

KE-96-002

AUDIT REPORT

SPACEHAB COMMERCIAL MIDDECK AUGMENTATION MODULE (CMAM) PROJECT

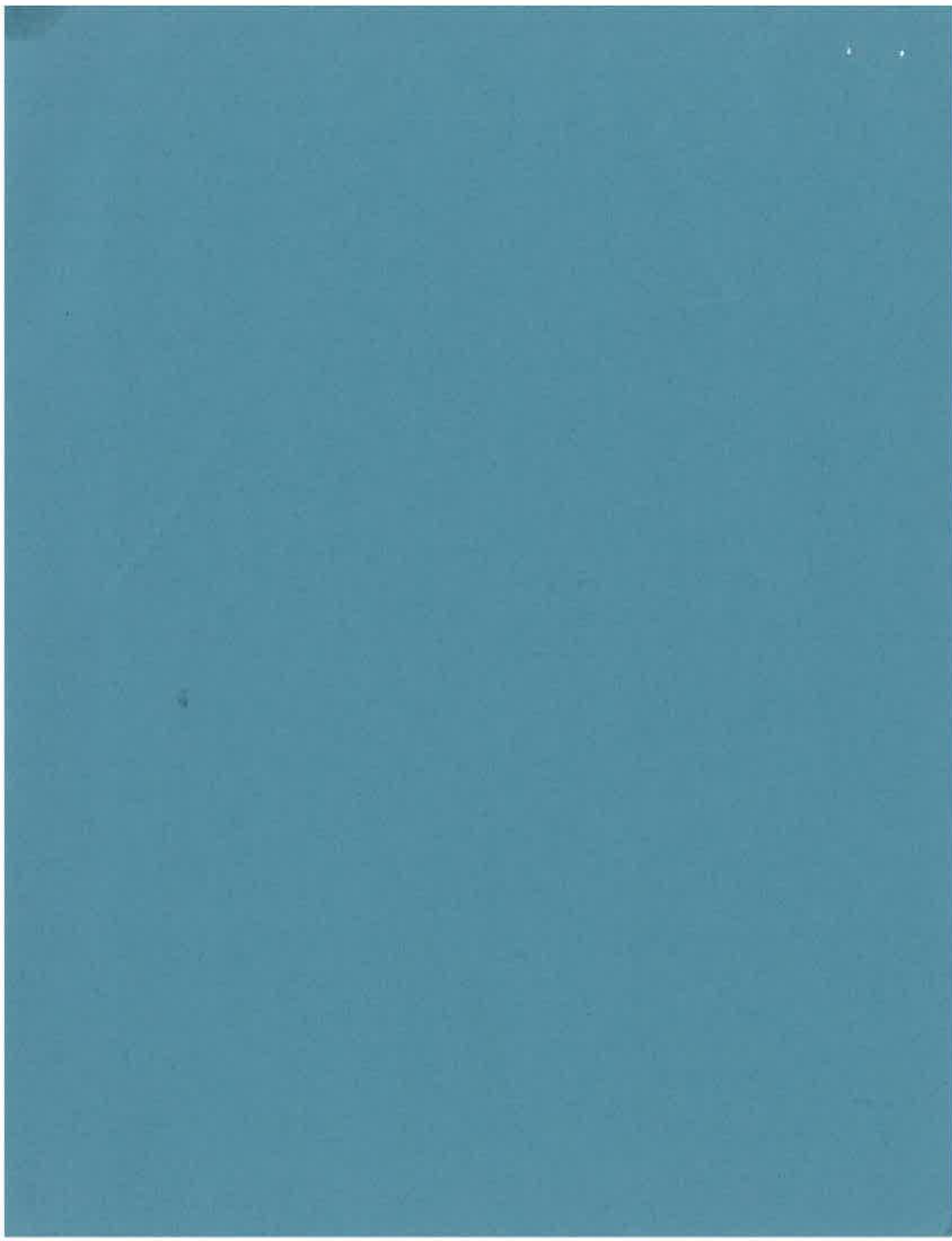
KENNEDY SPACE CENTER, FLORIDA

October 27, 1995



National Aeronautics and
Space Administration

OFFICE OF INSPECTOR GENERAL



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



OCT 27 1995

Reply to Attn of

W

TO: B/Chief Financial Officer
H/Associate Administrator for Procurement
M/Associate Administrator for Space Flight
X/Associate Administrator for Space Access and Technology

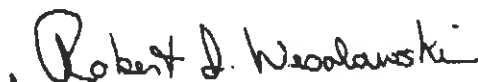
FROM: W/Acting Deputy Assistant Inspector General for Auditing

SUBJECT: Final Report
SPACEHAB Commercial Middeck Augmentation Module (CMAM) Project
Assignment No. A-KE-93-009
Report No. KE-96-002

We have completed our audit of the SPACEHAB CMAM Project. This subject report is a summary of overall results from audit inception. We have also included copies of each of the reports previously issued under this assignment as appendices to this report.

Although the Space Systems Development Agreement and the SPACEHAB CMAM contract were intended to foster the commercialization of space, it is our opinion that the project did not achieve its stated objective. Further, certain provisions of the original agreements left the Agency at financial risk. During the course of the audit, however, these provisions were amended to reduce NASA's risk. Due to the lack of commercial customers, NASA modified the CMAM contract to utilize full capacity of the modules over four flights. The remaining two flights of the CMAM contract will not be flown since the project did not attract any commercial customers.

If you have any questions regarding this audit, please contact Robert Wesolowski, Director, Audit Field Operations Division, or me at 358-1232.


- Carroll S. Little

Enclosure

cc:
JMC/P. Chait
W/P. Smith, JSC
L. Van Camp, KSC
JSC/BU/P. Ritterhouse
KSC/HM/J. Jennings

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ACRONYMS

CMAM	Commercial Middeck Augmentation Module
FY	Fiscal Year
JSC	Johnson Space Center
OACT	Office of Advanced Concepts and Technology
SSDA	Space Systems Development Agreement

SPACEHAB COMMERCIAL MIDDECK AUGMENTATION MODULE (CMAM) PROJECT

KENNEDY SPACE CENTER, FLORIDA

INTRODUCTION

The Office of Inspector General has completed an audit of the SPACEHAB CMAM project. The purpose of this report is to summarize the results of our audit.

BACKGROUND

The National Aeronautics and Space Act of 1958 (Space Act) directs NASA to "... seek and encourage to the maximum extent possible, the fullest commercial use of space." In accordance with the Space Act, NASA developed the Space Systems Development Agreement (SSDA) with SPACEHAB, Incorporated (SPACEHAB). This agreement provides for use of the Space Shuttle to transport SPACEHAB's Commercial Middeck Augmentation Module (CMAM) (see Figures 1 and 2, below). The CMAM provides pressurized space for approximately 50 lockers for "crew-tended" experiments in space. Subsequent to the SSDA, NASA entered into a contract (NAS9-18371) with SPACEHAB for lease and integration services for 200 CMAM lockers to be flown over six flights on the Space Shuttle. This contract, priced at \$184 million, served to (1) fulfill one of the Agency's attempts to award a contract which would promote the commercialization of space and (2) meet the Centers for Commercial Development of Space requirements for middeck locker space to fly crew-tended experiments.

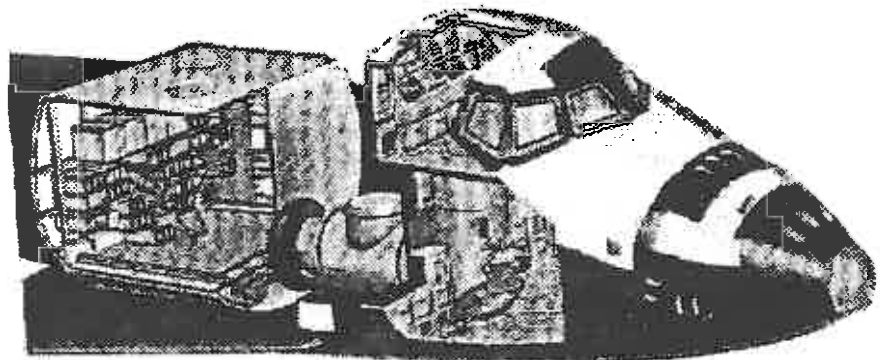


FIGURE 1 - CMAM MODULE

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FIGURE 2 - SPACEHAB LOCKERS

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OBJECTIVE, SCOPE, AND METHODOLOGY

OBJECTIVE

The overall objective of the audit was to evaluate the CMAM project to ensure it effectively fulfills Agency goals in a manner consistent with Agency policies and interests. Specific areas evaluated during the audit included:

1. The impacts of the CMAM contract and the amended SSDA on NASA.
2. The acquisition, allocation, and use of Agency procured locker space.
3. The Agency oversight of CMAM payload processing procedures to ensure protection of the space shuttle and astronaut crew.

SCOPE

The audit scope was limited to the SPACEHAB CMAM activities from contract solicitation to date. Specifically, the scope included reviews of the following:

1. Original and amended SSDA as incorporated in the CMAM contract.
2. CMAM contract and Supplemental Agreements, including the solicitation and award process.
3. Policies, procedures, and actual practices for integrating CMAM and associated payloads into the shuttle.

METHODOLOGY

The audit included (1) discussions with NASA Headquarters, Johnson Space Center (JSC), Kennedy Space Center, and contractor personnel and (2) examinations of Agency and contractor records, including SSDA and CMAM contract terms, and selected internal controls related to the audit objectives.

The audit was conducted in accordance with generally accepted government auditing standards and included such examinations and tests of applicable records, documentation, and internal controls as deemed necessary in the circumstances.

***INTERNAL
CONTROLS
REVIEWED***

Internal controls reviewed are discussed in the attached Rapid Action Reports, as applicable.

***AUDIT FIELD
WORK***

Audit field work was conducted during the period of April 1993 to July 1994. Most of the field work was performed at KSC, Florida. However, field visits were conducted to NASA Headquarters, Washington, DC; JSC, Houston, Texas; and SPACEHAB, Inc., Arlington, Virginia. Assist work was also performed by auditors at the Marshall Space Flight Center, Huntsville, Alabama.

RESULTS OF AUDIT

OVERALL EVALUATION

Although the SSDA and the subsequent CMAM contract were intended to foster the commercialization of space, it is our opinion that this project did not achieve its stated objective. Further, certain provisions of the original agreements left the Agency at financial risk. During the course of the audit, these provisions were amended to reduce NASA's financial risks associated with this project.

Even though SPACEHAB has completed three flights, the company has leased only one locker to a commercial customer, the European Space Agency. Due to this lack of commercial customers, NASA modified the CMAM contract to utilize the module's full capacity over four flights. Upon completion of the fourth flight, 195 of the 200 NASA-leased lockers will have been flown. The remaining five lockers will be accommodated under the SPACEHAB Phase One Contract (NAS 9-19250) for services in support of the Space Shuttle/Russian Space Station Mir missions. Consequently, the CMAM project did not result in commercial customers.

REEVALUATION OF CMAM CONTRACT

As a result of initial audit work, a Rapid Action report, Re-Evaluation of the SPACEHAB Commercial Middeck Augmentation Module (CMAM) Contract, KE-93-008, was issued on September 30, 1993. This report expressed concerns with SPACEHAB's continued financial viability without commercial customers and independent of NASA funding. We recommended that NASA justify continued support of the CMAM contract or limit Fiscal Year (FY) 1994 funding to the completion of Flight 2. The Office of Advanced Concepts and Technology (OACT) responded to our report, stating that the CMAM is the only feasible alternative to meet the requirements for experiments developed by the Centers for Commercial Development of Space. With regard to our concerns about SPACEHAB's financial viability, OACT responded that the Office of Space Flight is the action office for assessing SPACEHAB's ability to pay NASA for shuttle transportation services. Consequently, OACT's justification for continued support of the CMAM contract rested solely on the needs of the Centers for Commercial Development of Space without considering the risks of SPACEHAB's financial viability to NASA as a whole. (See Appendix A.)

APPROPRIATION SHORTFALL

Subsequent to the issuance of KE-93-008, we issued a second Rapid Action Report, Impacts of the SPACEHAB Commercial Middeck Augmentation Module Fiscal Year 1994 Appropriation Shortfall, KE-94-002, on February 17, 1994. This report stated that completion of the CMAM contract was jeopardized because sufficient funds were not appropriated by Congress for FY 1994 and NASA did not plan to reprogram funds to cover the appropriation shortfall. If the Agency terminated the contract for convenience, NASA stood to lose as much as \$68 million plus associated termination costs. We recommended that OACT take appropriate action to meet FY 1994 progress payment requirements, thus ensuring that the CMAM contract was not terminated for the convenience of the Government. The OACT concurred and, working with the Office of Space Flight, as well as the contractor, completed arrangements to address the shortfall avoiding program losses of up to \$68 million. (See Appendix B.)

CMAM CONTRACT NEGOTIATED PRICE

On March 20, 1995, we issued a third rapid action report, Commercial Middeck Augmentation Module (CMAM) Contract Negotiated Price, KE-95-009. JSC negotiated a contract price which was not in NASA's best financial interest. This occurred because Headquarters procurement officials approved deviations from generally accepted procurement practices in order to foster the commercialization of space. If these deviations had not been approved, then JSC could have reduced the negotiated price by \$22.7 million. We recommended that the Associate Administrator, Office of Procurement, ensure that deviations aimed at fostering the commercialization of space are approved only when they are (1) in compliance with procurement regulations and (2) in NASA's best financial interest. We also recommended that the Director of Procurement, JSC, ensure that construction costs recovered by the contractor under the existing CMAM contract, along with potential residual value, be considered when determining the amount to be recovered under subsequent contracts. Procurement officials concurred with our recommendations. During a follow-up review, we noted that JSC procurement officials negotiated reduced lease costs of \$25 million on a subsequent SPACEHAB contract. (See Appendix C.)

SECURITY RISKS TO SHUTTLE AND CREW

At the request of NASA, one other issue was addressed separately in our report, Selected Security Risks to the Space Shuttle and Crew, KE-95-008. This report addressed concerns that some commercial payloads flown under the CMAM project pose security vulnerabilities to the Space Shuttle and crew. Specifically, sealed or self-contained payloads which are delivered directly to the shuttle prior to launch are

not subject to KSC's usual integration procedures. Consequently, NASA does not have reasonable assurance that the lowest feasible level of risk has been provided for these payloads. We recommended that the Office of Space Flight assess the SPACEHAB integration procedures to ensure that security risks to the Space Shuttle and crew are minimized. The Office of Space Flight responded that although there may be security risks associated with flying commercial payloads, these risks are unavoidable.

AUDIT CLOSURE

The SPACEHAB CMAM audit is closed with issuance of this report. All previous report recommendations have been addressed and there are no outstanding actions required by NASA.

GENERAL COMMENT

The NASA Office of Inspector General staff members associated with this review express their appreciation to NASA Headquarters, Johnson Space Center, Kennedy Space Center, and contractor personnel contacted for their courtesy, assistance, and cooperation.

Rapid Action Report
Dated September 30, 1993

KE-93-008

**AUDIT
REPORT**

RAPID ACTION

**Re-Evaluation Of The
SPACEHAB Commercial
Middeck Augmentation
Module (CMAM) Contract**

Kennedy Space Center

September 30, 1993



**National Aeronautics and
Space Administration**

OFFICE OF INSPECTOR GENERAL

Rapid Action Report
Dated September 30, 1993

National Aeronautics and
Space Administration
Washington, D.C.
20546

Reply to Attn of

W

SFP 30 1993

TO: C/Acting Associate Administrator for Advanced
Concepts and Technology

FROM: W/Deputy Assistant Inspector General for Auditing

SUBJECT: Rapid Action Report on the Re-evaluation of the
Spacehab/Commercial Middeck Augmentation Module
(CMAM) Contract
Assignment Nos. A-KE-93-009, A-KE-93-012
Report No. KE-93-008

INTRODUCTION

The NASA Office of Inspector General (OIG) is conducting an audit of Spacehab and the Commercial Middeck Augmentation Module (CMAM). The overall objective of the audit is to evaluate the CMAM project to ensure it effectively fulfills Agency goals in a manner that is consistent with Agency policies and interests. During the survey phase of the audit, certain conditions came to our attention which warrant immediate consideration.

The draft Rapid Action Report was issued on September 3, 1993 and management's response was received on September 24, 1993. Management's response is summarized following the recommendation in the report and included in full as Appendix A of this report.

BACKGROUND

In August 1988, NASA entered into a Space Systems Development Agreement (SSDA) with Spacehab, Inc. (Spacehab). Under the terms of this agreement, NASA provides transportation and associated services for launching Spacehab's middeck augmentation modules into orbit using the Space Transportation System (STS), known as the Shuttle. NASA agreed to charge Spacehab

Rapid Action Report
Dated September 30, 1993

\$28.2 million for six STS missions for a total of \$169.2 million. At this point, NASA was only committed to provide transportation for the Spacehab module. Spacehab's commitment was to pay NASA for the flights and seek commercial customers to lease the module lockers.

Subsequently, in November 1990, NASA entered into a procurement contract, NAS 9-18371, for the lease and associated integration services for 200 of 300 available lockers to be flown over 6 flights. The remaining 100 lockers were available for private sector use.

This contract, priced at \$184 million, served to:

- fulfill one of the Agency's first attempts to award a contract which would promote the commercialization of space; and
- meet the Centers for Commercial Development of Space (CCDS) requirements for middeck locker space to fly man-tended experiments.

In February 1991, subsequent to the CMAM contract award, the SSDA was amended to address the issue of NASA now being a customer on board the Spacehab module. The SSDA was amended to reduce the STS flight fees to reflect the amount of space NASA occupied on the module for flights one through six. Consequently, the total STS charges were reduced from \$169.2 million to \$55 million.

RESULTS OF SURVEY

**CMAM CONTRACT HAS
NOT ACHIEVED
COMMERCIALIZATION
OF SPACE**

The SSDA and CMAM contracts have not achieved their primary objective, the commercialization of space. Commercialization has been unsuccessful because the private sector has been unwilling to pay Spacehab's price, \$1.6 million per locker, and with the exception of the European Space Agency locker, NASA has been the only customer.

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**Space Act
Encourages
Commercialization
of Space**

In the absence of commercial customers, Spacehab requested that NASA accelerate its use of lockers for the first flight launched on June 21, 1993. NASA agreed to the acceleration which increased the number of experiments on flight 1 and added the associated costs to progress payments for flight 1. As a result, NASA increased progress payments through FY 1993 from \$82 million to \$96 million for lease and integration costs. Simultaneously, the acceleration reduced FY 1993 STS revenues from \$14 million to \$0.5 million for flight 1.

The Space Act of 1958 requires NASA to promote and encourage the commercial use of space. The Commercial Use of Space Program, under the Office of Advanced Concepts and Technology, was established to carry out the provisions of the Space Act. The objectives of this Program are to develop opportunities for the expansion of U.S. private sector investment and involvement in civil space activities. The program is designed to:

- Foster close working relations with the private sector and academia that encourage investment in space technology...for commercial purposes.
- Facilitate private sector space activities through improved access to available NASA capabilities and the development of new high technology space markets.
- Encourage increased private sector investment in the commercial use of space independent of NASA funding.
- Implement and support commercial space policy NASA-wide.

**Commercialization
Not Achieved**

The SSDA and CMAM contracts have not achieved their primary objective, the commercialization of space. At the time the contract was awarded, Spacehab was having difficulty finding commercial customers. Although Spacehab had letters of intent, primarily from foreign governments, actual sales were not consummated. This condition has persisted.

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Although Spacehab has engaged in extensive marketing efforts, to date, they have sold only one locker to a customer other than NASA. This locker was sold to the European Space Agency (ESA), not a private sector entity. This sale does not constitute a commercial sale under the provisions of the Commercial Use of Space program.

This effort at commercialization of space has been unsuccessful because private sector customers have been unwilling to pay Spacehab's price, \$1.6 million per locker. The private sector customers may be unwilling to pay Spacehab's price because some have free access to space through other NASA programs while others are uncertain that their investment will be recovered. Consequently, there has been no commercial market for Spacehab's product.

**Commercial
Customers
Not Secured**

Spacehab continues to market lockers for future flights; however, Spacehab requires 18 months lead time to process an experiment for flight. Therefore, additional lockers would be difficult, if not impossible, to process for flights 2 and 3, currently scheduled for November 1993 and May 1994, respectively.

Because Spacehab has not been able to secure commercial customers, the objective of fostering commercialization of space has not been achieved. It also brings into serious question the continuing financial viability of Spacehab without continuing NASA support.

**Accelerated
Costs; Delayed
Revenues**

In July 1991, NASA announced that Flight 1 would slip from December 1992 to April 1993. The following month Spacehab proposed an acceleration of NASA's locker use for flight 1. NASA accepted the proposal because additional experiments could be processed for flight 1, and this benefited both Spacehab and the CCDS program.

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The NASA acceleration is reflected in Table 1.

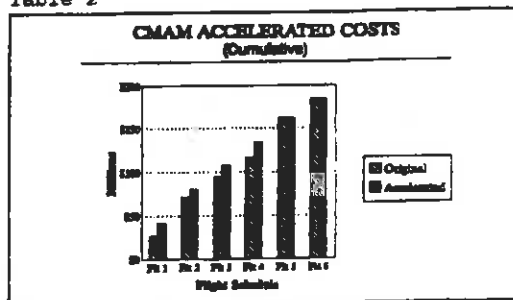
Table 1

NASA CMAM UTILIZATION Original and Accelerated Schedules							
	Flt 1	Flt 2	Flt 3	Flt 4	Flt 5	Flt 6	Total
Original	25	30	25	25	30	25	200
NA 6	41	44	30	30	30	25	200
NA 8	46	44	30	30	30	20	200

NA 6 - 1st Acceleration
 NA 8 - 2nd Acceleration

Although total contract costs were not increased, NASA's up-front contract costs were increased by the acceleration to occupy unsold lockers. For example, costs increased \$14 million for flight 1. (\$41 million less \$27 million) This is illustrated in Table 2.

Table 2

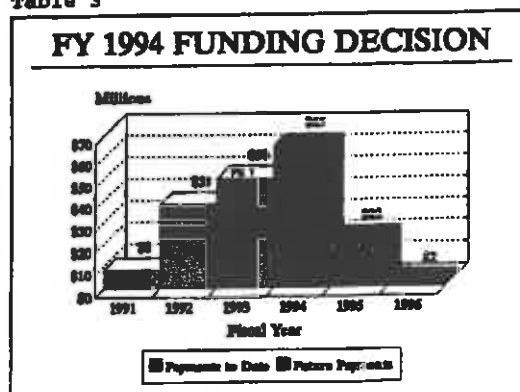


There was no adjustment in funding as a result of the locker acceleration. Although some progress payments increased, others were delayed in conjunction with delays in the launch schedule. The net result of increased costs combined with delayed progress payments fell within available funding.

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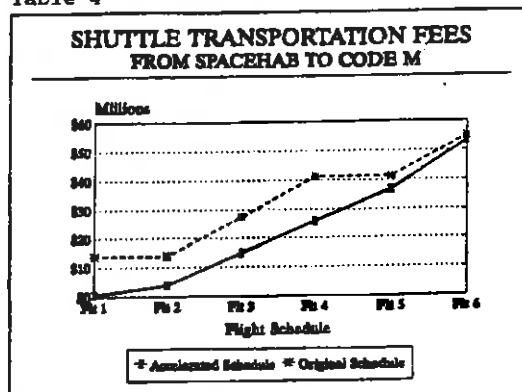
NASA also incurred \$92 million in progress payments prior to first flight as shown in Table 3. (\$96 million less \$4 million final payment)

Table 3



Additionally, STS revenues were reduced from \$14 million to \$0.5 million for the first flight as shown in Table 4.

Table 4



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MANAGEMENT'S RESPONSE

The Office of Advanced Concepts and Technology (OACT) concurs with the recommendations of the subject draft rapid action report (DRAR).

The Policy and Plans Division (Code MB) within the Office of Space Flight is responsible for administration and management of the Space Systems Development Agreement (SSDA), and as such is the action office for assessing SPACEHAB'S ability to pay the debt incurred so far for Shuttle transportation services. Activity on this issue should be referred to the Policy and Plans Division since that office has responsibility for the SSDA.

The Office of Commercial Programs (OCP) foresaw the need for a middeck locker augmentation module to support microgravity experiments being developed by the CCDS program. To satisfy this need, OCP solicited and awarded the Commercial Middeck Augmentation Module (CMAM) contract.

The current requirements of the experiments developed by the CCDSs for middeck locker type flight accommodations are well documented. These requirements continue to be significantly greater than can be accommodated by the Shuttle with its projected flight rate. Currently, the use of the SPACEHAB module is the only feasible alternative that will allow the CCDS experiments timely access to the space environment, the required on-orbit operations, and return to earth. The elimination of the CMAM contract would have a devastating impact on the CCDS program. Thus in our judgement there is a valid justification for the continuance of the CMAM contract.

However strong the demand and need to fly CCDS payloads may be, NASA is concerned about the continued viability of SPACEHAB, Inc. and its ability to meet the obligations under the SSDA and CMAM contract. NASA is attempting to assure itself that SPACEHAB can meet all of its future financial obligations in regard to the SSDA.

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The payment terms under the CMAM contract provided for scheduled progress payments based on milestone accomplishments. These payments, more accurately called milestone payments, reflect a level of effort performed; however, they do not reflect a usable end item until the experiment has flown. As a result, upon completion of flight 1:

- NASA has paid \$96 million in progress payments (approximately 50% of contract value) but,
- has flown only 46 of the 200 contracted lockers (23% of end item delivery.)
- Of the \$96 million, \$14.9 million was paid toward Flight 3 and \$8 million was paid toward Flight 4.

Decision Critical
Prior to FY 1994
Funding

Agency consideration is critical prior to FY 1994, the peak year for contract funding as shown in Table 3. If the FY 1994 funding is approved, then progress payments totaling \$65 million will be paid during the year. Consequently, NASA will have paid substantially all contract costs but will not have received a commensurate portion of the product. Once the FY 1994 funding is committed, it would not be feasible to discontinue the program from a cost-benefit position.

An important factor, termination costs, must be taken into account when considering the continuance of the CMAM project. Under the Limitation of Funds clause in the CMAM contract, NASA has liability for only those funds obligated against the contract through FY 1993. From the contract's inception through FY 1993, NASA has obligated and expended \$96 million of the \$184 million total contract value. Consequently, the balance of the contract value, \$88 million, has yet to be obligated.

Should NASA elect to discontinue the CMAM contract, action should be taken prior to Flight 3 because NASA will have at that time:

- paid \$148 million in progress payments (80% of contract value) and,

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- flown only 2 flights, totaling 90 lockers (45% of end item delivery.)
- paid \$68 million toward lockers scheduled for flights three through six.
- received only \$3.8 million of the \$14.8 million due from Spacehab for STS fees.

Conclusion

The original objective of the SSDA and the associated CMAM contract was to encourage increased private sector investment in the commercial use of space, independent of NASA funding. Because commercial customers have not been secured, this private sector venture cannot succeed independent of NASA funding.

Since there appears to be no commercial market and other alternatives are available to support the CCDS program, NASA may not be able to justify continued support of the CMAM contract. If continued support is not justified, as much as \$88 million in Agency funds could be put to better use.

RECOMMENDATION

In view of Spacehab's inability to secure commercial customers and its unwillingness to provide proof of ability to pay future STS fees, we are recommending that the Acting Associate Administrator for Advanced Concepts and Technology:

- 1) Justify continued support of the CMAM contract.
- 2) If continued support is not justified, limit FY 1994 funding to completion of Flight 2.

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EVALUATION OF MANAGEMENT'S RESPONSE

**SPACEHAB
VIABILITY NOT
CONSIDERED IN
JUSTIFICATION**

Although OACT summarizes in its response that NASA is concerned about the viability of Spacehab, Inc., and its ability to meet the obligations under the CMAM contract, this concern is not included in their justification for continued support of the CMAM contract. OACT's response states that our concerns regarding Spacehab's questionable financial viability without commercial customers should be addressed by the Policy and Plans Division within the Office of Space Flight (OSF).

OACT's position does not recognize that if Spacehab cannot secure commercial customers and subsequently meet its obligations under the SSDA, then Spacehab's fulfillment of the CMAM contract is also at risk. Consequently, these concerns should have been of vital importance to OACT when justifying the continued support of the CMAM contract.

**CMAM IS NOT
ONLY FEASIBLE
ALTERNATIVE**

The OACT states that current requirements for middeck locker type flight accommodations have been documented. However, according to both OACT and OSF officials, the Spacehab module is not the only feasible alternative to support these requirements. For example, 28 CCDS experiments were flown in Fiscal Year 1992 without the benefit of the CMAM.

The CMAM contract justification is based solely on fulfilling the needs of the CCDS program. When deciding which of the available alternatives is most feasible, OACT must consider Spacehab's future viability. If the company is unable to fulfill the terms of the CMAM contract and expended funds for future flights are not recoverable, then the CMAM contract would not have been the most feasible alternative.

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**AGENCY AT
CONSIDERABLE
RISK**

The position taken by OACT, while in the interest of the CCDS program, places the Agency, both OACT and OSF, at considerable risk. Without secured commercial customers to ensure Spacehab's continued viability or proof of Spacehab's ability to pay STS fees for future flights, the Agency is in a position of vulnerability. Specifically, OACT may not be able to recover contract cost associated with future flights (i.e., progress payments to date) and OSF may be unable to collect STS fees earned to date.

CONCLUSION

Based on our evaluation of OACT's overall response, we continue to have concerns regarding the risk associated with continued support of the CMAM contract. We do not believe OACT's justification weighs the considerable risk to NASA as a whole. However, since OACT has elected to continue support of the CMAM contract, we believe that no additional assistance (i.e., accelerating lockers, procuring additional lockers, bartering services for fees, or other similar agreements) should be provided for the benefit of a venture for which commercial success has not materialized.

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OIG RESPONSE TO OTHER OACT ISSUES RAISED

As part of the OACT response, several issues were raised and included in Enclosure 2 of the response. Each issue is summarized below and followed with our comments.

Issue 1

An error consistent throughout the report is the assertion that the CMAM contract was issued to "promote the commercialization of space".

**Mission of
OACT is
Commercialization
Of Space**

The mission of the Commercial Use of Space (CUS) Program, under OACT, is to carry out provisions of the Space Act of 1958 (Act). The Act requires NASA to promote and encourage the commercialization of space. Consequently, the CMAM contract and all other activities under the CUS program should be designed to foster this objective.

The CCDS program was established to carry out the intent of the Act. Subsequently the CMAM contract was awarded in support of the CCDS program. Consequently, both initiatives serve to foster the commercialization of space.

Issue 2

There is conflicting information on pages 2 and 4 concerning the first locker acceleration. It is incorrectly suggested that NASA accelerated lockers only to provide assistance to Spacehab.

**NASA Acceleration
Per Spacehab's
Request**

We do not agree that information on pages 2 and 4 are conflicting. Page 2 clearly states that Spacehab requested that NASA accelerate locker usage on the first flight. It is not suggested that NASA agreed to this only to provide assistance to Spacehab. Although NASA agreed to the acceleration, it was not initiated by NASA, nor was the Agency in a position which necessitated such an acceleration.

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ISSUE 3

Progress payments decreased through FY 1993 from \$117.7M to \$95.6M rather than increased from \$82M to \$96M as a result of acceleration, manifest changes, and congressional appropriated funding. Shuttle revenues were reduced from \$13.8M to \$.5M.

Misinterpretation
Of Cost versus
Funding

The enclosure incorrectly states that progress payments through FY 1993 decreased from \$117.7M to \$95.6 million. A correct statement would be that congressional appropriations decreased through Fiscal Year (FY) 1993 from \$117.7M to \$95.6M. The report correctly states that progress payments, not congressional funding, increased from \$82M to \$96M through FY 1993 because of the locker acceleration. If NASA had not accelerated the locker usage, then contract progress payments would not have increased regardless of fiscal year funding. As stated in the report and explained in discussions with OACT, a distinction must be made between progress payments (cost) and fiscal year appropriations (funding).

The reduction of STS revenues from \$14M to \$.5M is correctly stated in the report. Initial revenues were stated at \$13.8M in OACT's enclosure. With the exception of rounding differences (\$13.8M rounded to \$14M), we fail to see where there is erroneous information regarding these values.

Issue 4

The commercial locker sale was to IntoSpace, a private sector entity, not the European Space Agency. OACT believes that the Space Act means non-U.S. government when it refers to the private sector.

Is Foreign
Government a
Private Sector
Entity under the
Space Act?

Although the actual sale of the locker was to IntoSpace, the sale was made on behalf of and for the use of the European Space Agency. Further, we do not agree with OACT's interpretation of the Space Act that a foreign government is a private sector entity.

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Issue 5

The schedule for CMAM progress payments was patterned after the Shuttle transportation services fee payment schedule. The apparent discrepancy in payments versus delivery can be explained by high up front costs and extensive time required to prepare for each of the six CMAM flights.

***Progress Payment
Provisions Leave
Agency Vulnerable***

The means of financing the CMAM contract would have been more appropriate if patterned after Federal Acquisition Regulations (FAR) as opposed to the STS fee payment schedule. The CMAM contract payment schedule does not conform to standard FAR provisions and consequently leaves the agency vulnerable in terms of payments made versus value received.

The CMAM contract is for lease and associated integration services for 200 lockers to be flown over 6 flights. Consequently, Spacehab's predelivery expenditures should be limited to training the astronauts, coordinating integration activities with the CCDSs, and analytical and physical integration of the experiments into the module. Since Spacehab is a privately-owned, independently-financed business venture, developmental costs, such as constructing the modules and establishing a processing facility, should not be expected to be recovered under the CMAM contract, but rather amortized over the useful life of the assets. As a private venture, Spacehab must assume responsibility for covering up front developmental cost.

Issue 6

Funding in the first three years of the contract was greatly reduced by the first acceleration.

***Cost versus
Funding***

As stated earlier, funding for the first three years of the contract was not reduced because of the NASA acceleration, but because of reduced congressional appropriations.

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Issue 7

Progress payments after Flight 2 will total \$125M, not \$148M. NASA has paid \$45M toward lockers for flights 3 through 5, not \$68M through flights 3 through 6. Based on current NASA usage, SPACEHAB's obligation to NASA is \$1.9M for the first two flights, not \$14.8M.

**Discrepancies
Due to Timing
Differences**

The discrepancies between progress payment amounts and associated percentages referenced in the report and those presented in enclosure 2 of the response are a result of timing differences. The report references a point in time prior to flight 3 while the response apparently references a point just after flight 2. The report emphasizes that action is critical prior to flight 3; therefore, this point in time was used as the basis of analysis. Similarly, just prior to flight 3, Spacehab's obligation for STS fees was \$14.8 million which includes approximately \$11 million due for flight 3.

The report does not state that the \$14.8 million represents charges for the first two flights only.

Issue 8

The DRAM states that the CMAH contract has not encouraged increased private sector investment for the commercial use of space. Access to space afforded to the CCDSs by the CMAH contract provides an incentive for industry to invest in the commercial use of space.

**Spacehab Cannot
Succeed Without
NASA Funding**

The report does not state that the CMAH contract does not encourage increased private sector investment for the commercial use of space. Rather, the report states that Spacehab, as a private sector venture cannot succeed independent of NASA funding.


Robert F. Raspen

Enclosures

cc: H/D. Lee
JMC/J. Keifer
M/J. Pearson
W/L. Van Camp
P. Smith
JSC/BY/G. Martinez
KSC/HM/J. Jennings

**Rapid Action Report
Dated September 30, 1993**

National Aeronautics and
Space Administration
Washington, D.C.
20546

APPENDIX A

SEP 24 1993

Ref: 12 Aug 93

CF

TO: W/Deputy Assistant Inspector General for Auditing

FROM: C/Acting Associate Administrator for
Advanced Concepts and Technology

SUBJECT: Review of Draft Rapid Action Report on the Re-evaluation of the
SPACEHAB/Commercial Middeck Augmentation Module (CMAM)
Contract Assignment Nos. A-KE-93-009, A-KE-93-012

The Office of Advanced Concepts and Technology (OACT) concurs with the recommendations of the subject draft rapid action report (DRAR).

The major reason that the report provides for re-evaluating the need for continued use of the CMAM contract is SPACEHAB's questionable financial viability without commercial customers and unwillingness to provide proof of ability to pay Shuttle transportation service fees. The Policy and Plans Division (Code MB) within the Office of Space Flight is responsible for administration and management of the Space Systems Development Agreement (SSDA), and as such is the action office for assessing SPACEHAB's ability to pay the debt incurred so far for Shuttle transportation services. Code MB has sent letters to SPACEHAB on April 27, June 2, and September 10, 1993, asking for proof of ability to pay this debt and has held several meetings in September with SPACEHAB. In addition your office at Kennedy Space Center sent a letter to SPACEHAB on September 1, 1993, asking for financial information to make a similar assessment. Therefore further activity on this issue should be referred to the Policy and Plans Division, since that office has responsibility for the SSDA.

In 1985 the Office of Commercial Programs (OCP) established the Centers for the Commercial Development of Space (CCDS) to take advantage of the unique properties of space by developing technologies that contained significant potential for commercial applications. In addition to ground based activities, the CCDSs were to develop experiments that would be flown to low earth orbit by NASA. In 1989 OCP recognized that Shuttle middeck lockers would not provide sufficient capacity in the future due to the large number of small experiments being developed by the CCDSs and the other microgravity research program codes. OCP foresaw the need for a middeck locker augmentation module, advocated the budget to obtain these services and solicited and awarded the Commercial Middeck Augmentation Module (CMAM) contract. Both CMAM and the CCDS experiments conducted in it to date have been very successful. The CMAM contract is on schedule and on budget and SPACEHAB has met the requirements of the CMAM contract to date.

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Rapid Action Report
Dated September 30, 1993

2

The current requirements of the experiments developed by the CCDSs for middeck locker type flight accommodations are well documented. These requirements continue to be significantly greater than can be accommodated by the Shuttle with its projected flight rate. Currently the use of the SPACEHAB module is the only feasible alternative that will allow the CCDS experiments timely access to the space environment, the required on-orbit operations, and return to earth. As can be seen from the graphical display provided as enclosure 1, even with the currently contracted CMAM services, there will still be a significant number of the CCDS experiments that will not be flown in the desired timeframe. The elimination of the CMAM contract would have a devastating impact on the CCDS program. Thus in our judgment there is a valid justification for the continuance of the CMAM contract.

However strong the demand and need to fly CCDS payloads may be, NASA is concerned about the continued viability of SPACEHAB, Inc. and its ability to meet the obligations under both the SSDA and the CMAM contract. NASA is attempting to assure itself that SPACEHAB can meet all of its future financial obligations in regard to the SSDA.

The recommendations are considered closed upon issuance of the final report.

In addition to our response to the DRAR recommendations, we enclose comments on some differences of interpretation, several errors and incorrect assertions contained in the report.


Gregory M. Reck

4 Enclosures:

1. Graph of Code C Demand vs Middeck Locker Availability
2. Corrections to Information Contained in the Body of the Draft Rapid Action Report
3. Graph of Fiscal Year Funding Profile for the CMAM Contract
4. Comparison of CMAM and Shuttle Reimbursement Schedules

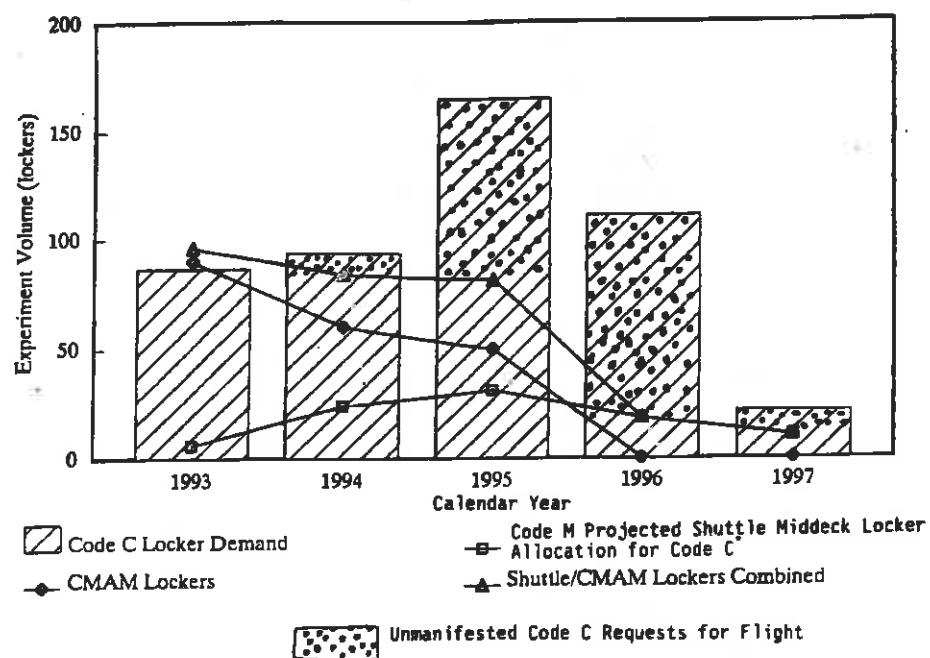
cc:

BR/W. Dimmer
CM/S. Fruchter
G/E. Frankle
GS/J. Edwards
H/D. Lee
HS/M. LaBeau
JMC/J. Kiefer
LB/J. Meredith
MB/R. Tucker
W/P. Smith, JSC
/L. Van Camp, KSC
JSC/1A161/D. Bland
/BY/G. Martinez
KSC/HM/J. Jennings

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Rapid Action Report
Dated September 30, 1993

Page 1 of 1

Code C Demand vs Middeck Locker Availability

Based on May 21, 1993 Code M Assessment of Locker Allocations

A-3

Rapid Action Report
Dated September 30, 1993Enclosure 2
Page 1 of 3

An error consistent throughout the report is the assertion that the CMAM contract was issued to "promote the commercialization of space." In fact, the intent of the CMAM contract, as clearly stated in the Commerce Business Daily notice, the CMAM statement of work, and the OMB budget narratives, was to obtain an augmentation to the Shuttle middeck lockers to "provide CCDS payloads with timely access to space" and "to elevate commercial payloads to primary payload status." After the CMAM contract had been justified based on programmatic needs, the form of the contract, i.e. anchor tenancy, was used to facilitate the development of commercial space infrastructure. It is the Space Systems Development Agreement (SSDA), as stated in its preamble, that has the primary goal to "seek and encourage, to the maximum extent possible, the fullest commercial use of space."

- There is conflicting information on pages 2 and 4 concerning the first locker acceleration. The events as related on page 4 are correct and show the primary reason NASA accepted the acceleration was that the first flight was delayed more than 4 months because of Shuttle delays. Since the major objective of the CMAM contract was to provide timely access to space and the first flight was now within one month of the original second flight date, some payloads originally scheduled for the second flight were moved to the first flight. Thus on page 2, it is incorrectly suggested that NASA accelerated lockers only to provide assistance to SPACEHAB. Also on page 5 it is incorrectly stated that the acceleration was done "to occupy unsold lockers."

On page 2, progress payments through FY 1993 decreased from \$117.7M to \$95.6M as a result of the acceleration, shuttle manifest changes and congressional appropriated funding. Payments did not increase from \$82M to \$96M as stated in the DRAR. The first acceleration reduced anticipated Shuttle revenues from \$13.8M to \$5.0M (FY 1988 \$). This was later reduced to \$0.5M based on actual OACT use levels and the second acceleration. These erroneous values are also referenced on page 6.

It is stated on page 3 that SPACEHAB's sale of one locker to the European Space Agency "does not constitute a commercial sale" because it is not a private sector entity. This sale was actually to IntoSpace, a private sector entity. OACT also believes that the Space Act clearly means non-U.S. government when it refers to the private sector, so even a sale to a foreign government does constitute a commercial sale.

Rapid Action Report
Dated September 30, 1993Enclosure 2
Page 2 of 3

The DRAR takes issue with the progress payment schedule in the CMAM contract. The schedule for the CMAM progress payments was patterned after the Shuttle transportation services fee payment schedule. This payment schedule begins 33 months prior to launch, to reserve space on the Shuttle and pay for integration activities required prior to flight, with total payment received 3 months prior to launch. The CMAM schedule begins at 18 months prior to launch with the final payment made 1 month after launch. When these two schedules are compared, see enclosure 3, it is clear that the CMAM schedule is more beneficial to NASA than using the model NASA imposes on its reimbursable customers.

The DRAR also suggests that NASA is paying well in advance for the services provided and says they are "more accurately called milestone payments," reflecting "a level of effort performed." However, the contractor is paid when contractually specified milestones are completed. The payment does not reflect the level of effort performed. The level of effort performed by the contractor is irrelevant to NASA. As stated in Clause B.3 PAYMENT SCHEDULE, "the contractor shall be paid progress payments based on a percentage or stage of completion." The contractor will be paid only when the required milestone is completed, regardless of the effort he performed to complete the milestone. Also as FAR 32.501-2 states, the contracting officer may provide unusual progress payments if the contract necessitates predelivery expenditures that are large in relation to contract price and in relation to the contractor's working capital and credit. There were significant up front requirements with the CMAM contract, including constructing the modules and mockups, establishing integration facilities, training the astronauts, coordinating integration activities with the CCDs, and analytical and physical integration of the experiments into the module. The apparent discrepancy in payments versus delivery can be explained by these high up front costs and the extensive time required to prepare for each of the six CMAM flights. The milestones are predicated on this basis. Consequently, NASA has paid over 50% of the contract value to date, but this covers more than just the first flight. The payments to date cover elements of the first four flights that the contractor has successfully completed, and thus earned.

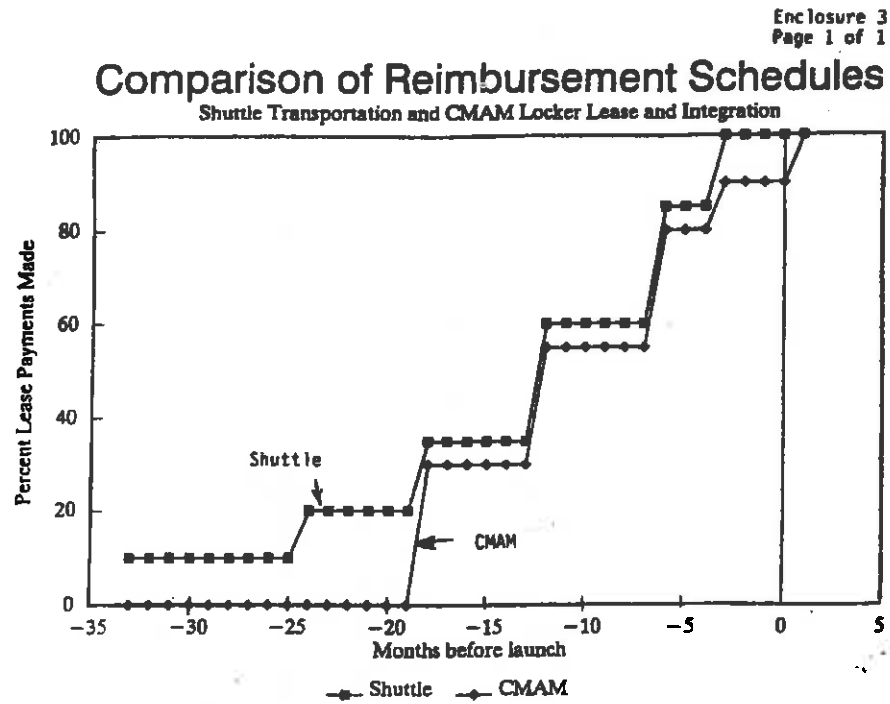
It is suggested on page 5 that NASA's up front costs were increased by the first acceleration. Enclosure 4 clearly shows that funding in the first 3 years of the contract was greatly reduced by the acceleration. In fact funding was reduced by more than \$22M through FY 1993.

Rapid Action Report
Dated September 30, 1993Enclosure 3
Page 3 of 3

On page 7, the \$96M spent upon completion of flight 1 includes \$31.7M for flight 2. Payments toward flight 2 were not referenced even though payments for flights 3 and 4 were presented. Also progress payments after flight 2 will total \$125M not \$148M; reflecting 68% of contact value, not 80%. NASA has paid \$45M toward lockers scheduled for flights 3 through 5, not \$68M on flights 3 through 6 as stated on page 8. Thus \$59M will be required to obtain the remaining services. Based on current NASA usage, SPACEHAB's obligation to NASA is \$1.9M for the first two flights, not \$14.8M. Since the CMAM contract has been modified twice to change NASA's usage, the corresponding reimbursements for these 2 flights have been reduced. This of course was accompanied by decreased NASA use on later flights and a corresponding increase in transportation reimbursements. However, after the second flight SPACEHAB will have incurred an additional \$26M in deferred Shuttle transportation service fees for flights 3 through 7.

Finally, the DRAR states that the CMAM contract has not encouraged increased private sector investment for the commercial use of space. It should be noted that the access to space afforded to the CCDSs by the CMAM contract provides an incentive for industry to invest in the commercial use of space. To date these investments total \$250M of cash and in kind contributions.

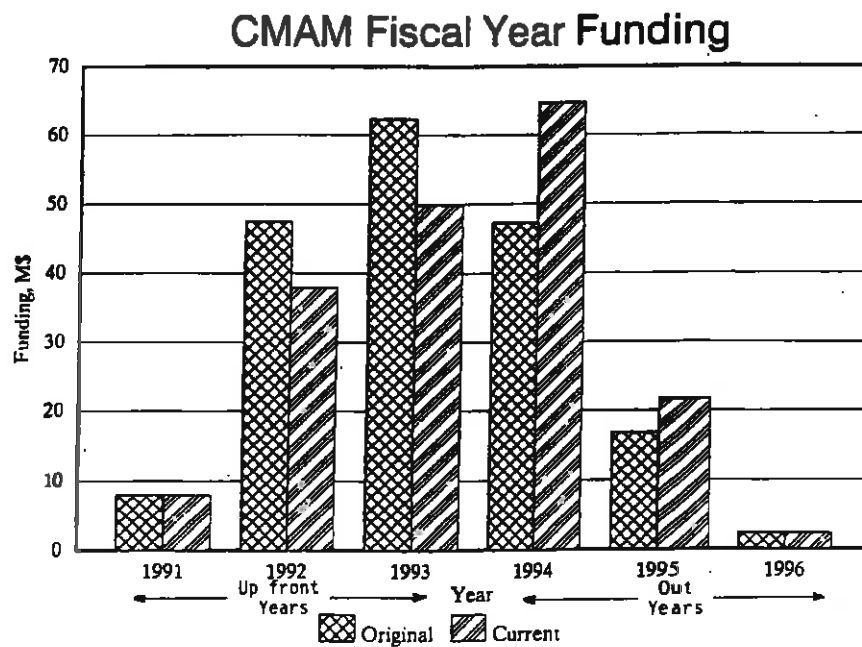
Rapid Action Report
Dated September 30, 1993



A-7

A-1-23

Enclosure 4
Page 1 of 1



A-8

Rapid Action Report
Dated February 17, 1994

KE-94-002

**AUDIT
REPORT**

RAPID ACTION

**IMPACTS OF THE SPACEHAB
COMMERCIAL MIDDECK
AUGMENTATION MODULE
FISCAL YEAR 1994
APPROPRIATION SHORTFALL**

KENNEDY SPACE CENTER

FEBRUARY 17, 1994



OFFICE OF INSPECTOR GENERAL

Rapid Action Report
Dated February 17, 1994

National Aeronautics and
Space Administration
Washington, D.C.
20546

Reply to Attn of
W

February 17, 1994

TO: C/Acting Associate Administrator for Advanced Concepts
and Technology

FROM: W/Assistant Inspector General for Auditing

SUBJECT: Rapid Action Report on the Impacts of the SPACEHAB
Commercial Middeck Augmentation Module (CMAM)
Fiscal Year 1994 Appropriation Shortfall
Assignment Nos. A-KE-93-009 and A-KE-94-001
Report No. KE-94-002

INTRODUCTION

Audit Objective

The NASA Office of Inspector General is conducting an audit of the SPACEHAB Commercial Middeck Augmentation Module (CMAM) project. The overall objective of the audit is to evaluate the CMAM project to ensure it effectively fulfills Agency goals in a manner consistent with Agency policies and interests. Since the issuance of Rapid Action Report No. KE-93-008, Reevaluation of the SPACEHAB/CMAM Contract, additional information has come to our attention which warrants management's immediate consideration.

The discussion draft Rapid Action Report was issued on November 23, 1993, and management's response was received on January 31, 1994. Management's response is summarized following the recommendation in the report and included in full as Appendix A of this report. (The draft report was omitted due to management's concurrence with the recommendation as presented in the discussion draft.)

**Rapid Action Report
Dated February 17, 1994****Background**

On September 30, 1993, our office issued a Rapid Action Report (KE-93-008) which expressed concerns with SPACEHAB's continued financial viability without commercial customers and independent of NASA funding. Consequently, we recommended that NASA justify continued support of the CMAM contract or limit Fiscal Year (FY) 1994 funding to the completion of flight 2.

**OACT Believed CMAM
Essential to CCDS
Program**

The Acting Associate Administrator, Office of Advanced Concepts and Technology (OACT), responded to our report, stating that the SPACEHAB module is the only feasible alternative to meet the requirements for experiments developed by the Centers for Commercial Development of Space (CCDS's). He indicated that these requirements are well documented and elimination of the CMAM contract would have a devastating impact on the CCDS program. Thus, in OACT's judgment, there was justification for the continuance of the CMAM contract.

With regard to our concerns about SPACEHAB's financial viability, the response indicated that the Office of Space Flight, Policy and Plans Division (Code MB) is responsible for the administration and management of the Space Systems Development Agreement. Therefore, Code MB is the action office for assessing SPACEHAB'S ability to pay the debt for Shuttle transportation services. Consequently, OACT's justification for continued support of the CMAM contract rested solely on the needs of the CCDS program without considering the risks of SPACEHAB's financial viability to NASA as a whole.

Based on this justification, OACT maintained support of the contract and continued to seek full funding for FY 1994 in the amount of \$65 million.

**Rapid Action Report
Dated February 17, 1994**

RESULTS OF AUDIT

**CMAM Contract
Jeopardized by
Appropriation
Shortfall**

The completion of the CMAM contract has been jeopardized because sufficient funds were not appropriated by Congress for FY 1994 and NASA does not plan to reprogram funds to cover the appropriation shortfall. As a result, the Agency will have to terminate for convenience or take other appropriate actions to cover the appropriation shortfall. If the Agency terminates the CMAM contract for convenience, then NASA stands to lose as much as \$68 million plus associated termination costs.

The CMAM contract (NAS 9-18371) "Schedule for Allotment of Funds" provided for \$64.7 million for FY 1994. However, Congress appropriated only \$45 million for the CMAM contract. Consequently, there is a shortfall of approximately \$20 million for FY 1994.

**Results of
Shortfall**

The Chase Manhattan Bank (Chase) has expressed a serious concern to SPACEHAB that the shortfall will result in termination of the CMAM contract for convenience of the Government. The \$45 million appropriated is sufficient to cover CMAM progress payments only through March 1994 as shown in Table 1.

SPACEHAB relies on these progress payments to service its outstanding line of credit with Chase and other financial institutions. According to NASA officials, OACT does not plan to reprogram funds to cover the shortfall. Therefore, the additional \$20 million anticipated will not be available to service the outstanding line of credit beyond March 1994.

Rapid Action Report
Dated February 17, 1994

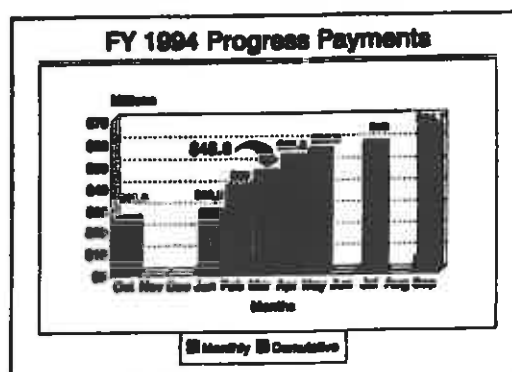


Table 1

**Lenders
Protected
Against
Appropriation
Shortfall**

SPACEHAB secured contingency insurance at contract inception to protect SPACEHAB's lenders in the event of an appropriation shortfall. For the banks to benefit from this insurance, a termination must occur prior to the policy expiration on February 26, 1994. According to NASA officials, SPACEHAB could request that NASA terminate for convenience in order to invoke Contingency Insurance provisions.

Chase correspondence to SPACEHAB indicated that the credit agreement will not be restructured to accommodate the appropriation shortfall. Chase is pressing SPACEHAB to alleviate this condition and has stated that the optimal solution is for the Contingency Policy underwriters to immediately pay off the entire outstanding debt under the credit agreement.

Should the insurance providers pay off SPACEHAB's line of credit, there is speculation that the insurers may assume the position of financier for SPACEHAB. It is unknown how such an arrangement would affect SPACEHAB's assets which include the CMAM contract.

Rapid Action Report
Dated February 17, 1994

**Impacts of
Termination
to NASA**

A termination for the convenience of NASA prior to insurance expiration would result in the loss of:

- \$25.6 million in FY 1994 progress payments made through October 25, 1993, and
- \$23 million in prior year progress payments made towards flights 3 and 4.

A termination for the convenience of NASA after insurance expiration would result in the loss of:

- \$45 million in FY 1994 progress payments paid through March 1994, and
- \$23 million in prior year progress payments made towards flights 3 and 4.

Conclusion

Because of SPACEHAB's financial dependency on NASA, the appropriation shortfall will have a significant impact on SPACEHAB's program within the next 3 months. While various options are being considered to address the shortfall, it is essential that the alternative chosen is in NASA's best interest. Although a termination for convenience of the Government would be a positive solution to SPACEHAB's lenders, it would result in as much as \$68 million (\$45 million in FY 1994 and \$23 million in prior years) in program losses to NASA. Therefore, we believe steps should be taken to ensure that a termination for convenience of the Government does not occur.

Rapid Action Report
Dated February 17, 1994

RECOMMENDATION

The Acting Associate Administrator, Code C, to prevent program losses of as much as \$68 million, should take appropriate action to meet FY 1994 progress payment requirements, and thus ensure that the CMAM contract is not terminated for the convenience of the Government.

**MANAGEMENT'S
RESPONSE**

OACT concurs with the report recommendation. OACT, working with the Office of Space Flight and SPACEHAB, has successfully completed arrangements to address the FY 1994 appropriation shortfall. SPACEHAB's restructuring of its financing arrangements, in conjunction with changes made in the SSDA and CMAM contract, has resulted in lower funding requirements as recommended by Congress.

**EVALUATION OF
MANAGEMENT'S
RESPONSE**

The actions initiated by OACT satisfactorily address the audit recommendation. The rescheduling of launch dates will result in FY 1994 funding requirements in accordance with the FY 1994 Congressional appropriation.


Karla W. Corcoran

Enclosure

cc:
H/D. Lee
JMC/J. Keifer
H/J. Pearson
W/L. Van Camp
P. Smith
JSC/BY/G. Martinez
KSC/HM/J. Jennings

Rapid Action Report
Dated February 17, 1994

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

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FEB 1 1994

ASSISTANT INSPECTOR GENERAL
 FOR AUDITING

APPENDIX A



Reply to Airmail:

CF

JAN 31 1994

TO: W/Assistant Inspector General for Auditing

FROM: C/Acting Associate Administrator for
 Advanced Concepts and Technology

SUBJECT: Draft Rapid Action Report on the Impacts of the SPACEHAB
 Commercial Middeck Augmentation Module (CMAM) Fiscal Year
 (FY) 1994 Appropriation Shortfall
 Assignment Nos. A-KE-93-009, A-KE-94-001

The Office of Advanced Concepts and Technology (OACT) concurs with the OIG recommendation in the subject report.

OIG Recommendation:

The subject draft rapid action report (DRAR) recommends that "the Acting Associate Administrator, Code C, to prevent potential program losses of as much as \$68 million, should take appropriate actions to meet FY 1994 progress payment requirements, and thus ensure that the CMAM contract is not terminated for the convenience of the Government."

Management Response:

OACT concurs with this recommendation. OACT has been working with the Office of Space Flight and SPACEHAB, Inc. to reach a solution to both the NASA appropriations shortfall and the SPACEHAB transportation liability issues. Beginning in October 1993, when the appropriations bill was signed into law, NASA and SPACEHAB, Inc. held numerous meetings that culminated recently with SPACEHAB, Inc. successfully completing all re-financing arrangements. This, in conjunction with changes made on December 23, 1993, to the SPACEHAB launch dates in the Space Systems Development Agreement (SSDA), has allowed NASA and SPACEHAB, Inc. to reduce the FY 1994 funding levels in the CMAM contract, reflecting the lower funding profile as recommended by Congress. The change to the CMAM contract was signed by SPACEHAB, Inc. on December 29, 1993, and is currently in final review at the Johnson Space Center. Additional information on SPACEHAB, Inc.'s financial arrangements is contained in the enclosure.

Management considers this recommendation closed.

Gregory M. Reck

Enclosure

A-1

Rapid Action Report
Dated February 17, 1994



APPENDIX A

CONTRACTING OFFICE
 Suite 100
 600 Jefferson Davis Hwy
 Arlington, VA 22202-4302
 Phone (703) 555-0200
 Fax (703) 555-0207

3 January 1994

Mr. Jack Levine
 Mail Code CF
 NASA Headquarters
 Washington, DC 20546

Dear Mr. Levine,

I am pleased to inform you that we have successfully completed all the arrangements we have been working on relative to our re-financing. McDonnell Douglas was an active participant in the efforts and we paid them as expected. Assuming the CMAM funding stays on the currently anticipated schedule, we foresee no interruption in our work process as we go forward with our CMAM contract work.

I signed the CMAM Contract Supplemental Agreement 14 on 12/29/93 and it has been forwarded to the Contracting Officer. We are reviewing the proposed changes to the SSDA and we are very close to agreement on the final details.

For your information, Chase Manhattan Bank, N.A. is now only an agent to handle our operating accounts. They are no longer a lender. However, NASA should continue to send payments due on the CMAM Contract to the same place and account as in the past. NASA should see no difference in the financial arrangements we currently have. We will distribute our funds as necessary in our new arrangement.

I again want to thank NASA for its patience and understanding as we have made our way through some very trying times due to the reduction in FY94 funds appropriated for the CMAM contract. NASA's cooperation and assistance have helped make the program stronger without compromising in any way the integrity or contractual position of the Agency.

Sincerely,


 Alvin L. Rogers
 President/CEO

FLORIDA OPERATIONS • 600 Magnolia Road • Cape Canaveral, FL 32903 • Phone (407) 616-3401 • Fax (407) 616-3402
 HOUSTON OPERATIONS • 1400 Space Center Blvd. • Houston, TX 77058 • Phone (713) 285-5770 • Fax (713) 285-5771

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Rapid Action Report
Dated March 20, 1995

KE-95-009

**AUDIT
REPORT**

RAPID ACTION

**COMMERCIAL MIDDECK
AUGMENTATION MODULE (CMAM)
CONTRACT NEGOTIATED PRICE**

KENNEDY SPACE CENTER, FLORIDA

March 20, 1995



OFFICE OF INSPECTOR GENERAL

Rapid Action Report
Dated March 20, 1995

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



Reply to ATR of:

W/KSC-OIG/AKE95002

March 20, 1995

TO: H/Associate Administrator for Procurement

FROM: W/Deputy Assistant Inspector General for Auditing

SUBJECT: Final Rapid Action Report
SPACEHAB Commercial Middeck Augmentation Module (CMAM)
Contract Negotiated Price
Assignment Nos. A-KE-93-009, A-KE-95-002
Report No. KE-95-009

The NASA Office of Inspector General has completed the audit work for the SPACEHAB CMAM contract negotiated price. The negotiations for the CMAM contract were evaluated for compliance with Federal Acquisition Regulation and reasonableness of price.

The total effect of the SPACEHAB CMAM negotiations was a contract with terms which were not in NASA's best financial interest. Cost avoidance of approximately \$22.7 million could have been achieved on the CMAM contract. Although fostering the commercialization of space is consistent with the Space Act, ensuring the success of commercial ventures at the risk of other program losses may be beyond the scope of the Space Act and the CMAM contract. In future contracts with SPACEHAB or other commercial ventures, lessons learned on the CMAM contract and points outlined in the enclosed report should be taken into consideration.

A written response was received from the Procurement Office at NASA Headquarters on January 24, 1995. Management's comments have been incorporated, in part, in the report and are attached, as a whole, as Appendix A to the report.

In accordance with NMI 9910.1B, we plan to review the subsequent contract with SPACEHAB for services in support of the Space Shuttle/Russian Space Station Mir missions. The purpose of this review will be to ensure that our concerns are properly addressed in the upcoming procurement negotiations. Further, we request to be included in the concurrence cycle for closure of this recommendation.

Rapid Action Report
Dated March 20, 1995

2

If you have any questions or need additional information, please call Robert Wesolowski,
Director, Audit Field Operations, or me at (202) 358-1232.


Robert F. Raspen

Enclosure

cc:
JMC/D. Green
W/P. Smith, JSC
L. Van Camp, KSC
JSC/BU/P. Ritterhouse (10 copies)

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**Rapid Action Report
Dated March 20, 1995**

ACRONYMS

CCDS	Centers for Commercial Development of Space
CMAM	Commercial Middeck Augmentation Module
DCAA	Defense Contract Audit Agency
FAR	Federal Acquisition Regulation
JSC	Johnson Space Center
KSC	Kennedy Space Center
SSDA	Space Systems Development Agreement

**Rapid Action Report
Dated March 20, 1995****INTRODUCTION**

The Office of Inspector General is conducting an audit of the SPACEHAB Commercial Middeck Augmentation Module (CMAM) Project. The overall objective of the audit is to evaluate the CMAM project to ensure it effectively fulfills Agency goals in a manner that is consistent with Agency policies and interests. During the audit, certain conditions came to our attention which warrant management's early consideration.

A Draft Rapid Action Report addressing these conditions was issued on December 22, 1994. Management's response was received on January 24, 1995. The response is included, in part, in the report and, in whole, as an appendix to this report.

BACKGROUND

The National Aeronautics and Space Act of 1958 (Space Act) directs NASA to "seek and encourage to the maximum extent possible, the fullest commercial use of space." In accordance with the Space Act, NASA developed the Space Systems Development Agreement (SSDA). The SSDA is a special launch services agreement between NASA and a private entity for use of the Space Shuttle for new space industry ventures.

In August 1988, NASA entered into an SSDA with a private company, SPACEHAB, Incorporated (SPACEHAB). Under the terms of this agreement, NASA provides transportation and associated services for launching the company's middeck augmentation modules into orbit. The module is a privately developed, pressurized facility to support crew-tended experiments in space for scientific and industrial uses.

Subsequent to the SSDA, NASA entered into a contract (NAS9-18371) with SPACEHAB for lease and integration services for 200 lockers to be flown over six flights on the Shuttle. This contract, priced at \$184 million (approximately \$921,000 per locker) served:

- To fulfill one of the Agency's attempts to award a contract which would promote the commercialization of space.
- To meet the Centers for Commercial Development of Space (CCDS) requirements for middeck locker space to fly crew-tended experiments.

Rapid Action Report
Dated March 20, 1995***SUBSEQUENT
CONTRACT TO BE
NEGOTIATED***

During the audit of the SPACEHAB CMAM Project, we questioned cost elements included in the negotiated price of the CMAM contract. Because NASA is preparing to negotiate a subsequent contract with SPACEHAB, this issue warrants management's early consideration.

Recently, NASA accepted an unsolicited proposal from SPACEHAB. The Proposal covers the lease of modules and acquisition of payload integration and operations services in support of Space Shuttle missions to the Russian Mir Space Station beginning in early 1996. The estimated cost for the basic period of performance is \$60.0 million and \$16.5 million for Options I, II, and III, for a total firm-fixed price of \$109.5 million. JSC procurement officials stated that a Letter Contract is planned which would permit SPACEHAB to begin work immediately. Negotiations to definitize the contract will begin after receipt of SPACEHAB's full proposal.

Rapid Action Report
Dated March 20, 1995**OBJECTIVE, SCOPE, AND METHODOLOGY****OBJECTIVE**

The overall objective of the audit was to evaluate the CMAM project to ensure it fulfills Agency goals in a manner consistent with Agency policies and interests. Specifically, the negotiations for the acquisition of locker space were evaluated for compliance with Federal Acquisition Regulation (FAR) requirements and reasonableness of price.

SCOPE

The audit scope was limited to the SPACEHAB CMAM activities from contract solicitation to date. Specifically, the scope included reviews of the following:

1. Original and amended SSDA as incorporated into the CMAM contract.
2. CMAM contract and Supplemental Agreements, including the solicitation and award process.

METHODOLOGY

The audit included (1) discussions with NASA Headquarters and Johnson Space Center (JSC) procurement personnel and (2) examinations of Agency and contractor records and selected internal controls related to the audit objective.

The audit was conducted in accordance with generally accepted Government auditing standards and included such examinations and tests of applicable records, documentation, and internal controls as deemed necessary in the circumstances.

**INTERNAL CONTROLS
REVIEWED**

We identified a need to strengthen contract negotiation procedures to ensure that NASA obtains a fair and reasonable price. The controls in this area are discussed in detail in the Observation and Recommendations section of this report.

AUDIT FIELD WORK

Audit field work was conducted during the period of April 1993 to May 1994. Most of the field work was performed at Kennedy Space Center (KSC), Florida. However, field visits were conducted to NASA Headquarters, Washington, DC, and JSC, Houston, Texas.

**Rapid Action Report
Dated March 20, 1995****OBSERVATION AND RECOMMENDATIONS*****NEGOTIATED CMAM
CONTRACT PRICE
WAS EXCESSIVE***

JSC negotiated a contract price which was not in NASA's best financial interest. This occurred because Headquarters procurement officials approved deviations from generally accepted procurement practices in an effort to foster the commercialization of space. Specifically, the negotiated price included cost elements generally prohibited under the FAR. If these cost elements had not been approved, then a reduction of approximately \$22.7 million could have been achieved on the CMAM contract negotiated price. In addition, we noted that a cost allocation (recovery) method, liberal to the contractor, was accepted as a basis for negotiating the contract price. Use of an alternative allocation method could have further reduced the negotiated price to NASA.

The FAR 31.102 states that the objective for negotiating a firm-fixed-price contract is to negotiate a price that is fair and reasonable. When cost analysis is performed, contract cost principles and procedures, as described in FAR 31.2, shall be used in the pricing of fixed price contracts. In the absence of price competition or comparisons with prior purchases of similar services made on a competitive basis, these FAR provisions provide a basis for arriving at a fair and reasonable price. The CMAM contract was award by the JSC Procurement Office with guidance from the NASA Headquarters Procurement Office. In our review of the solicitation, negotiation, and final award of the contract, we made the following observations.

***REASONABLENESS OF
COST ELEMENTS***

SPACEHAB's total program costs for six flights were used as the basis for their price proposal. Since NASA contracted for 200 of the 300 available lockers (50 lockers per flight), two-thirds of the costs were proposed as NASA's share.

SPACEHAB submitted financing costs such as bank fees and interest as part of their total program costs to be shared by NASA. The Defense Contract Audit Agency (DCAA) questioned the entire amount (\$30.7 million) because FAR 31.205-20 indicates that these costs are unallowable. Although the JSC Procurement Office determined that the interest expense was overstated by \$7.2 million, procurement officials decided that the remaining \$23.5 million in financing costs should be allowed. Procurement officials justified inclusion of these financing costs in order for SPACEHAB to remain a commercially-viable, financially-stable company. JSC

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Dated March 20, 1995

agreed to inclusion of \$15.7 million in financing costs (23.5 million x 2/3). See Exhibit, page 10.

SPACEHAB submitted insurance premiums for five policies totaling \$41.4 million as part of their total program costs to be shared by NASA. DCAA questioned \$8.0 million of premium cost because it was unsupported and \$1.6 million of premium costs because it was in the form of interest. (One policy allowed for payment at the end of the year with interest.) JSC took no exception to any of the insurance costs which were based on quotes received from SPACEHAB's insurance company. The reasonableness of the premiums was not verified with other sources, nor was the inclusion of the interest questioned by JSC. Consequently, the final negotiated price included \$1 million interest on insurance premiums (\$1.6 million x 2/3). See Exhibit.

**TERMINATION
LIABILITY INSURANCE**

Contract negotiations were reopened to address the inclusion of termination liability insurance in the event Congress failed to appropriate funds for either the Space Shuttle Program or the CMAM contract. The CMAM Request for Proposal (RFP 90BC4-92-0-1P) specified that no such termination liability coverage would be provided in the contract. Procurement officials at NASA Headquarters subsequently reversed this position and allowed \$4 million (6 million x 2/3) as part of the final negotiated contract price. This was allowed because commercial financing for the SPACEHAB venture would not have been approved without provision for this coverage.

Cost avoidances could have been achieved by (1) disallowing \$15.7 million in financing costs, (2) disallowing \$10 million of interest on insurance premiums, and (3) disallowing \$4.0 million in termination liability insurance. These reductions totaling \$20.7 million, combined with the resulting reduction of \$2.0 million in profit, could have resulted in a total cost avoidance of approximately \$22.7 million on the CMAM contract (\$15.7 + \$1.0 + \$4.0 + \$2.0 million). See Exhibit.

**COST RECOVERY
ALLOCATION**

JSC agreed to a cost allocation for SPACEHAB's modules which would provide full recovery of module construction cost at the end of six flights. Two-thirds of the construction cost would be recovered under the CMAM contract through NASA's lease of 200 of the 300 available lockers to be flown over six flights. Consequently, of the \$92.2 million module construction cost, \$61.5

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Dated March 20, 1995

million ($\$92.2 \times 200/300$) will be recovered under the CMAM contract. The remaining one-third (\$30.7) can be recovered by the commercial lease of the remaining 100 lockers.

Although the cost allocation method used was allowable, other viable alternatives were available. For example, one alternative more favorable to the Government was known to procurement officials prior to negotiation of the contract. The procurement pre-negotiation memorandum states that the SSDA has been renegotiated to give SPACEHAB two additional flights beyond the six flights covered under the CMAM contract. Further, the memorandum states that an argument could be made that SPACEHAB's pricing approach should be to spread the development costs over at least eight flights.

Had this approach been pursued, JSC could have reduced the negotiated contract price by over \$15 million. The available lockers would have increased from 300 to 400. Consequently, SPACEHAB could lease additional lockers to the commercial market, thus, spreading their construction costs over 400 lockers at the end of eight flights. The potential reduction of \$15 million is calculated as follows:

Construction costs	\$92.2 million
2/3 Cost recovery over 6 flights (\$92.2 x 200/300 lockers)	\$61.5 million
2/4 Cost recovery over 8 flights (\$92.2 x 200/400 lockers)	<u>\$46.1 million</u>
NASA's Cost Avoidance	\$15.4 million

According to the contract file, a total of eight flights was not used because (1) procurement officials did not believe that this allocation method would significantly reduce NASA's price, (2) SPACEHAB had not marketed or leased space on the additional two flights, and (3) there was no certainty of what their success in doing so might be.

Finally, the negotiated price was based on full recovery of construction costs with no consideration given to residual value of the modules. The modules have value beyond six or eight flights when disposed of through sale or recycle. Inclusion of a residual value in the cost recovery calculations could have further reduced the negotiated price to NASA.

Rapid Action Report
Dated March 20, 1995**CONCLUSION**

The total effect of the SPACEHAB CMAM negotiations was a contract with terms which were not in NASA's best financial interest. As demonstrated in the Exhibit, cost avoidances of approximately \$22.7 million could have been achieved on the CMAM contract. Special circumstances, such as the requirement to foster commercialization of space, were cited by Headquarters and JSC procurement officials as justification for approval of deviations and liberal treatment of contract elements in favor of the contractor. We agree that special emphasis on fostering the commercialization of space is consistent with the Space Act; however, ensuring the success of commercial ventures at the risk of other program losses may be beyond the scope of the Space Act and the CMAM contract. In future contracts with SPACEHAB or other commercial ventures, lessons learned on the CMAM contract and points outlined in this report should be taken into consideration.

RECOMMENDATION I

The Associate Administrator, Office of Procurement, should ensure that deviations aimed at fostering the commercialization of space are approved only when they are in (1) compliance with applicable cost and procurement regulations and (2) NASA's best financial interest.

**MANAGEMENT'S
RESPONSE**

We concur with the recommendation; however, it should be noted that all deviations requested by NASA Procurement officers are reviewed on a case by case basis and are approved at NASA Headquarters only when they are in compliance with applicable cost and procurement regulations, and when they are in NASA's best financial interests.

**EVALUATION OF
MANAGEMENT'S
RESPONSE**

While management states that deviations are only approved when in compliance with procurement regulations and in NASA's best financial interest, the CMAM contract negotiated price included costs which were clearly prohibited under the FAR or which were not in NASA's best financial interest. Although goals such as fostering the commercialization of space should be supported, procurement officials have an obligation to strive for a fair and reasonable price to both NASA and the contractor when negotiating contracts. This recommendation is intended to ensure that cost elements such as those negotiated in the CMAM contract are not approved in future procurements.

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Dated March 20, 1995

In accordance with NMI 9910.1B, we plan to review the subsequent contract with SPACEHAB for services in support of the Shuttle/Mir missions. The purpose of this review will be to ensure that our concerns are properly addressed in the negotiations. We also request to be included in the concurrence cycle for closure of this recommendation.

RECOMMENDATION 2

The Director of Procurement, JSC, should ensure that construction costs recovered by SPACEHAB under the CMAM contract, along with potential residual value, will be considered when determining the amount to be recovered under subsequent contracts.

**MANAGEMENT'S
RESPONSE**

We concur with the recommendation. The JSC Procurement Officer has advised (copy attached) that they shall ensure that construction costs recovered by SPACEHAB, under the existing CMAM contract, along with the potential residual value, shall be considered during the evaluation and negotiation of any subsequent contracts with SPACEHAB, Inc.

**EVALUATION OF
MANAGEMENT'S
RESPONSE**

The actions planned by the Director of Procurement, JSC, satisfactorily address our recommendation. However, as stated above, we plan to review the SPACEHAB contract for services in support of the Shuttle/Mir missions. In accordance with NMI 9910.1B, we request to be in the concurrence cycle for closure of this recommendation.

**Rapid Action Report
Dated March 20, 1995**

GENERAL COMMENT

The NASA Office of Inspector General staff members associated with this review express their appreciation to NASA Headquarters, Johnson Space Center, Kennedy Space Center, and contractor personnel contacted for their courtesy, assistance, and cooperation.

Rapid Action Report
Dated March 20, 1995

EXHIBIT

SCHEDULE OF COST AVOIDANCE
(Dollars in Millions)

<u>Cost Elements</u>	<u>Spacehab's Program Costs</u>	<u>Proposed NASA Costs</u>	<u>Negotiated Price (6 Flights)</u>	<u>Auditor's Price (8 Flights)</u>	<u>Contract Cost Avoidance</u>
Lease Costs:					
Construction of Module	\$ 92.2	\$ 61.5	\$ 61.5	\$46.1\1	\$15.4
Overruns	12.0	8.0	0.0	0.0	0.0
Maintenance/Refurb	8.6	5.7	5.7	5.7	0.0
Research & Development	1.0	.7	.7	.7	0.0
Insurance	39.8	26.5	26.5	26.5	0.0
Interest on Premiums	1.6	1.0	1.0	0.0	1.0
Administrative Costs	14.2	9.5	9.5	9.5	0.0
Financing Costs	<u>30.7</u>	<u>20.5</u>	<u>15.7\2</u>	<u>0.0</u>	<u>15.7</u>
Total Lease Costs	\$200.1	\$133.4	\$120.6	\$88.5	\$16.7
Integration Costs:					
Integration/Operations	\$ 45.5	\$ 30.3	\$ 30.3	\$30.3	\$ 0.0
Contingency	11.5	7.7	7.7	7.7	0.0
Facility Lease	<u>3.8</u>	<u>2.5</u>	<u>2.5</u>	<u>2.5</u>	<u>0.0</u>
Total Integration Costs	\$ 60.8	\$ 40.5	\$ 40.5	\$40.5	\$ 0.0
Total Program Costs	\$260.8	\$173.9	\$161.1	\$129.0	\$16.7
Profit (11.91%)		\$ 20.7	\$ 19.2	\$ 15.4	\$ 3.8
Optional Services		<u>4.3</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
Total Program Costs	\$260.8	\$173.9	\$161.1	\$129.0	\$16.7
Profit (11.91%)		\$ 20.7	\$ 19.2	\$ 15.4	\$ 2.0
Optional Services		4.3	0.0	0.0	0.0
Additional Days on Orbit		<u>52.9</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
NEGOTIATED PRICE		\$ 251.8	\$180.3	\$144.4	\$18.7
Subsequent Negotiation:					
Termination Liability Insurance		4.0	<u>4.0</u>	<u>4.0</u>	<u>4.0</u>
TOTAL PRICE		\$255.8	\$184.3	\$148.4	\$22.7\3

\1 Construction costs over 8 flights results in payment of \$46.1 million (\$92.2 x 6/8).

\2 Negotiated financing costs were: (\$30.7 less 7.2) x 2/3 or \$15.7 million.

\3 Total cost avoidance does not include \$15.4 million construction costs because actual cost avoidance could range from \$0 to \$15.4 million depending on the cost recovery method used.

Rapid Action Report

Dated March 20, 1995

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

NASA-010/CODE W

RECEIVED

JAN 24 1995

ASSISTANT INSPECTOR GENERAL
FOR AUDITING

APPENDIX A



JAN 23 REC

Reply to Airm of: HS/9900JSMS.001

TO: W/Deputy Assistant Inspector General for Auditing
FROM: H/Associate Administrator for Procurement
SUBJECT: Draft Rapid Action Audit Report on the SPACEHAB
Commercial Middeck Augmentation Module (CMAM) Contract
Negotiated Price -- Assignment Numbers: A-XE-93-009, A-
XE-95-002

The subject draft report included two audit recommendations for review and comment. The first is addressed to the Associate Administrator for Procurement and the second is addressed to the Director of Procurement, Johnson Space Center (JSC). Our comments and the proposed corrective actions are as follows:

Recommendation No.1:

"The Associate Administrator, Office of Procurement, should ensure that deviations aimed at fostering the commercialization of space are approved only when they are in (1) compliance with applicable cost and procurement regulations and (2) NASA's best financial interest."

We concur with the recommendation; however, it should be noted that all deviations requested by NASA Procurement officers are reviewed on a case by case basis and are approved at NASA Headquarters only when they are in compliance with applicable cost and procurement regulations, and when they are in NASA's best financial interests.

Recommendation No.2:

"The Director of Procurement, JSC, should ensure that construction costs recovered by SPACEHAB under the existing CMAM contract, along with potential residual value, will be considered when determining the amount to be recovered under subsequent contracts."

We concur with the recommendation. The JSC Procurement Officer has advised (copy attached) that they shall ensure that construction costs recovered by SPACEHAB, under the existing CMAM contract, along with potential residual value, shall be considered during the evaluation and negotiation of any subsequent contracts with SPACEHAB, Inc.

A-1

Rapid Action Report
Dated March 20, 1995


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NASA-D1Q/CODE W

P.02

With the proposed actions, and the IG's acceptance of these actions, we will consider the recommendations closed upon issuance of the final report. If you have any questions, please contact Mr. John E. Moore on (202) 358-0434.


Deidre A. Lee
Enclosure

A-2

Rapid Action Report

Dated March 20, 1995

01-24-1995 11:53 2023583022
 National Aeronautics and
 Space Administration
 Lyndon B. Johnson Space Center
 2101 NASA Road 1
 Houston, Texas 77058-3696

NASA-OIG/CODE W

P.03



Reply to Attn of: BU3-94-010

DEC 05 1994

TO: NASA Headquarters
 Attn: H/Associate Administrator for Procurement

FROM: AA/Director

SUBJECT: Management Response to Recommendation 2 of OIG's Discussion
 Draft Rapid Action Report on the SPACEHAB Commercial Middeck
 Augmentation Module (CMAM) Contract Negotiated Price,
 Assignments Nos. A-KE-93-009, A-KE-95-002

In response to the subject audit, JSC has opted not to hold an exit conference. As suggested, we are providing inputs for inclusion in a consolidated management response to the audit report being prepared by your office. This approach was discussed with John Horvath, Code HM, and Phil Chait, Code JMC; and was coordinated with the KSC Office of Inspector General at the time an exit conference was waived. The management response to the recommendation addressed to JSC is as follows:

Recommendation 2:

"The Director of Procurement, JSC, should ensure that construction costs recovered by SPACEHAB under the prior CMAM contract, along with potential residual value, will be considered when determining the amount to be recovered under subsequent contracts."

We concur with the recommendation. The JSC Procurement Officer shall ensure that construction costs recovered by SPACEHAB, Inc. under the prior CMAM contract, along with potential residual value, shall be considered during the evaluation and negotiation of any subsequent contracts with SPACEHAB, Inc.

With these proposed actions, and the IG's acceptance of those actions, we will consider the recommendation closed upon issuance of the final report. If you have any questions, please call Pat Ritterhouse at 713-483-4220.

Carolyn L. Huntoon
 Carolyn L. Huntoon

cc:
 BD/G. Darnell
 BE4/G. Della Longa
 SM4/P. Bahr
 W-JS/J. Goodnight
 HQS, HM/J. Horvath
 HQS, JMC/P. Chait

ENCLOSURE

A-3

**Rapid Action Report
Dated March 20, 1995**

National Aeronautics and
Space Administration

Office of Inspector General
John F. Kennedy Space Center
P.O. Box 21066
Kennedy Space Center, FL 32815



Reply to Altir of W/KSC-OIG/KE95009

August 16, 1995

TO: BA/JSC Procurement Officer
FROM: W/OIG Center Director, KSC
SUBJECT: Closure of Rapid Action Report (KE-95-009) on the SPACEHAB Commercial
Middeck Augmentation Module (CMAM) Contract Negotiated Price.

We have reviewed the contract negotiations for the SPACEHAB Phase One Contract (SPOC). The purpose of our review was to ensure that concerns identified in the subject audit report were addressed. We found that procurement officials (1) requested no deviations that were not in the Agency's best interest, and (2) considered the construction costs recovered under the CMAM contract. These actions satisfy the recommendations made in our report.

Procurement officials negotiated a contract price based on sound cost recovery principles. By applying these principles, JSC reduced the proposed lease costs by \$25 million. We recommend that these same principles be followed in negotiations for subsequent options.

We commend the JSC Procurement Officials for their diligence during difficult contract negotiations.


Larry J. Camp

cc:
H/D. Lee
W/C. Little, HQ

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