the program plans will define the program in three successively more detailed levels of the WBS hierarchy as follows:

Level I Program Plan

- The Aeronautics Research & Technology Base Level I Program Plan was first created in FY 1995. The plan provides an authoritative, top level management description of the program and is the controlling document for program content and organization. The technical plan portion of the overall plan contains a vision statement, research goals, justification and technical approach, and Level I milestones for the first six elements of the WBS (Aerodynamics through Systems Analysis). Except for Advanced Concepts, a subelement of Interdisciplinary Technologies, the plan does not comment on the last three elements – Interdisciplinary Technologies, Code B Requirements, and the AA Reserve. Each research goal is associated with one of the strategic thrusts described previously. The Level I plan documents the commitment between the Headquarters Managers and the Associate Administrator for Aeronautics.

Level II Program Plans

- Level II plans were not developed in FY 1995. However, FY 1994 Research Plans are being used as Level II plans for FY 1995. The Level II plan will be signed by the Center Aeronautics Directors and will document the agreement between the Headquarters Managers and the performing organizations at the Research Centers.

Level III Program Plans

- Level III plans will be detailed implementation plans that are internal to each center.

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Management's Reponse to the Audit Recommendations

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

APR 22 1996

Reply to Attn of: RB

TO: W/Assistant Inspector General for Auditing

FROM: RB/Director, Resources Management Office

SUBJECT: Comments on Discussion Draft Audit Report
Adequacy of the Research and Technology Base
Assignment No. A-LA-95-001

During the exit conference of the above-cited audit, we agreed to provide you comments on the subject draft audit report. In general, the report accurately portrays the current R&T Base program. Many, if not all, of the findings and observations are known and corrective actions are underway. Comments regarding your recommendations are as follows:

IG Recommendation 1. "Office of Aeronautics managers responsible for the R&T Base and aeronautics managers at the research centers should ensure the Level II and Level III program plans described in the Aeronautics Research & Technology Base Level I Program Plan are developed.

OA Response: Concur with intent. The objective of developing Level I and II program plans is the Lead Center's responsibility. Lower level plans are not an Agency or OA requirement. In light of the R&T Base restructuring and the transition to Lead Center program management, the requirement for Level III Program Plans will be re-examined.

IG Recommendation 2. "The Associate Administrator for Aeronautics should develop management policies and responsibilities for aeronautics research programs including the R&T Base. These policies would provide guidance for managing programs and projects which are outside the scope of NMI 7120.4, "Management of Major System Programs and Projects" and its implementing policies and processes contained in NHB 7120.5.

OA Response: Concur. The R&T Base is long-range research work -- not a major system "program" or "project." Management policies and responsibilities have existed that are appropriate for this type of level-of-effort activity. Code R will continue to provide guidance on management policies and responsibilities for the R&T Base to the Centers, but not in NMI form. Agency policies do not require NMI-like documentation for

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research work. In light of the R&T Base restructuring and the transition to Lead Center program management, all OA management policies will be re-examined in their new context.

IG Recommendation 3. "The leader of OA team established to restructure the R&T Base should ensure that the revised WBS being developed for the restructured program is product- or task-oriented."

OA Response: Concur. The WBS you reviewed is a remnant of the RTOP system. Consistent with the philosophy set out in the Administrator's discussion draft of February 2, 1996, we have further refined the structure along the lines of Center Missions and Centers of Excellence for implementation in FY 1997.

IG Recommendation 4. "The Associate Administrator for Aeronautics should ensure performance goals and measures for all significant program elements are included in the program plans for the R&T Base or its successor programs."

OA Response: Concur. This was done in our FY 97 Level 1 Program Plans which were submitted as part of the Agency ZBR budget exercise.

IG Recommendation 5. The Associate Administrator for Aeronautics should provide the CFO with OA's cost accounting needs including consistent accounting for facility costs, full costing of research programs and program elements, and other information required by program managers for effective and efficient program management.

OA Response: Concur. Code R has representatives on the Code B cost accounting working group and Steering Council to ensure that our needs are addressed in this regard.

Additional comments follow.

IG Observation:
"Three obligations of R&T Base Program funds totaling $2 million were partial payments on a contract for the High Speed Research (HSR) program."

Code R Comment: Thrust 2 Base funds (505-64-20) of $4.4M were made available to the HSR Program for use in PY 95. From a Code R perspective, the TSRV adjustments noted by the IG are totally attributable to an Aeronautics management decision to shift from "a first user" cost philosophy to assessing all "benefiting programs." We stand by the appropriateness of that decision. All stakeholders were notified of this action.

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IG Observation:
"An obligation of $900,000 was made to operate and maintain a Cray 2 supercomputer dedicated to hypersonics research applications even though the Level I program plan indicated no hypersonics thrust effort would be done in the R&T Base."

Code R Comment: The Hypersonics Program was moved from a focused program to the R&T Base Program at the direction of the Agency Administrator and OMB. After the Hypersonics Program was moved to the R&T Base Program, all Hypersonic financial actions were charged to the R&T Base Program. The computer was dedicated to support the unique needs of the Hypersonic Program and the costs to operate and maintain the computer were charged like any other Hypersonic direct charge item.

IG Observation:
"Five obligations of R&T Base funds were direct charges for facility costs."

Code R Comment: Four of these cases are consistent with the Congressional approval of an Aeronautics Facility Maintenance Augmentation initiative. Most facility costs are charged to the R&T Base as facility performance is tied to program objectives. Agency transition to full-cost accounting will resolve this concern.

- "$150,000 of FMA funds to repair streets throughout Langley." - Element 505-59-88, Facility Maintenance Augmentation, was established to fund facility maintenance work. While the maintenance and repair of streets is a primary element of the facility maintenance program, we understand that the repair of streets could be more appropriately charged to the ROS institutional facility maintenance account. We agree with the IG recommendation and we will initiate corrective action immediately.

- "$1.4M for operation of the National Transonic Facility (NTF), a Langley wind tunnel." - Element 505-59-85, NTF Operations, was established in the R&T Base to collect all NTF costs. The $1.4M obligation was correct.

- "$900,000 to paint the exterior of the 16-foot wind tunnel test section." - Element 505-90-82, Environmental Compliance, was established in the R&T Base to fund environmental work. The $900,000 obligation was correct.

- "$696,000 for lead paint containment in the Transonic Dynamics Tunnel." - Element 505-90-82, Environmental Compliance, was established in the R&T Base to fund environmental work. The $696,000 obligation was correct.

- "$172,000 of Facility Maintenance Augmentation (FMA) funds to replace the air conditioning system in building 1146." - Element 505-59-88,

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Facility Maintenance Augmentation, was established to fund facility maintenance work. The obligation of $172,000 was correct.

IG Observation:
"R&T Base Program Contains Many Varied Elements"

Code R Comment: Because of the broad and diverse nature of the research activities conducted in the R&T Base, it has always contained varied elements. We recently transitioned from managing by RTOPS to Program Plans to ensure more disciplined program oversight consistent with your concerns in this regard.

IG Observation:
"Accounting System Does Not Handle Facility Costs Consistently"

Code R Comment: Program support is allocated consistent with Code B approved chargeback algorithms. The Agency transition to full-cost accounting will ultimately address this concern.

If you have any questions or need additional information, please call me at 202-358-2790. We appreciate your recommendations regarding suggested improvements in R&T Base management and we will initiate near- and long-term corrective action in response to your FMA findings.

Glenn C. Fuller

cc:
R/R. Reeves
RT/R. Christiansen
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