

JS-96-007

# AUDIT REPORT

---

## RUSSIAN INVOLVEMENT IN THE INTERNATIONAL SPACE STATION PROGRAM

JOHNSON SPACE CENTER

SEPTEMBER 26, 1996

---



National Aeronautics and  
Space Administration

OFFICE OF INSPECTOR GENERAL

### **ADDITIONAL COPIES**

To obtain additional copies of this audit report, contact the Assistant Inspector General for Auditing at 202-358-1232.

### **SUGGESTIONS FOR FUTURE AUDITS**

To suggest ideas for or to request future audits, contact the Assistant Inspector General for Auditing. Ideas and requests can also be mailed to:

Assistant Inspector General for Auditing  
NASA Headquarters  
Code W  
300 E St., SW  
Washington, DC 20546

### **NASA HOTLINE**

To report fraud, waste, abuse, or mismanagement, contact the NASA OIG Hotline by calling 1-800-424-9183; 1-800-535-8134 (TDD); or by writing the NASA Inspector General, P.O. Box 23089, L'Enfant Plaza Station, Washington, DC 20026. The identity of each writer and caller can be kept confidential upon request to the extent permitted by law.



National Aeronautics and  
Space Administration

Headquarters  
Washington, DC 20546-0001

Reply to Attn of: W

September 26, 1996

**TO:** M/Associate Administrator for Space Flight

**FROM:** W/Assistant Inspector General for Auditing

**SUBJECT:** Final Report  
Russian Involvement in the International Space Station Program  
Assignment No. A-JS-96-005  
Report No. JS-96-007

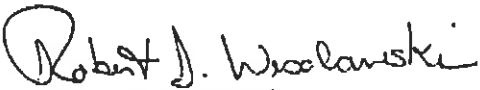
The NASA Office of Inspector General has conducted a survey of the Russian Involvement in the International Space Station Program (A-JS-96-005). The purpose of the survey was to determine the impact of Russia's funding for the Service Module and proposed schedule changes on the International Space Station Program. The specific audit objectives were to determine whether:

- there is an adverse impact due to delays in Russia's funding for the Service Module;
- the Russian proposed changes to the assembly sequence will impact cost and schedule;
- Russia's roles and responsibilities in the International Space Station Program have been defined and documented; and
- Russian deliverables during the next 18 months will be provided on-time and within budget.

Our survey revealed that the space station program has taken action to manage the impacts to the program due to the Russian funding issues. It is important for NASA to continue to pursue resolution of the funding delays and to ensure the Memorandum of Understanding is brought to closure. Because the Program Office continues to actively monitor and pursue positive solutions to the Russian funding problems, our report does not contain any recommendations; however, we feel it is important to note our observations and concerns.

We issued a discussion draft of this report to you on August 28, 1996, and received your verbal comments on September 11, 1996. The comments were incorporated into the report.

The NASA Office of Inspector General staff members associated with this survey express their appreciation to the NASA personnel for their courtesy, assistance, and cooperation. Should you have questions or desire to discuss the matters contained in this report, please contact Janice Goodnight at (713) 483-4773, Robert Wesolowski, Director, Audit Division-A, or me at (202) 358-1232.

  
for Debra A. Guentzel

Enclosure

cc:

HQs-JMC/P. Chait

ISC-AA/G. Abbey

BU/P. Ritterhouse

OA/R. Brinkley

OA/W. Bates

OG/D. Tam

# ACRONYMS

---

FEL	First Element Launch
FGB	Functional Cargo Block
ISS	International Space Station
LTV	Logistics Transfer Vehicle
MOU	Memorandum of Understanding
OIG	Office of Inspector General
RSA	Russian Space Agency
SPP	Science Power Platform

**THIS PAGE INTENTIONALLY LEFT BLANK**

# RUSSIAN INVOLVEMENT IN THE INTERNATIONAL SPACE STATION

## JOHNSON SPACE CENTER HOUSTON, TEXAS

### INTRODUCTION

---

#### ***BACKGROUND***

On September 2, 1993, Vice President Al Gore and Russian Prime Minister Viktor Chernomyrdin signed a joint statement on space cooperation signaling a new era for NASA and a new direction for space flight. On December 16, 1993, the United States and Russia formalized their joint space station program by signing a statement on the plan for the two nations, along with the European Space Agency, Japan, and Canadian Space Agency, to build and staff an international space station.

Since these historic signings, significant work has been done to negotiate a memorandum of understanding (MOU) which would define respective roles and responsibilities for both countries. Although some products and services have changed during the course of the negotiations, one of the main Russian contributions continues to be the Service Module.

The Service Module is the core module for the Russian segment. It will also provide crew habitations for three crew members until the U.S. Habitational Module is launched in April 2002 when capability for an additional four members is added.

During meetings in late 1995, the Russian Space Agency (RSA) notified NASA that it was not receiving funds from the Russian government for work performed on the Service Module. RSA stated that if it did not receive funding by December 1, 1995, the Service Module would fall behind schedule on a day-for-day slip with the funding delay. This pattern of under-funding and nonpayment by the Russian government for RSA's key element contribution to the International Space Station (ISS) caused RSA's December 1995 proposal to NASA to redesign the Space Station and attach the ISS elements to Mir. Russia proposed merging the ISS with the existing Mir Space Station even though for nearly two years, NASA has maintained that the design for the station is set in stone. As part of the U.S. Government response to the Russian proposal, NASA worked with Congress and the White House to resolve the funding issues with the Russian government.

The Chairman of the House Subcommittee on Veterans Affairs, Housing and Urban Development, and Independent Agencies, Committee on Appropriations, and the Chairman of the House Subcommittee on Space and Aeronautics visited Russia on January 7-9, 1996, and conveyed to RSA and to the Government of the Russian Federation the necessity to meet their commitments. The Russian First Deputy Prime Minister assured the congressional entourage that Russia would live up to all of its partnership obligations.

In March 1996, the congressmen sent a letter to Russia's First Deputy Prime Minister asking why his government is still failing to fund the Service Module. During a March 26, 1996 overview hearing to the Senate Commerce Committee's Subcommittee on Science, Technology, and Space, NASA Administrator Dan Goldin stated if the situation is not resolved in four to six weeks, the agency would lose its ability to hold the launch schedule of the Service Module. The Service Module contains the station's life support equipment, water filtration system, and galley. Without the Service Module, the space station cannot support permanent human presence capability. Because of the potential impact caused by the Service Module not being able to make-up for production delays and meets its delivery date, the Office of Inspector General (OIG) initiated this audit.



## **OBJECTIVES, SCOPE, AND METHODOLOGY**

---

### ***OBJECTIVES***

The overall objective of the audit was to determine the impact of Russia's funding for the Service Module and proposed schedule changes on the International Space Station Program. The specific audit objectives were to determine whether:

- there is an adverse impact due to delays in Russia's funding for the Service Module;
- the Russian proposed changes to the assembly sequence will impact cost and schedule;
- Russia's roles and responsibilities in the International Space Station Program have been defined and documented; and
- Russian deliverables during the next 18 months will be provided on-time and within budget.

### ***SCOPE AND METHODOLOGY***

Survey field work was performed during the period April 1996 through July 1996 at Johnson Space Center. The audit methodology included interviews of space station program personnel, reviews of draft protocols, and meeting observations.

### ***MANAGEMENT CONTROLS REVIEWED***

Our review was limited to the impact of Russia's funding for the Service Module and proposed schedule changes to the space station program. Accordingly, we express no opinion on NASA's system of internal controls.

### ***AUDIT STANDARDS***

The audit was performed in accordance with generally accepted government auditing standards.

## OBSERVATIONS

---

### ***OVERALL EVALUATION***

The review showed the Space Station Program Office has determined:

- there is an adverse impact due to delays in Russia's funding for the Service Module;
- there will be an impact to cost and schedule because of the Russian proposed changes to the assembly sequence;
- Russia's roles and responsibilities are defined and documented in an *ad referendum*; however the MOU must still be approved by each nation; and
- other Russian deliverables may not be delivered on-time.

Because the Program Office continues to actively monitor and pursue positive solutions to the Russian funding problems, our report does not contain any recommendations; however, we feel it is important to note our observations and concerns.

### ***IMPACT DUE TO RUSSIA'S FUNDING DELAYS***

The space station program will experience adverse impacts to cost and schedule if RSA continues to delay the Service Module funding. RSC-Energia, the company building the Service Module, is in the process of preparing a proposal to RSA to complete the Service Module at a reduced funding level. Consequently, RSA is withholding funds to RSC-Energia until the contract is negotiated. If the funding issue is not resolved quickly, the Service Module's schedule will slip and NASA will be faced with a major schedule delay or redesign.

If RSC-Energia is unable to meet the April 1998 launch date because of the funding delays, NASA must quickly decide if it is willing to:

- absorb the delay and keep the Russians in the critical path for space station assembly, or
- drop the Russians from the program and implement its contingency plan.

NASA has aggressively pursued a solution to the funding situation in Russia. NASA even solicited help from Congress and the Vice President. After receiving numerous inquiries on behalf of NASA, the Russian President stated publicly on April 12, 1996, that the Russian

government will move quickly to provide significant, critical funding for Russian companies working on the ISS program. As a result, the Government of the Russian Federation approved a resolution for funding the expenses incurred by RSA for the space program in 1996. Additionally, RSA was permitted to draw special-purpose loans from commercial banks. In an April 12, 1996 letter to the Vice President, the Russian Prime Minister stated that Russia will meet its commitments to the ISS program in full. Subsequently, RSA has received 40 percent of the requested funding from the Government of the Russian Federation. On July 10, 1996, RSA signed a contract with RSC-Energia; however, RSA has only released about 10 percent of the funding required for this fiscal year to RSC-Energia, which is building the Service Module for RSA.

RSA continues to withhold funds from RSC-Energia until the organizations are able to negotiate a contract to complete the work at reduced funding levels. RSA admitted in several meetings with NASA that the work on the Service Module is behind schedule by as much as six months because of the delay in funding. However, it has not admitted it cannot meet the Service Module's launch date of April 1998. RSC-Energia has been using its own funds to perform in-house work on schedule. However, it has been unable to procure the long lead items needed to outfit the module from its subcontractors. These long lead items include the avionics boxes and telemetry systems and are crucial in order to maintain schedule. RSC-Energia is able to make its employees work with only a promise of payment but is not able to subcontract work without payment.

If RSC-Energia is unable to complete the Service Module on schedule, NASA must determine the impacts to the balance of the assembly sequence and whether the date for the first element launch (FEL) should be maintained. The FEL is the functional cargo block or FGB. The FGB provides propulsion, guidance, communications, electrical power, and thermal control systems. It also performs the station reboost and attitude control function until the Service Module is docked. The FGB has an on-orbit life of 450 days. The current schedule requires the FGB to be launched 1 1/2 months before the Service Module is delivered to the launch site. If technical problems on the Service Module arise after the launch of the FGB, there is a chance the FGB would orbit for an indefinite amount of time. Without the reboost provided from the Service Module, the FGB's orbit will begin to deteriorate over its 450-day on-orbit life and eventually reenter the earth's atmosphere.

NASA has developed a contingency plan for building the space station without Russian participation. NASA would construct a control module that would replace the FGB and the Service Module. However, this plan could add \$2 billion to the cost for the station, and delay assembly about 1 1/2 years.

***RUSSIAN PROPOSED  
CHANGES IMPACT ON  
COST AND SCHEDULE***

There is a cost and schedule impact to the space station program due to the December 1995 Russian proposed changes. In December 1995, Russia proposed changes to the space station design. After a month of intense negotiations, NASA agreed to fly two additional flights to Mir and to assist Russia in delivery of the Science Power Platform (SPP). The compromise resulted in at least a \$124 million cost impact because a shuttle flight was added to the manifest and the delivery of several components will be delayed. NASA's agreement to fly two additional flight to Mir and to assist Russia in the delivery of the SPP was factored in the balance of contributions negotiated with RSA across the ISS and Shuttle Mir programs.

In December 1995, RSA presented a formal proposal to NASA's space station management. The proposal entailed extending the life of Mir and attaching to it early station elements such as the FGB and Node 1. Both of these elements are slated for the first two assembly flights. This would have allowed Russia to reduce its hardware and launch costs by substituting many components it had pledged to contribute with on-orbit Mir hardware. NASA told RSA that it would listen to the proposal, but would not approve any changes that would require a redesign, slipping the station's assembly schedule, increasing technical risk, or raising costs.

In January 1996, the Vice President and the Russian Prime Minister announced details of a counter offer to RSA's proposal to attach ISS to Mir. NASA would help cash-strapped Russia keep its commitments to the planned ISS while helping it operate Mir until 1998. NASA will fly two additional shuttle flights to Mir to ferry the food, water, clothing, and other supplies required to keep it operational for one more year. Additionally, the shuttle, instead of a Russian launch vehicle, will transport the Russian SPP and four of its eight solar power panels to ISS. Russia will also save the launch costs of one or two rocket boosters because the shuttle will now take the supply cargo to Mir.

NASA identified the cost of \$124 million for the addition of one shuttle flight to Mir. The other flight to Mir is a re-manifest of a previously scheduled shuttle flight. Furthermore, the launching of the

SPP aboard the shuttle will cause a ripple effect of delays in the space station's assembly sequence. The Japanese Experiment Module will now be launched five months later. Delivery of the station's centrifuge, used for microgravity experiments, will be delayed by eight months, and the sixth so-called utility flight, for scientific experiments, will be bumped until after completion of assembly in June 2002.

***DEFINING RUSSIA'S  
ROLES AND  
RESPONSIBILITIES***

Since August 1994, NASA has been negotiating an MOU with RSA to define both agencies' respective roles and responsibilities. NASA has already signed similar MOUs with the other international partners. However, with the addition of RSA as a partner to the ISS program, amendments to Japanese, the European, and the Canadian Space Agency's MOUs became necessary. On July 16, 1996, NASA and RSA reached an *ad referendum* agreement on the text for its MOU. As of September 1996, the MOUs and the Intergovernmental Agreements are ready for signature by each agency.

Since inviting Russia to join the partnership in building the space station, NASA has only been able to negotiate protocols and the *ad referendum* agreement. The protocols were intended to help define the parties' contributions and obligations. The terms, conditions, and assumptions specified in the balance of contributions protocol were summarized and incorporated into the NASA/RSA MOU.

During the *U.S.-Russian Joint Commission on Economic and Technological Cooperation* held in Moscow on July 16, 1996, the Vice President and the Russian Prime Minister acknowledged the following agreements:

- the previously mentioned *ad referendum*;
- a concept for the ISS cost and resource sharing which minimizes the exchange of funds for cooperative activities, and which benefits all the ISS partners;
- a set of technical and financial responsibilities to extend the Shuttle-Mir program into the year 1998; and
- a set of milestones both sides must accomplish to ensure the success of the ISS program.

***OTHER RUSSIAN  
DELIVERABLES***

Other Russian deliverables may not be delivered on-time. The Service Module is not the only Russian deliverable effected by the funding delays. The funding delays also affect the Logistics Transfer Vehicle (LTV) and the SPP. NASA has focused most of its attention on the Service Module since it is Russia's first contribution to be launched.

Since funding problems also exist for the LTV, station costs will increase and the schedule will slip if these components are not delivered on schedule. The LTV will be used to deliver payloads to ISS, including dry cargoes, propellants, water, and compressed gases. It is scheduled for launch August 1998, April 1999, and October 1999. Even though the LTV's first launch is only four months after the Service Module, NASA does not believe the schedule will slip due to technical difficulties. The LTV is a derivative of the FGB, a flight proven Russian component; therefore, the technical risk is considered to be very low. However, the funding delays keep work from progressing. If RSC-Energia, the contractor building the LTV, could get the funds, the work would progress. Work is not progressing on the SPP as well because RSC-Energia does not have the funding.

NASA is closely monitoring the funding situation. Talks and dialogue exchanges have been held at the highest levels between both organizations and governments. RSA has told NASA they will know the impacts of the funding by the September 1996 Incremental Design Review 2B. At this point, NASA is waiting for the results of RSA's review.

***SUMMARY***

The space station program has taken action to manage the impacts to the program because of Russian funding issues. It is important for NASA to continue to pursue resolution of the funding delays and to ensure the MOU is brought to closure. Most of these issues are not controlled by NASA because of the political aspects of inter-government agreements. Until an answer is known on whether or not the Russians will be able to maintain schedule for its elements, the NASA OIG will continue to monitor progress and conduct additional audits as appropriate.

# Report Distribution

## National Aeronautics and Space Administration (NASA) Officials-In-Charge

Code H/Associate Administrator for Procurement

Code J/Associate Administrator for Management Systems and Facilities

## NASA Director, Field Installations

Ames Research Center

Dryden Flight Research Center

Goddard Space Flight Center

Jet Propulsion Laboratory

Kennedy Space Center

Langley Research Center

Lewis Research Center

Marshall Space Flight Center

Stennis Space Center

## NASA Office of Inspector General, Field Offices

Ames Research Center

Goddard Space Flight Center

Jet Propulsion Laboratory

Kennedy Space Center

Langley Research Center

Lewis Research Center

Marshall Space Flight Center

## Non-NASA Federal Organizations and Individuals

Assistant to the President for Science and Technology Policy

Deputy Associate Director, Energy and Science Division, Office of Management and Budget

Budget Examiner, Energy Science Division, Office of Management and Budget

Associate Director, National Security and International Affairs Divisions,

General Accounting Office

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

**Chairman and ranking minority member of each of the following congressional committees and subcommittees:**

Senate Committee on Appropriations

Senate Subcommittee on VA-HUD-Independent Agencies

Senate Committee on Commerce, Science and Transportation

Senate Subcommittee on Science, Technology and Space

Senate Committee on Governmental Affairs

## MAJOR CONTRIBUTORS TO THIS REPORT

---

***JOHNSON SPACE  
CENTER***

Janice Goodnight, Program Director, Human Exploration and  
Development of Space  
Loretta Garza, Auditor-in-Charge



**Report Distribution (continued)**

House Committee on Appropriations  
House Subcommittee on VA-HUD-Independent Agencies, Committee on Appropriations  
House Committee on Government Reform and Oversight  
House Subcommittee on Space and Aeronautics, Committee on Science  
House Committee on Science

**Non-NASA Federal Organizations and Individuals (Continued):**

Honorable Barbara Boxer, U.S. Senate  
Honorable Dianne Feinstein, U.S. Senate  
Honorable Tom Harkin, U.S. Senate  
Honorable Charles Robb, U.S. Senate  
Honorable Paul S. Sarbanes, U.S. Senate  
Honorable John Warner, U. S. Senate  
Honorable Herbert Bateman, U.S. House of Representatives  
Honorable Tom Campbell, U.S. House of Representatives  
Honorable Anna G. Eshoo, U.S. House of Representatives  
Honorable Martin R. Hoke, U.S. House of Representatives  
Honorable Tom Lantos, U.S. House of Representatives  
Honorable Steven C. Latourette, U.S. House of Representatives  
Honorable Zoe Lofgren, U.S. House of Representatives  
Honorable William H. Zeff, Jr., U.S. House of Representatives





The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice. This not only helps in tracking expenses but also ensures compliance with tax regulations.

In the second section, the author provides a detailed breakdown of the monthly budget. It includes categories for housing, utilities, food, and entertainment. The goal is to allocate funds wisely to avoid overspending in any one area.

The third section covers the topic of debt management. It suggests creating a repayment schedule for all outstanding loans and credit cards. Prioritizing high-interest debts can help in reducing the overall financial burden more quickly.

Finally, the document concludes with advice on emergency fund building. It recommends setting aside a portion of each month's income into a separate savings account. This fund acts as a safety net in case of unexpected expenses or job loss.

10/10/20

10/10/20