IG-98-025

AUDIT REPORT

EARTH SCIENCE COMMERCIAL DATA BUY PROGRAM

September 3, 1998

National Aeronautics and Space Administration

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Acronyms

CRSPO	Commercial Remote Sensing Program Office
DAAC	Distributed Active Archive Center
EROS	Earth Resources Observation System
MOU	Memorandum of Understanding
SIR-C	Spaceborne Imaging Radar-C
USGS	United States Geological Survey
USI/SIE	User Systems, Inc., and Space Imaging EOSAT

W September 3, 1998

TO: Y/Associate Administrator for Earth Science

FROM: W/Assistant Inspector General for Auditing

SUBJECT: Report on the Audit of Earth Science Commercial Data Buy Program
Assignment Number A-HA-98-001
Report Number IG-98-025

The subject final report is provided for your use. Your comments on a draft of this report were responsive to our recommendations, and additional comments are not required. Please refer to the executive summary for the overall audit results. The report provides our evaluation of your response with respect to planned corrective actions. The recommendations are considered closed for reporting purposes.

If you have questions concerning the report, please contact Mr. Daniel J. Samoviski, Program Director for Earth/Space Science Program Audits, at (301) 286-0497 or Ms. Sandy Massey, Auditor-in-Charge, at (407) 867-4057. We appreciate the courtesies extended to the audit staff. See Appendix E for the report distribution.

[Original signed by]

Russell A. Rau

Enclosure

cc:
B/Chief Financial Officer
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JM/Management Assessment Division
SSC/Director
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EARTH SCIENCE COMMERCIAL DATA BUY PROGRAM

EXECUTIVE SUMMARY

INTRODUCTION

Congress and the Office of Management and Budget directed NASA to initiate a commercial data buy program that would acquire Earth Science[1] data products. One of the program objectives is to use private sector remote sensing capabilities to promote broad Earth Science research goals.

NASA's fiscal year 1997 appropriation contained $50 million to accomplish the purchases. During Phase I of the two-phased data buy program, the Commercial Remote Sensing Program Office (CRSPO) awarded 10 contracts totaling about $3.7 million.

OBJECTIVES

Our objectives[2] were to determine whether:

- the acquisition of data from commercial sources has been properly planned and managed;
- competitive procurement procedures were used; and
- the data obtained will help achieve Earth Science program goals.

OVERALL RESULTS

Overall, the CRSPO properly planned and managed the commercial data buy program. However, we have concerns regarding 1 of the 10 contract awards. Specifically, the CRSPO unnecessarily contracted with User Systems, Incorporated (USI), and Space Imaging EOSAT (SIE)[3] for an online Spaceborne Imaging Radar-C (SIR-C) archive.[4] This contract duplicated NASA's capability to access SIR-C data through two existing agreements. As a result, the CRSPO will unnecessarily spend $295,000 during Phase I of the commercial

[1] The Earth Science Enterprise was formerly the Mission to Planet Earth Enterprise.
[2] See Appendix A for a detailed description of our scope, methodology, and field work.
[3] USI and SIE entered into a joint venture whereby USI is the prime contractor in Phase I and SIE is the prime contractor in Phase II.
[4] The SIR-C imagery will be placed in SIE's interactive global data distribution system, making the data accessible to Earth scientists worldwide.

data buy program. Further, cost projections show that the CRSPO could spend at least $576,000 during Phase II for data that are already available at no additional cost to the Agency. Therefore, a total of $871,000 could be put to better use.

We could not determine whether the Phase I data will help achieve Earth Science program goals because the CRSPO has not yet accepted, validated, or evaluated the data. The CRSPO expects to complete these processes by September 30, 1998. Science evaluators and intended users believe the data may benefit the Earth Science Enterprise. We will perform further audit work to address this objective.

RECOMMENDATIONS

We recommended that the SIR-C archive portion of the Phase I data buy contract with USI/SIE be terminated. Additionally, we recommended that the CRSPO should not award the SIR-C portion of the Phase II contract.

MANAGEMENT'S RESPONSE

Management did not concur with the recommendation to terminate the Phase I contract because all Phase I products had been delivered and accepted. Termination of the Phase I contract would not have been cost advantageous to the Government. As a result of our discussions with management officials, we agree that contract termination would not be cost-effective.

Management agreed that the CRSPO should not award the Phase II contract. The CRSPO will notify the contractor of NASA's intent not to pursue a Phase II contract. Management's planned actions are responsive to the recommendation.

BACKGROUND

As a result of the National Performance Review, the White House directed Federal agencies to pursue innovative methods of procurement, including the use of data buys. The 1996 National Space Policy further emphasized the National Performance Review by recommending that NASA "make use of relevant private sector remote sensing capabilities, data and information products, and establish a demonstration program to purchase data products from the U.S. private sector."

The Omnibus Civilian Science Authorization Act of 1996 authorized $50 million for commercial data purchases. The Act states that the funds shall not be obligated to "duplicate private sector or other Federal activities." Furthermore, the solicitation for Phase I of the data buy program states that the Earth Science Enterprise "seeks data sets which will provide critical ***new*** [emphasis added] science measurements . . . ."

In 1997, Congress and the Office of Management and Budget directed NASA to initiate a program to acquire Earth Science data products from commercial sources. The Office of Management and Budget's primary goals for the data buy program were to:

- obtain critical Earth Science data sets; and

- explore the willingness of industry to accept a major portion of the up-front financial risk to providing the data.

Fostering the commercial remote sensing industry was desirable, but not a specific goal. The Office of Management and Budget considered promoting industry as a by-product of the data buy program.

The CRSPO, located at Stennis Space Center, is responsible for managing the commercial data buy program. The CRSPO established the procurement method, whereby contracts are firm-fixed price and paid on delivery. Accordingly, the contracting officer will not pay contractors until the CRSPO accepts the data products. The CRSPO also implemented a two-phased procurement approach:

- Phase I included a Request for Offers and a 1- to 6-month effort with simulated or prototypical deliverables at the end of the effort.

- Phase II will include a letter Request for Offers for a 1- to 3-year effort with incremental delivery of data or products.

The phased approach and the cash on delivery procurement methods were used as a means to reduce NASA's risk. By limiting the Phase I awards to $3.7 million of the appropriated $50 million and by paying for products upon delivery, the CRSPO established greater controls over the data buy program.

In May 1997, the CRSPO released a Request for Offers in accordance with Federal Acquisition Regulation, Part 12, and NASA Federal Acquisition Regulation Supplement, Part 1871. By June, the CRSPO received proposals for 65 products from 18 companies. In November, the Source Selection Official selected 23 products from 11 companies for negotiation of Phase I data buy contracts. Ultimately, the contracting officer awarded 10 contracts, which will result in 22 data products (see Appendix B for details). The CRSPO will make Phase II awards, expected by September 30, 1998, based on the validation and scientific evaluation of the Phase I data products.

FINDING AND RECOMMENDATIONS

COMMERCIAL DATA BUY CONTRACT IS NOT NECESSARY

The CRSPO unnecessarily contracted with USI/SIE to archive SIR-C data.[5] This contract duplicated NASA's capability to access SIR-C data through two existing agreements. The CRSPO believes the archive will provide more efficient access to SIR-C data. However, excessive download time for online access to SIR-C data resulted in the same method of distribution being used as for both existing agreements. As a result, the CRSPO will unnecessarily spend $295,000 during Phase I of the commercial data buy program. Further, cost projections show that the CRSPO could spend at least $576,000 during Phase II for data that are already available at no additional cost to the Agency.

USI/SIE PROPOSED ONLINE SIR-C ARCHIVE

USI/SIE submitted a proposal for six value-added Synthetic Aperture Radar products in response to the data buy Request for Offers. The CRSPO selected three of the six products for negotiation. One of the products was an online SIR-C archive. The CRSPO awarded a Phase I contract for $490,000, of which $295,000 was for the online archive.

The USI/SIE contract for an online SIR-C archive duplicated NASA's existing capability to access SIR-C data products. Specifically, NASA has access to SIR-C images through two existing agreements:

- the Memorandum of Understanding (MOU) between NASA and the U.S. Geological Survey (USGS), and
- the Space Act Agreement with USI.

MOU WITH USGS PROVIDES ACCESS TO SIR-C DATA

In 1992, NASA entered into an MOU with the USGS to plan for, implement, and operate an active archive center for Earth Observing System land processes data. This archive center is the Earth Resources Observation System (EROS) Distributed Active Archive Center (DAAC). The MOU states that NASA will fund the EROS DAAC, short-term, archive functions to include information management systems, facility lease costs, maintenance costs, and distribution functions. In return, USGS

[5] The CRSPO contracted for single look, complex SIR-C imagery, referred to as SIR-C data in the report. The data were collected from an imaging radar system launched aboard the NASA Space Shuttle in 1994 and can be used to make measurements of a variety of Earth environmental observations.

will manage and operate the DAAC, which will archive, process, and distribute Earth Observing System and other remotely sensed land data, to include SIR-C data.

SPACE ACT AGREEMENT WITH USI PROVIDES ACCESS TO SIR-C DATA

In 1997, NASA entered into a Space Act Agreement with USI for processing and distributing SIR-C data products. The agreement states that NASA will loan USI SIR-C flight tapes, auxiliary data, and equipment necessary to read the tapes. Conversely, USI agreed to process all SIR-C data into image products and to distribute those products to NASA at no cost.

ONLINE SIR-C ARCHIVE BELIEVED TO BE MORE EFFICIENT

The CRSPO data buy project manager believed the USI/SIE award did not duplicate existing capability. In his opinion, an online SIR-C archive would provide more efficient access than either the MOU or the Space Act Agreement. Consequently, he recommended the proposal for award.

The average size of a SIR-C image, about 500 megabytes (1 megabyte equals more than 1 million bytes of data), requires excessive download time. For example, depending on a user's connection, downloading a 500 megabyte image could take from 5 to 39 hours. (See Appendix C for details on download times.) The EROS DAAC's guideline for online distribution is no greater than 25 megabytes. Therefore, the EROS DAAC uses 8 millimeter tape to distribute files larger than 25 megabytes.

USI officials acknowledged the inefficiency of an online SIR-C archive. To address the time constraint of downloading, USI/SIE intends to distribute the SIR-C images via CD-ROM or 8 millimeter tape. Because the MOU and the Space Act Agreement provide for these same methods of distribution, USI/SIE's online archive will only duplicate an existing capability.

DATA BUY CONTRACT RESULTS IN UNNECESSARY EXPENDITURES

Because NASA already has access to SIR-C data products, the Phase I and II data buy contracts with USI/SIE will result in unnecessary expenditures. In Phase I, the CRSPO will spend $295,000 for an online SIR-C archive. In addition, the CRSPO could spend as much as $576,000 if a Phase II contract is awarded. Therefore, a total of $871,000 could be put to better use. The SIR-C portion of USI/SIE's Phase I data buy contract should be terminated for the convenience of the Government, and the Phase II contract should not be awarded.

From August 1, 1996, to February 9, 1998, the EROS DAAC generated 285 single look, complex, SIR-C images in response to NASA requests. The requests resulted in an average of 16 images per month. USI/SIE proposed selling the archived SIR-C images to NASA for $1,000 each during Phase II. Since the CRSPO anticipates that the Phase II awards will last up to 3 years, it could spend at least $576,000 (16 images per month x $1000 per image x 36 months) for SIR-C images already available at no additional cost to the Agency.

RECOMMENDATION 1 The Program Manager, CRSPO, should request that the contracting officer terminate for convenience the SIR-C archive portion of the Phase I data buy contract with USI/SIE in accordance with Federal Acquisition Regulation, Part 12.403, Contract Termination.

MANAGEMENT'S RESPONSE Management did not concur with the recommendation to terminate the Phase I contract because all Phase I products had been delivered and accepted. Accordingly, termination of the Phase I contract would not be cost advantageous to the Government. The complete text of management's comments is in Appendix D.

EVALUATION OF MANAGEMENT'S RESPONSE We discussed the effects of this recommendation with Agency officials and concur with their response that termination would not be advantageous to the Government at this time. The recommendation is considered closed.

RECOMMENDATION 2 The Program Manager, CRSPO, should not award the SIR-C portion of the Phase II contract.

MANAGEMENT'S RESPONSE Management concurred with the recommendation. The CRSPO will notify the contractor of NASA's intent not to pursue a Phase II contract.

EVALUATION OF MANAGEMENT'S RESPONSE The actions planned by management are responsive to the recommendation. The recommendation is considered closed.

APPENDIX A

SCOPE, METHODOLOGY, AND FIELD WORK

SCOPE AND METHODOLOGY

We performed this first review of the commercial remote sensing area, which includes the commercial data buy program, because it is a new way of acquiring Earth Science data products and, if successful, the program will be applied to all NASA enterprises. We evaluated the efforts of the CRSPO to solicit and purchase data, which should help achieve Earth Science program goals. Our survey was limited to Phase I of the two-phased data buy program.

We reviewed the applicable Federal Acquisition Regulation and NASA supplement requirements for the solicitation, evaluation, and final selection of the Phase I proposals. We then reviewed:

- all 65 contractor proposals received in June 1997,
- all 10 contracts awarded in December 1997, and
- all 65 science and business team evaluations and 29 past performance questionnaires conducted from June through December 1997 for the 10 contract awards.

We conducted interviews with program officials from NASA Headquarters, Stennis Space Center, and Goddard Space Flight Center. Finally, we evaluated 11 responses to a January 1998 questionnaire, which we submitted to 12 science and business evaluation team members.

FIELD WORK

We performed the audit in accordance with generally accepted Government auditing standards. Field work was performed from November 1997 through May 1998 at NASA Headquarters, Stennis Space Center, and Goddard Space Flight Center.

APPENDIX B

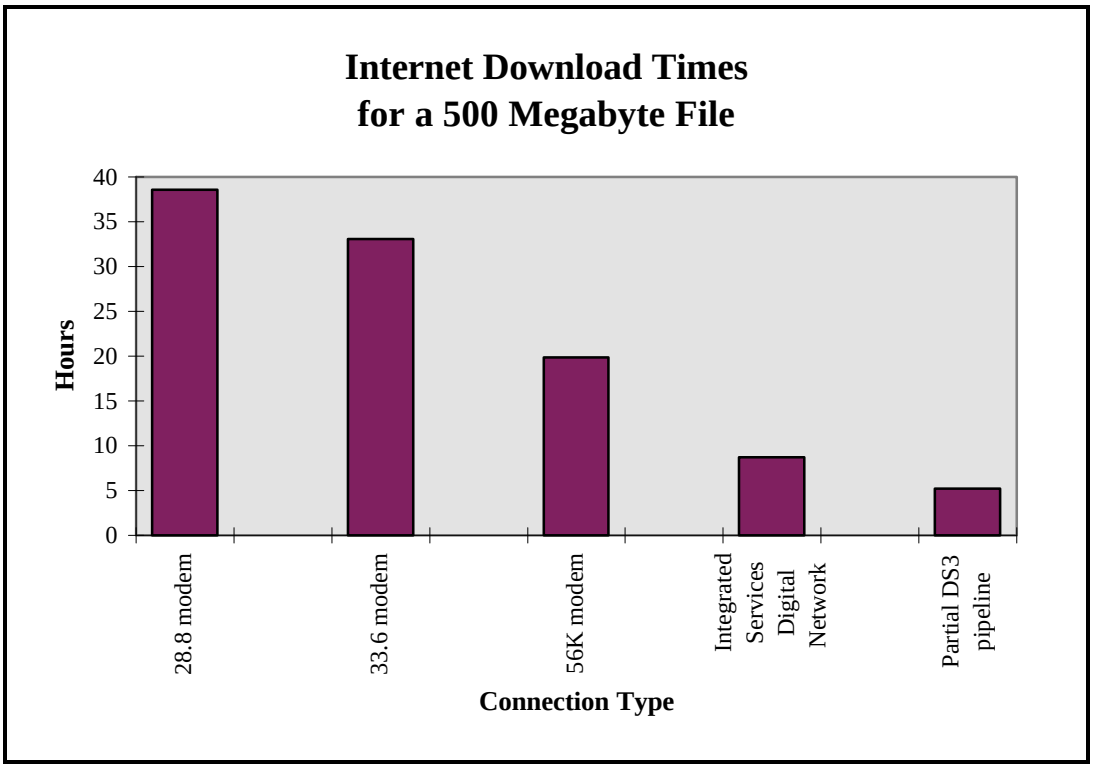
PHASE I COMMERCIAL DATA BUY AWARDS

CONTRACTOR	CONTRACT COST	PROPOSED DATA PRODUCTS	SCIENCE THEMES*
Earth Satellite Corporation	$240,000	Global Landsat thematic mapping imagery data base	1
	90,000	Global Landsat multispectral scanner imagery data base	1
	210,000	Global Land-Cover change analysis (6 Class)	1
	210,000	Global Land-Cover change analysis (9 Class)	1
Jackson and Tull/Woods Hole Oceanographic Institute	50,000	One data set of high-volume, in situ, ocean data from a demonstration ocean buoy and four archived Global Ocean Ecosystems data sets, properly reformatted in the Earth Observing System metadata format ($50,000 each)	4
	50,000		4
	50,000		4
	50,000		4
	50,000		4
User Systems, Inc./Space Imaging EOSAT	295,000	Online SIR-C imagery archive	1
	195,000	Land-Cover/Land-Use maps	1
	0	SIR-C ground plane images	1
EarthWatch, Inc.	85,000	EarlyBird satellite combined 3-meter/15-meter resolution data set	1
	204,669	Airborne Data Acquisition and Registration multispectral 3-meter resolution data set	1
	175,000	STAR-3i 3-meter resolution image maps	1
	25,200	TOPOSAR 15-meter resolution image maps	1
University of Wisconsin-Madison	143,227	Upper tropospheric water vapor and cloudiness data set	2 and 4
Space Imaging EOSAT	238,403	Simulated 1-meter and 4-meter resolution imagery from IKONOS 1 satellite	1, 3, and 4
Final Analysis, Inc.	497,000	Atmospheric gas and aerosol monitoring program	3 and 4
Positive Systems, Inc.	216,300	High resolution (1-meter) multispectral imagery of Sevilleta National Wildlife Refuge	1 and 3
AstroVision, Inc.	100,000	Prototypical high-resolution (500-meter) imagery from geostationary orbit	3
Resource 21	500,000	Agricultural and forestry data for extracting land resource management information from multispectral imagery	1
Total	**$3,674,799**		

***SCIENCE THEMES:**

1. Land-Cover and Land-Use Change Research
2. Seasonal-to-Interannual Climate Variability and Prediction
3. Natural Hazards Research and Applications
4. Long-Term Climate: Natural Variability and Change Research

APPENDIX C



As noted, using a modem or an Integrated Services Digital Network to download a SIR-C image takes significantly longer than using the Partial DS3 pipeline. This pipeline is representative of the typical Internet connection at a NASA installation. However, because the pipeline is shared with all Center users, it is unlikely that a user could download a 500 megabyte (1 megabyte equals to more than 1 million bytes of data) file without some interruptions or errors. Five hours is the fastest download time possible. To download a 500 megabyte image without errors in 5 hours is unlikely.

Also, the majority of SIR-C image users are not located at NASA installations. Therefore, most users will not have access to a DS3 pipeline and, accordingly, download time could take up to 39 hours.

APPENDIX D

NASA MANAGEMENT RESPONSE

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

Reply to Attn of: YB

AUG 1 1998

TO: W/Assistant Inspector General for Auditing

FROM: Y/Associate Administrator for Earth Science

SUBJECT: Draft Report on the Audit of Earth Science Commercial Data Buy Program at Stennis Space Center
Assignment Number A-HA-98-001

This is in response to the draft report for the Audit of the Earth Science Commercial Data Buy Program at Stennis Space Center. At the time this draft report was issued, NASA was unable to provide a complete response because the science assessment and product validation of User Systems Inc. SIR-C and Land Use/ Land Cover products were not complete. This process was completed on July 27, 1998. NASA's response to the two recommendations follow.

Recommendation 1
The Program Manager, CRSPO, should request that the Contracting Officer terminate for convenience the SIR-C archive portion of the Phase I data buy contract with USI/SIE in accordance with Federal Acquisition Regulation, Part 12.403, Contract Termination.

Response
NASA does not concur with this recommendation for the following reason:

The User Systems Inc. Phase I contract of the Science Data Buy was signed on December 17, 1997, with a 180-day contract performance period. All Phase I products have been delivered and accepted since the audit work was completed. Termination of the contract at this time would not be cost advantageous to the government.

NASA agrees with the IG's report that the distribution of the data sets over the Internet would be ineffective and untimely. However, under the Space Act Agreement with User Systems Inc. the query, browse and ordering capability were not provided utilizing an interactive user interface. The user interface proposed by USI/SIE under the Science Data Buy did offer this additional functionality. While the interactive interface would have been useful and could have been more cost effective, the data provided by User Systems did not pass the science evaluation. The phase I experience was valuable, however, because without it, NASA would not have had the opportunity to determine the potential effectiveness of this proposed capability.

Planned Action
No further action is required on this recommendation; management considers this recommendation closed.

APPENDIX D

Recommendation 2
The Program Manager, CRSPO, should not award the SIR-C portion of the phase II contract.

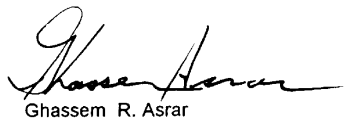
Response
NASA concurs with this recommendation for the following reasons:

- The offer was considered in two parts, the SIR-C+Interface component and the LC/LU maps component. The science assessment panel did not recommend either component of this offer for Phase II funding, ranking it at level 2: "poor quality and/or of limited value to NASA ESE research."
- User Systems has not fulfilled their obligations under the existing Space Act Agreement with Stennis Space Center.

Planned Action
User Systems Inc. will be notified, in writing by the end of August 1998, of NASA's intent not to pursue a phase II contract.

In the pursuit of making NASA more effective, efficient and looking for opportunities to be more responsive to our stakeholders, NASA would like to develop partnerships with the Office of Inspector General on a more frequent basis. A positive example of partnering was the participation of Ms. Rebecca Andrade in the Land Use/Land Cover science assessment meeting at Stennis Space Center on July 11 through 13 of this year. As with any new path finding process, difficult decisions and critical crossroads have to be adequately addressed. Ms. Andrade's input and support during this process was invaluable. In addition, NASA believes that the OIG gained valuable insight to the thoroughness of the science peer review process.

Should you have any other questions or need any additional clarifications to this response please contact Ms. Desiree Santa at NASA Headquarters at (202) 358-0743.



Ghassem R. Asrar

APPENDIX E

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House Committee on Government Reform and Oversight
House Committee on Science
House Subcommittee on Space and Aeronautics

Congressional Member

Honorable Pete Sessions, U.S. House of Representatives, Texas

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