



National Aeronautics and  
Space Administration  
Goddard Space Flight Center

# Goddard News

Greenbelt, Maryland / Wallops Island, Virginia

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## Goddard projects dominate STS-69

by Tammy Jones and Jeremy Phillips

Space Shuttle Mission STS-69 marks a major milestone in Goddard's history. Space Shuttle Endeavour and its crew are set to embark on this mission on July 30. The mission is scheduled for 10 days and 21 hours. Endeavour will carry three Goddard payloads mounted on crossbay structures. All three come from the Special Payloads Division (SPD), Code 740 and are part of NASA's efforts to produce faster, better and cheaper access to space.

Spartan-201 is flying the third mission in a series of four for the Spartan Project. All Shuttle programs administered by the SPD have at least one experiment flying on STS-69. The White Light Coronagraph (WLC) instrument on Spartan-201 was created by the Laboratory for Astronomy and Solar Physics Division, Code 680. The other two bridges, International Extreme Ultraviolet Hitchhiker (IEH-1) and Capillary Pumped Loop-2 (CAPL-2)/Get Away Special Bridge Assembly (GBA-6) are from the Shuttle Small Payloads Project (SSPP). IEH-1 has three Hitchhiker (HH) Program experiments and a Hitchhiker-Jr., (HH-J) Program experiment. CAPL-2/GBA(6) has one Hitchhiker experiment, one Complex Autonomous Payload using the Get Away Special (GAS) carrier, and four GAS payloads.

Spartan-201 is an orbiting spacecraft that is deployed by the Shuttle and retrieved on the same mission. After deployment, it is completely autonomous, providing its own battery power, pointing system and recorder for capturing data.

Spartan-201 will study the acceleration and velocity of the solar wind and measure aspects of the sun's corona. Results should suggest solutions to the questions of coronal and solar wind physics and dramatic observations.

This mission marks the ultimate versatility of the SSPP carrier systems that are designed to make access to space affordable to anyone, including educational institutions. The HH system is designed to be modular and expandable in accordance with customer

requirements. HH provides power, data or command services to operate these experiments. Typically, payloads receive their power and data handling through the HH Avionics that provide standardized electrical, telemetry, and command interface between the orbiter and the experiments. During the mission operations, experimenters will receive real-time communications between themselves and their payloads at the Goddard Payload Operations Control Center.

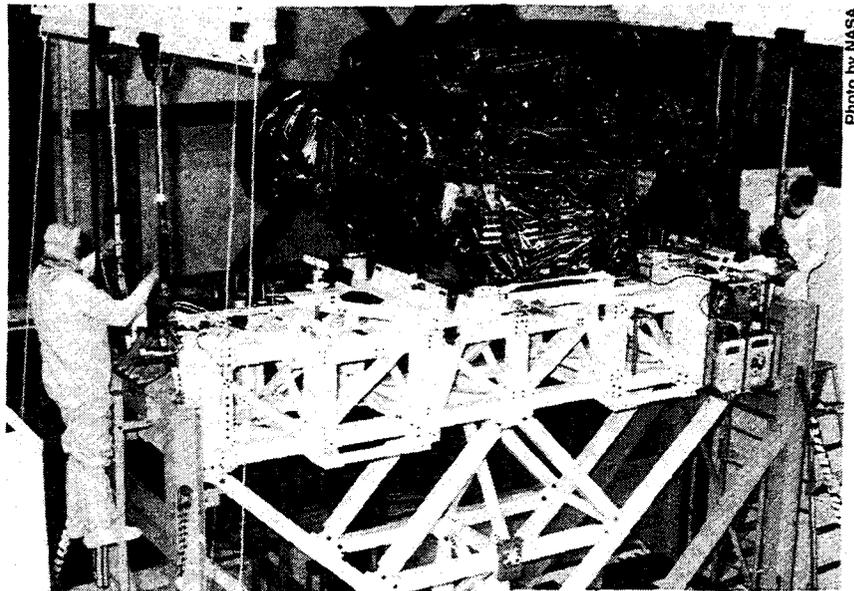


Photo by NASA

Members of the Kennedy Space Center payloads processing team prepare the Shuttle Pointed Autonomous Research Tool for Astronomy-201 for lowering into the payload bay of the Space Shuttle Endeavour in preparation for Mission STS-69.

HH-J payloads are placed in a canister with either a standard sealed top or a canister with a motorized door. HH-J allows experiments to be powered either from the orbiter or experiment batteries. A connection to the orbiter through the GAS intercom line enables crew members to send commands and check the status of the payload using a laptop computer.

GAS canisters are placed on the Shuttle when the primary payload does not take up the orbiter's full payload capacity. GAS canisters carry smaller experiments and are offered at a low cost. Four GAS payloads will be on board Endeavour for this flight. Experimenters are from NASA's Lewis Research Center, Langley Research Center, Millcreek Township School District; Erie, Pa., and the European Space Agency; Noordwijk, Netherlands.

# Business owners seek opportunities

by Tammy Jones

Goddard hosted its 22nd Annual Small and Small Disadvantaged Business Conference in May. Representatives from Goddard's scientific, technical and administrative areas were on hand to counsel small businesses regarding procurement opportunities. Also representatives from the Small Business Administration, local government agencies and Goddard's prime contractors were on hand to advise business owners.

Goddard's Industry Assistance section, organizers of the conference, offered seminars on Procurement Streamlining and Electronic Data Interchange (EDI). EDI is a fast, easy and inexpensive method to improve productivity and cut the cost of doing business with the government. Using EDI, business people learn of new opportunities to bid on government contracts electronically.

More than 500 people attended the conference, many with the hope of meeting the right person to put them in the right place to do business. Ralph Thomas, assistant administrator for the Office of Small Disadvantaged Business Utilization at NASA Headquarters, told the business owners what he hoped they would get out of the conference. "You should learn the process to get into the system, what opportunities major corporations can offer small businesses, and a chance to network."

This business conference fell on the heels of the announcement of sweeping



Photo by Mark DeBord

Small and Small Disadvantaged Business Conference Participants collect material during registration

budget cuts at NASA, but the business owners were encouraged to continue to seek business because opportunities were still available.

Acting Center Director Joseph Rothenberg welcomed the business owners and later they had a chance to mingle with honored guests including: Dr.

Charles Kennel, associate administrator for Mission to Planet Earth; Luwanda Jenkins, executive director, Office of Minority Affairs for Maryland; Ernie Mosby, deputy director of the Office of Minority Affairs for Maryland and James Hubbard, Maryland House of Delegates.

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## NASA awards education grants

NASA recently awarded eight minority universities three-year grants to develop teacher preparation and educational curriculum enhancement projects. Each university will receive up to \$600,000 over the three years.

The Mathematics, Science and Technology Awards for Teacher and Curriculum Enhancement Program (MASTAP) grants are intended to help prepare underrepresented mathematics, science and technology pre-service teachers to become state certified and to teach in middle and high schools that have sub-

stantial enrollments of underrepresented minority students.

The grant program targets institutions of higher education, especially Historically Black Colleges and Universities and Hispanic Serving Institutions that meet the eligibility criteria outlined in Public Law 102-325 in the higher education amendments of 1992, as well as Tribal Colleges and other minority universities whose student enrollment of underrepresented minorities exceeds 50 percent.

The universities selected to receive grants are: Xavier University, New

Orleans, La.; Bennett College, Greensboro, N.C.; Shaw University, Raleigh, N.C.; South Carolina State University, Orangeburg, S.C.; Medgar Evers College, Brooklyn, N.Y.; Humacao University College, Humacao, P.R.; University of Puerto Rico at Mayaguez, P.R.; and Florida International University, Miami, Fla.

The MASTAP grant program is sponsored by NASA's Office of Equal Opportunity Programs, Washington, D.C.

# Hubble in spotlight at Space Congress

by Ann Jenkins

The Hubble Space Telescope (HST) was the star of the recently concluded 32nd Annual Space Congress in Cocoa Beach, Fla. During sessions, Dr. H. John Wood, Code 717; and Hubble project teammates commanded attention and fascinated Space Congress participants eager for information.

Wood, the lead optics engineer on HST, showed some of Hubble's most important and spectacular discoveries during a lecture. His talk was accompanied by Hubble pictures displayed on two projection screens, and a dramatic movie of Hubble's view of Mars rotating. Also, Wood received a commemorative award for his achievements and participation as a Space Congress speaker.

Frank Cepollina, Code 442; project manager for the HST Flight Systems and Servicing Project, led "Global Competition in the Use of Space," a session that featured seven major subtopics and eleven speakers, including astronaut John Young, who evaluated Space Shuttle and Orbiter capabilities.

In the exhibit hall, the Hubble Space Telescope booth created a stir as spectators lined up to view the "PCs In Space" demonstration, receive free copies of the software, and collect information on Hubble's latest discoveries. "PCs In Space" is a series of educational software

created by HST teammate Tom Devlin of Jackson and Tull. Using data from the Hubble Space Telescope, Devlin developed a series of interactive computer packages to teach elementary school children about space.

Approximately 3865 copies of the "Exploring the Solar System" and "The Hubble Space Telescope First Servicing Mission" were distributed for use by teachers and school aged children. "PCs In Space" has been tested in more than 20 schools in the District of Columbia and Maryland.

The software is updated regularly as new images from Hubble become available, and has been adapted for use in the curriculum of the School of Education at the American University in Washington, DC. Also it has been introduced into schools and universities in Santa Barbara, Calif.; Boulder, Colo.; and Salt Lake City, Utah. In March 1994, more than 2,000 copies of the modules were distributed free of charge to teachers during the National Science Teachers Association Convention in Philadelphia, Pa. Two new modules—"Exploring the Sun" and "Exploring the Earth"—will soon be released. Devlin's hope is to get free copies of "PCs In Space" software into use in as many elementary schools as possible.



Photo by Ann Jenkins

Hubble project members assist Space Congress participants with "PCs In Space."

## What's Up?

June 1995

**International Ultraviolet Explorer (IUE)**  
*Days on orbit: 6,336.*

During May, IUE observed the eclipsing binary system V342 Aquilae. The ultraviolet spectra obtained indicate that recently the two stars in this system have been undergoing an extremely active phase of mass transfer.

Mass exchange occurs between many stars in close binary systems and can have dramatic effects on the evolution of the stars. Material from the outer envelope of one star streams onto the other, in some

cases accounting for phenomena such as novae and supernovae — this material can form a circumstellar disk or ring of matter or be ejected from the system entirely. Such mass exchange can also help create neutron stars and black holes.

The majority of all stars are members of binary or multiple systems, and observations of exotic binaries such as V342 Aql help us better understand star formation and evolution. In the case of V342 Aql, the IUE data completely cover the orbital period of 3.4 days and span an observing baseline of 5 years. The data

show strong iron absorption lines indicating an extensive circumstellar shell in the system, and the absorption varies over an orbital period, providing clues to the physical structure of the disk. The presence of emission lines from carbon and silicon further constrain the types, effective surface temperatures, and orbital geometry of the two stars. Ongoing analysis of the IUE spectra will provide additional clues to the unusually large rate of mass flow in V342 Aql.

# Summer Programs

*Continued from page 8.*

## **Technology for All Americans:**

Fifty teachers from the northeast region will be participating in a day-and-half workshop, to become familiar with and gain consensus on documents generated by the Technology for All Americans Project. Those working on this project will develop standards for technology education. This workshop is directed by Dr. William E. Dugger, from the International Technology Education Association from Blacksburg, Va.

## **AeroSpace for Kids (ASK):**

ASK is a six week program for kids sponsored by the Public Services Unit of the Office of Public Affairs. The kids participate in hands-on activities that include constructing and launching model rockets, payload packing and payload insulation drop tests. There are sessions for fourth through ninth graders. The program is open to anyone, but there is usually a waiting list.

The Office of University Programs, Code 120 offers numerous programs during the summer and throughout the year. Following are some of its summer programs:

## **NASA University JOint VEnture (JOVE):**

JOVE makes space science data and NASA resources available to university researchers in exchange for universities providing faculty and student support on a matching funds basis to carry out the research.

## **NASA Space Academy:**

This summer institute of higher learning guides future leaders of the space program. Graduate and undergraduate students in the physical sciences, engineering, mathematics, and computer sciences come to GSFC for a comprehensive 10-week introduction to the space program, and for a research experience.

## **Kiosk**

The Kiosk program provides unique research and educational experiences while promoting the interaction and strengthening ties between GSFC and the University of Maryland Baltimore County. The research fellows spend the majority of their time in a GSFC laboratory, matched with a project based on the individual's background, experience and interests.

## **Quality Education for Minorities (QEM):**

Network Internship Program QEM provides graduate and undergraduate students with significant exposure to issues, areas of research, and programs related to the education of minorities through two internship programs, the Network Internship Program and the Science Student Internship Program.

## **Undergraduate Student Researchers Program (USRP):**

USRP awards grants to underrepresented minorities and students with disabilities who are U.S. citizens and will be enrolled full-time as freshmen or sophomores in a post-secondary institution. The program seeks students pursuing degrees in the areas of science and engineering compatible with NASA's programs in space science and aerospace technology.

## **The National Physical Science Consortium (NPSC):**

**Fellowship** The NPSC is a national graduate fellowship program for women and minorities in the physical sciences. NPSC fellowships pay tuition, fees and a stipend for each graduate year, plus summer internships at GSFC.

## **NASA/ASEE Summer Faculty Fellowship Program (SFFP):**

This is a 10-week summer research and NASA orientation experience

research faculty with a minimum of two years teaching experience. This program is operated in collaboration with the American Society for Engineering Education.

The Equal Opportunity Program Office also offers educational programs for students, they include:

## **NASA Technical Experience for Select Students (NTESS):**

NTESS provides summer work experience for students with disabilities. This program is unique to GSFC.

## **Public Service Internship (PSI)**

PSI provides experience for graduate students in administrative fields.

## **Summer Institute in Engineering & Computer Applications (SIECA):**

SIECA is open to graduate and undergraduate students from any four-year institution in the country. Students work on projects with mentors, receive college credit, a stipend, and a make a final presentation.

## **Summer Institute in Science, Technology, Engineering, and Research (SISTER):**

The SISTER program exposes girls in middle school to women in the engineering, mathematics and science fields. Its goal is to encourage young women to aspire to work in non-traditional career fields.

## **High School/High Tech:**

This program provides an opportunity for students with physical, mental or learning disabilities to work summer jobs at GSFC and at the Department of Transportation.

Other programs sponsored by EEO are Women in Science & Engineering (WISE), Project Space and Laser. These are NASA funded programs that have an internship component.

# About Goddard Space Flight Center

## History

### Greenbelt:

1958: National Aeronautics and Space Administration founded

1959: Goddard Space Flight Center established as NASA's first space flight center

Explorer VI, First scientific satellite under Goddard Center project direction

1960: TIROS I, first weather observation satellite

ECHO I, first passive communication satellite

### Wallops Island:

1945: Wallops Flight Facility established under the National Advisory Committee for Aeronautics

1958: Wallops Station created under the National Aeronautics and Space Administration

1975: Wallops Flight Center established

1982: Wallops Flight Facility created in consolidation with Goddard Space Flight Center

## Facility

### Greenbelt:

1121 acres of land

32 major buildings

### Wallops Island:

6188 acres of land

84 major buildings including aircraft hangars

## Budget

1995 NASA: \$14.5B

1995 Goddard: \$2.7B

## Work Force

### Civil Servants:

1990: 3872    1991: 3997    1992: 3961    1993: 3987    1994: 3900    1995: 3575

## Economy

1994 contribution to Maryland:

\$2.1B in gross output/sales

\$904M in civil service/contractor income

# Fulfilling a dream

by Karen W. Davis

Otilia Rodriguez-Alvarez, an attitude control engineer in the Guidance and Control Branch, Code 712; is in pursuit of a childhood dream. Rodriguez-Alvarez was born in Cuba, where she remained until 1978 when she moved to Puerto Rico. She later earned a bachelor of science degree in electrical engineering from the University of Puerto Rico, Mayaguez Campus.

With her hopes for the future intact, Rodriguez-Alvarez set her sights on NASA. In 1986, Rodriguez-Alvarez began working for NASA. "I always wanted to work at NASA, ever since I was a little kid," she said. "I loved the mystery of space and I was fascinated by the astronauts traveling through space. Even today, I can still vividly remember the Apollo landing on the moon, and thinking how amazing."

Rodriguez-Alvarez began her career at Goddard as a test engineer for the Space Simulation Test Engineering Section, Code 754.4. She worked on the Broad Banned X-Ray Telescope, Cosmic Background Explorer and other spacecraft. Her responsibilities included the preparation of systems and subsystems for thermal vacuum testing.

In 1989, Rodriguez-Alvarez moved to the Guidance and Control Branch, Code 712. She performed control systems analysis for solar arrays and antennae for the Tropical Rainfall Measuring Mission (TRMM) and X-Ray Timing Explorer (XTE) satellites until March 1994. Currently, she is part of the sensors and actuators group, which is responsible for the Earth sensor for the TRMM satellite.

Education continued to be paramount to her career objectives and in 1991, Rodriguez-Alvarez earned a master's degree in control systems from George Washington University, Washington, D.C. From 1991-1994 she served as Vice-Chairperson, and later Chairperson of the Goddard Hispanic Advisory Committee for Employees.

"Everyday, there is a different challenge or surprise to be met," she said. "It is amazing to see how one satellite or sensor can have a tremendous global impact. For instance, the TRMM satellite will measure the rain over the tropical



Photo by Ron Mollers

**Otilia Rodriguez-Alvarez**

and subtropical regions. The results will have a sizeable influence over millions of lives."

Rodriguez-Alvarez says she immensely enjoys her job and the challenges that it brings on a daily basis. "The work we are doing at Goddard involves so many people. I feel honored to play a part on such a good team," Rodriguez-Alvarez said.

Rodriguez-Alvarez says that as an engineer, it is extremely important to remain focused and determined. "Every job brings its own pressures. You have to remember that things can always go wrong, especially if they are out of your control. Therefore, all you can do is keep track of everything and do your best to accomplish project goals. It doesn't hurt to have your own goals that motivate you

to succeed," Rodriguez-Alvarez said.

According to Rodriguez-Alvarez, experience has taught her the importance of teamwork. Sensors are extremely intricate and delicate objects and they require input from people with a variety of expertise. "I could not do my job without the help of many of others," Rodriguez-Alvarez said.

The future seems to be a bright and promising one for Rodriguez-Alvarez. She is content and plans to fulfill many more dreams at Goddard. "One day I hope to be a true sensors expert," she concluded. "Not just in my particular field, but in a more concentrated area. This is one of my dreams among many that I intend to fulfill in my lifetime."

# Japanese space agency earns Goddard award

by Ernie Shannon

Representatives of the National Space Development Agency of Japan (NASDA) were presented with the Tropical Rainfall Measuring Mission (TRMM) outstanding performance award for their work on the Precipitation Radar and the launch vehicle to satellite interfaces. The NASDA team recently was at Goddard for a week-long set of meetings with the TRMM Project, Code 910.

The visit coincided with an "all hands" meeting for the project. The event included the presentation of a number of performance awards to recognize the contributions of civil service and contractor employees to the TRMM Program.

A highlight of the ceremony was the presentation of an 1/8 scale model of the TRMM Observatory to Hideo Takamatsu, NASDA TRMM project manager, by Vern Weyers, Code 400; Director of Flight Projects Directorate.

TRMM Project Manager Tom LaVigna, Code 490; said the visit and the

awards ceremony was a significant event for the project. "The technical meeting was the 12th to be held between our teams. We are extremely pleased with the excellent working relationship we have with our Japanese partners. This visit, as with the others, was extremely productive in working various items and was especially significant for the formal signing of the Precipitation Radar to Observatory Interface Control Specification, a key project document."

Integration of the observatory flight subsystems to the TRMM structure has started and is progressing well. The Precipitation Radar will be delivered by NASDA to Goddard for integration to the observatory in November 1995.



Photo by Mark DeBord

Vern Weyers, Director of Flight Projects, left and Tom LaVigna, TRMM Project Manager are shown with Hideo Takamatsu, NASDA TRMM Project Manager when he was presented with a model of the TRMM spacecraft.

# NASA launches first high school student payload

by Keith Koehler

A suborbital space payload, the first built and managed by junior and senior high school students, was successfully launched on a NASA sounding rocket at 5:00 p.m. EDT, Friday May 12, from the Wallops Flight Facility.

The launch culminated a year-long aerospace course that took 79 Florida students in the 1993-94 school year through an academic program that taught them "hands-on" rocketry, including payload development, data analysis, flight electronics, flight dynamics, data transmission and optics.

The students are from Cocoa, Melbourne and Palm Bay High Schools and Southwest Junior High in Palm Bay, Fla. Some students traveled to classes at Brevard Community College in Palm Bay.

The project is a cooperative venture

between NASA, the State of Florida's Technological Research and Development Authority (TRDA) and the University of Central Florida (UCF). Harris Corp. and D.B.A. Systems, both of Melbourne, Fla., provided facilities for vibration testing.

The rocket, a ten-foot tall Super Loki-Dart, went past the stratosphere to 45 miles (73 kilometers) altitude to transmit data back to Earth. Its mission is to prove the value of small, inexpensive meteorological rockets as tools in remote optical sensing.

"Using the Super-Loki Dart rocket vehicle will provide an inexpensive way to study pollution in the Earth's atmosphere," said Dr. Nebil Misconi of UCF, the project scientist.

According to Frank Schmidlin, Code 972; the NASA principal investigator, there are two goals in this program. The first is the invaluable education experi-

ence the students are receiving. Still important, but secondary, is the data, which is to obtain a set of astronomical observations to deduce total content of atmospheric aerosols.

"This program enriches the participants' technical education and gives them practical knowledge of the importance of the space program in studying the environment. The students are gaining an up-close and personal experience with a space mission," said Frank Kinney, executive director of the TRDA.

The TRDA funded the educational program with a \$50,000 grant in 1994. This was made possible through the Florida Department of Education and Challenger license plate sale funding, which support TRDA programs.

Wallops provided the rocket, final payload testing support, and launch range support, including data acquisition services.

# Goddard summer education programs

by Tammy Jones

Goddard prides itself on being a leader in educational initiatives. The educational programs are designed to inspire and help develop students interested in the study of science and engineering, and to guide teachers who are charged with teaching those students. Following is a brief synopsis of Goddard's educational programs that will be held this summer.

## Summer High School Apprenticeship Program (SHARP):

SHARP students, juniors and seniors in high school, are assigned to work with a mentor on a technical area leading to a written research project and an oral presentation. The program offers opportunities to engage in activities with peers. SHARP is designed to increase under-represented minority students participation in math and science related fields. It is an 8-week internship and students are civil servant status. They culminate the program with a VIP night, which is when they present their work to their families, peers, mentors and senior staff from GSFC.

## National Space Club Scholars:

Space Club Scholars are selected by a committee identified by the National Space Club. They spend an 8-week internship at GSFC, paid for by a Space Club stipend. Similar to SHARP, these students work with a mentor to complete a specific project during their internship. All students compete for a place in these programs. Academic success, as well as indication of community service and volunteerism, are key criteria for selection.

## Space Science Student Involvement Program (SSIP):

SSIP is co-sponsored by NASA and the National Science Teachers Association to promote science, mathematics and technology achievement. Each year thousands of students compete in five competition categories of the national competition. The students win the opportunity to intern at a NASA field center for a week during the summer. They also win a scholarship to Space Camp.

## Maryland Earth & Environmental Science Teacher Ambassador Program (MEESTAP):

This program is the shining example of an Earth science and Mission to Planet Earth (MTPE) education endeavor covering the entire state.

The second class of science teachers from each district in Maryland will begin its 4 week summer program this month. Earth science is significant and GSFC is proud to be at the leading edge of MTPE; the cooperation of other organizations make this program happen. They include: NASA HQ, Maryland State Department of Education, and University of Maryland. Seminars continue for the participants after the summer.

## NASA's Educational Workshop for Mathematics and Science Technology Teachers (NEWMAST):

NEWMAST is a joint effort between NASA and National Science Teachers Association (NSTA). This is Goddard's 12th year in this partnership. Goddard provides a unique experience for 25 teachers in the northeast region for two weeks during the summer. The first week, the teachers simulate the procedures for putting a Get Away Special on board the Space Shuttle, from experiment proposals, to construction, to presentation/review. The second week, the teachers visit laboratories on Center and at other nearby research facilities.

## NASA Goddard Teacher Intern Program:

This program allows teachers from neighboring counties (Prince George's, Howard, and Anne Arundel) to work at Goddard for a summer. Teachers are paired with a mentor. Providing a wealth of current, up-to-date math, science, technology, and educational resources, this program enriches a teacher's classroom curricula in a powerful way. This is the program's 7th year.



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