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Spaceport News

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http://www-pao.ksc.nasa.gov/kscpao/snews/snewstoc.htm John F. Kennedy Space Center

ELV Mission Update

HETE-2 (Pegasus Hyb)
Launch date: August 2000
Launch site: Kwajalein Atoll

NOAA-L (Titan II)
Launch date: Aug. 29, 2000
Launch site: VAFB

EO-1/SAC-C (Delta)
Launch date: Oct. 17, 2000
Launch site: VAFB

ProSeds (Delta II)
Launch date: Dec. 14, 2000
Launch site: CCAFS

HESSI (Pegasus XL)
Launch date: NET Dec. 20, 2000
Launch site: CCAFS

EOS-PM (Delta II)
Launch date: Dec. 21, 2000
Launch site: VAFB

NET – No earlier than

Inside

Research at KSC shows CO_2's effects on plants.

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Scientists chase anvil storm clouds

Weather researchers are interested in the electric field characteristics of anvil-shaped clouds, such as the one shown above. A specially equipped Cessna Citation flys over the Shuttle Landing Facility to calibrate the Cessna's field mills, which are electric field measuring devices, with field mills attached to the tripod and car.

New weather study could lead to fewer lightning launch delays

A weather study being conducted at Kennedy Space Center this month could lead to improved lightning avoidance rules and fewer launch scrubs for the Space Shuttle and other launch vehicles on the Eastern and Western Ranges.

A team of NASA and university scientists are gathering data both from the air, using a specially equipped Cessna Citation jet aircraft, and from the ground with the Cape Canaveral Spaceport's extensive weather monitoring system

"We believe this new study will help us get the evidence we need to demonstrate that weather criteria for launch can be made more flexible and at the same time be as safe or safer than now," said Dr. Hugh Christian, a senior Marshall Space Flight Center meteorologist who is principal investigator in the study at KSC. "When we better understand the physics behind lightning creation, we can better predict what weather conditions preclude launching."

(See ANVIL, Page 4)

NASA Launch Services awarded to Boeing, LockMart

NASA recently announced the NASA Launch Services contracts awards, which will provide a range of launch services for planetary, earth-observing and scientific payloads.

NASA selected both Boeing Delta Launch Services Inc. and Lockheed Martin Commercial Launch Services Inc. for award of an Indefinite Delivery/Indefinite Quantity contract with a minimum of one launch service to each contractor over 10 years.

NASA is authorized to order a total of 70 launch services under all the contracts bringing the total estimated value to $5 billion.

Boeing was awarded three firm missions with a value of more than $168 million and five option missions with a potential value of over $248 million, with an overall value of about $417 million.

The contracts provide launch services to support the goals and objectives of NASA's Earth Science, Space Science and Human Exploration and Development of Space Enterprises.

NASA Launch Services contracts provide domestic launch services for a range of launch vehicles with a minimum performance capability of delivering NASA payloads weighing 3,300 pounds or greater to a low earth orbit.

In addition to the awarded firm and option missions, the NLS contains an innovative "on-ramp" clause.

The clause allows for emerging launch service providers and incumbents to introduce qualified launch vehicles not available at the time of the award of the initial contracts.

Savings Bond kick-off event set for July 11

About 15 million Americans will buy U.S. Savings Bonds this year.

Kennedy Space Center is once again offering employees the opportunity to invest in these bonds and build financial security through this year's Federal Savings Bond Campaign.

Jim Jennings, deputy director and chairman for the campaign, will launch the drive on July 11 at 9:30 a.m. in the Training Auditorium. He will discuss the benefits that savings bonds bring to your financial future through this form of long-term investing.

"I am thrilled to have the chance to chair the drive for the 2000 Federal Savings Bond Campaign, said Jennings. "Kennedy Space Center has always led the way in Agency participation and I look forward to another successful year."

The campaign will run from July 11-28 and will be co-chaired by Kathy Bryant, chief of cost and personnel services in the Chief Financial Officers Directorate.

"Creating a New Century of Savings is the perfect slogan for this year's campaign," said Bryant. "With Americans looking for stability to balance the fluctuations in the stock market, savings bonds are the perfect answer to complete any portfolio."

"KSC has always led the way in Agency participation and I look forward to another successful year."

– JIM JENNINGS
KSC DEPUTY DIRECTOR

In 1999, more than 55 percent of Kennedy Space Center employees were savings bond holders.

"This year the Agency goals are to increase new participation by at least five percent," Jennings noted, "and reach a 10 percent overall increase in new bond holders and current bondholders allotment increases through the Payroll Deduction Program."

Join 55 million other Americans who invest in U.S. Savings Bonds and enjoy the following benefits:

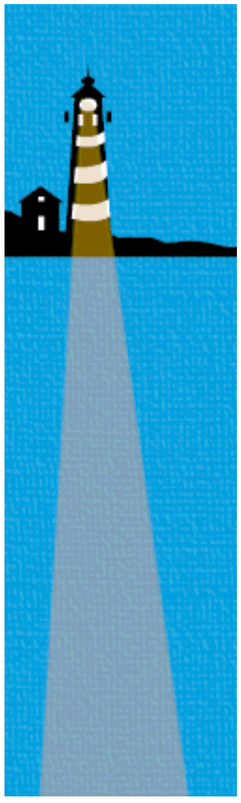
- All savings begin with paying yourself first, and U.S. Savings Bonds make it easy. You pay federal taxes only when you cash in your bonds for payoff.

Not paying taxes every year lets your savings take flight.

- U.S. Savings Bonds pay interest on interest already earned – not once but twice a year – so your account soars before you realize it. Interest paid on interest is what financial planners call the miracle of compounding.
- You can invest about $3 a day in Series EE bonds for 30 years and, at an average return of five percent, your nest egg grows to $83,000. At six percent, it's worth about $100,000.
- The Treasury Department announces interest rates on U.S. Savings Bonds every six months. In fact, bonds currently earn 90 percent of what five-year Treasury bonds yield in the market.
- U.S. Savings Bonds have no peers when it comes to safeguarding your investment. They are backed by the full faith and credit of the United States Government, and bonds can be replaced if lost, stolen or destroyed.
- You may be eligible for special tax benefits from bonds used for college or other higher education and training, and there may be tax savings in buying bonds in a child's name.

Canvassers will be selected soon and will be a point of contact for further information or to set up a bond purchase.

Further information about Federal Savings Bonds can be found on the Web site at **www.savingsbonds.gov.**



Part II: Covey's 7 Habits help you begin plan with end in mind

In the previous issue of *Spaceport News*, we began a refresher on Stephen Covey's popular self-help book, *The 7 Habits of Highly Effective People.*

This book, and the training course offered here at KSC, are invaluable tools for helping you make changes in your life and take advantage of opportunities.

Covey believes that in order to reinforce the principles of human effectiveness from an "inside-out" approach we must commit to 7 Habits.

Now that we've established an understanding of Habit 1– Be Proactive, let's move on to the next two Habits.

Habit 2: Begin with the End in Mind. To begin with the end in mind means to start with a clear understanding of your destination.

- A Personal Mission Statement can be divided into roles we assume in life – work and home. And then further divided into goals, which Covey believes, are "the building blocks of our mission and our goals."
- A Personal Mission Statement will ensure the balance between Production (P) and Production Capability (PC) which impacts the effectiveness of every aspect of our lives.

We will become self-aware and unlike the farmer in Aesop's fable of the goose and the golden egg, we will not sacrifice one for the other. Our visualization of our unique talents and areas of contribution (PC) will enable us to create the end we desire (P).

Covey encourages you to begin today to visualize "the image, picture or paradigm of the end of your life as your frame of reference, or the criteria by which everything else is examined." This will help you to keep on track and ensure that your daily activities contribute to the vision you have of your life as a whole.

Habit 3: Put First Things First. The last Habit of the "Private Victories" involves personal management and organizing our efforts and the efforts of others.

Covey believes that when we Put First Things First, we use our independent will to achieve our goals and fulfill your mission.

In promoting Habit 3, Covey focuses on the demands of our time and how we can better understand and utilize this precious commodity.

While using a Time-Management Matrix, he breaks down our time demands into four categories:

Important (things that serve our mission); Unimportant (things that do not); Urgent (things that have a pressing deadline); Non-urgent (things that do not).

From here we determine what activities we perform that will keep us proactive, productive and in control of our life.

Next issue we will explore more of the 7 Habits.

NASA, Air Force create joint Customer Service office

Another milestone has been reached in planning for the Cape Canaveral Spaceport.

KSC Director Roy Bridges and Brig. Gen. Donald P. Pettit, commander of the 45th Space Wing signed an interagency agreement on June 23, that established the Joint Planning and Customer Service (JPCS) office.

The agreement brings together an integrated staff from the 45th Space Wing and KSC into a single office to represent both agencies at the spaceport.

The principal missions of the JPCS are to eliminate bureaucracy, serve as a "one-stop shop" for new customers of the two federal agencies and to continue to expand the Air Force/NASA partnership.

"Our goals are simple: To make things easier for our customers to operate here and to plan together for the future. This office will offer personalized service and will be the first place all new customers come to initiate a business relationship with the Air Force and NASA," said Pettit.

The JPCS is also designed to facilitate inter-agency planning activities between the 45th Space Wing and KSC.

"We're continuing to widen the bridge over the river between NASA and the Air Force at the Cape," said Bridges."This is another major step towards streamlining and integrating our operations where possible and becoming more customer friendly."

Pettit added, "One more giant step towards ensuring the next 50 years of progress from the Cape is as dynamic as the first 50."

Patrick AFB will be the temporary location of the JPCSO. It will be relocated to Cape Canaveral AFS once a permanent office site is determined.

Rick Blucker, director of the 45th Space Wing Plans and Programs Office, will serve as director of the JPSC staff.

Wastewater pipeline another spaceport partnership strategy

Kennedy Space Center is partnering with the 45th Space Wing on a cost-saving wastewater management project that will benefit spaceport operations on both sides of the Banana River.

Construction crews are burying about 12 miles of a domestic wastewater sewage system pipeline so that about 95 percent of the Center's sewage can be transferred to a new wastewater treatment facility at Cape Canaveral Air Force Station, said James Belote, NASA's lead design engineer on the $2 million project.

The project was designed by Jones Edmunds and Associates Inc. of Gainesville.

The KSC Spaceport Services' project began in March and is expected to be finished before the contracted February 2001 completion date. Dry weather has sped the construction process.

KSC will save money because of not having to build a new effluent disposal area, which would have been required to meet newer state environmental standards. The Air Force has a large overland flow/rapid infiltration basin area designed so that the effluent from the treated wastewater can be absorbed safely back into the environment.

The Air Force's treatment facility, which is only a few years old, is expected to run more efficiently because of the additional waste.

"It's one of those situations where everybody wins. It's another opportunity for us to cut costs by partnering with the Air Force," Belote said.

The issue of safety was considered during the design review and there is no cause for concern, Belote said.

"We have used this type of piping extensively in our wastewater management system and have never had a rupture," he said.

A flexible, high-density polyethylene pipe with fused joints is being used.

The pipeline is pressure rated for 300 pounds per square inch (psi), but only will be under 30 psi of pressure, half of that of the potable water system.

Sections of pipeline, above, are ready to be used in a wastewater management construction project at Kennedy Space Center. About 12 miles of high-density polyethylene piping is being used. When completed, the pipeline will allow about 95 percent of the Center's wastewater to be transferred to a new wastewater treatment facility at Cape Canaveral Air Force Station. The partnership will benefit both KSC and the 45th Space Wing. At left, construction workers bury sections of the pipeline. Construction began in March and is expected to be completed before the contracted February 2001 completion date.

ANVIL ...

(Continued from Page 1)

Weather in general is the single greatest cause for launch delays and scrubs. About 30 percent of weather delays and scrubs are related to natural and triggered lightning avoidance rules, called lightning launch commit criteria (LCC), said Dr. Frank Merceret, KSC's Applied Meteorology Unit chief and program manager for the research project.

"Those national criteria prohibit launching any space vehicle under certain lightning danger conditions," Dr. Merceret said. "Because many factors related to lightning genesis are incompletely understood, criteria have been set conservatively."

A launch vehicle and its plume ascending through an anvil cloud can trigger lightning at lower electric field levels than required for natural lightning. That's because the plume easily can become a conductor between the cloud and the ground.

Such triggered lightning can disrupt or damage vehicles and their electronics. An Atlas-Centaur rocket and its payload, for example, were destroyed in 1987 when the launch of the vehicle triggered lightning.

To prevent such accidents, the lightning LCC, a strict set of lightning avoidance rules, were created by the national Lightning Advisory Panel. The panel, which is made up of representatives from various government agencies and academia, continues to review and modify those lightning launch commit criteria.

A weather researcher checks a field mill measuring device on the Cessna Citation. The aircraft is being used for NASA's airborne field mill study.

These rules apply to all launches from both the Eastern and Western ranges.

The current study, which could lead to significant changes in the criteria, will use devices called field mills that monitor electric fields. Six of the field mills, attached to a Cessna Citation on loan from the University of North Dakota, are being flown into anvil clouds in the KSC area.

The aircraft is also equipped with cloud physics probes that measure the size, shape and number of ice and water particles in the clouds.

Electric fields within anvil clouds are a major focus of the study because the LCC relating to these anvil-shaped storm clouds show significant potential for improvement as soon as the behavior of these fields is better understood.

The electric field data generated from the airborne field mills will be correlated with the cloud physics data as well as data generated from ground field mill stations at KSC and on a car. The mobile field mill unit is being driven by graduate student researchers from the University of Arizona.

The field mill data will also be compared to data generated by the rest of the Eastern Range's weather monitoring system, including wind profilers and weather towers.

"We are hoping to see clear patterns in the data from our ground-based monitoring system that correlate with data generated by the airborne field mills so that during a launch we can more accurately predict what the actual conditions in the cloud are," said Dr. Merceret. "If we can do that, then the criteria could become more flexible."

The payoff of the study could be significant. It costs about $300,000 extra for mission costs, for example, when a Shuttle launch is scrubbed. In addition, weather delays for one launch vehicle on a range can cause launch delays for other vehicles.

The current airborne field mill research project is being funded through savings created from KSC and the 45th Space Wing's Joint Base Operations Contract.

NASA plans to conduct additional related airborne electric field studies at KSC during 2001 if funding is available. Range weather monitoring is one of KSC's strategic areas for research and development in its growing role as a Spaceport Technology Center.

"KSC is an incredible location for studying lightning," said Dr. Phil Krider, a KSC visiting professor from the University of Arizona, who is the head of the Lightning Advisory Panel. "You have a combination of the world's best instruments and one of the most active lightning areas."

New images suggest present-day sources of liquid water on Mars

In what could turn out to be a landmark discovery in the history of Mars exploration, imaging scientists using data from NASA's Mars Global Surveyor spacecraft have recently observed features that suggest there may be current sources of liquid water at or near the surface of the red planet.

The new images show the smallest features ever observed from Martian orbit. Scientists compare the features to those left by flash floods on Earth.

"We see features that look like gullies formed by flowing water and the deposits of soil and rocks transported by these flows. The features appear to be so young that they might be forming today. We think we are seeing evidence of a ground water supply, similar to an aquifer," said Dr. Michael Malin, principal investigator for the Mars Orbiter Camera on the Mars Global Surveyor spacecraft at Malin Space Science Systems in San Diego, Calif.

The findings will be published in the June 30 issue of *Science* magazine.

"Twenty-eight years ago the Mariner 9 spacecraft found evidence that billions of years ago the planet had water flowing across its surface," said Dr. Ken Edgett, staff scientist at MSSS and co-author of the paper in *Science*. "Ever since that time, Mars science has focused on the question, 'Where did the water go?' The new pictures from Global Surveyor tell us part of the answer — some of that water went under ground, and quite possibly it's still there."

The gullies observed in the images are on cliffs — usually in crater or valley walls — and are made up of a deep channel with a collapsed region at its upper end and at the other end an area of accumulated debris that appears to have been transported down the slope.

Relative to the rest of the Martian surface, the gullies appear to be young, meaning they may have formed in the recent past.

The occurrence of gullies is quite rare. Only a few hundred locations have been seen in the many tens of thousands of places surveyed by the orbiter camera.

The Mars Global Surveyor images are available at: **http://www.msss.com/mars_images/moc/june2000/**

NASA receives ISS integrated truss structure P6

NASA has officially received from The Boeing Co. the first of four massive pieces of hardware that will become part of the International Space Station's electric power supply and control system.

Before turning over Space Station hardware, an Acceptance Review Board with representatives from Boeing and NASA reviewed all the engineering and testing documents to ensure the elements are ready for the next phase of pre-flight preparations.

The Integrated Truss Structure P6, which includes the long spacer, the integrated equipment assembly, two solar arrays and three radiators, is one of four integral units designed to generate, distribute and store electric power on the Station.

The element and its accompanying cargo are scheduled to be launched on STS-97, or the 4A Station mission, on Nov. 30.

"This hardware represents some of the most sophisticated, complex technology of our time. In fact this is the highest powered photovoltaic system ever qualified for space flight," said John Elbon, Boeing director of ground operations at Kennedy Space Center. "The Boeing and NASA team worked hard together over the past two years to reach this milestone. We are extremely proud of all the teams' achievements."

NASA receives ISS integrated truss, at left, from Boeing. Above, at left, Jay Greene, NASA's deputy program manager for the ISS program, and Dr. Joe Mills, Boeing deputy program manager of ISS.

> "The Boeing and NASA team worked hard together over the past two years to reach this milestone."
>
> **– JOHN ELBON**
> BOEING DIRECTOR OF GROUND OPERATIONS AT KSC

Boeing of Huntington Beach, Calif., built the integrated truss structure and the thermal control system, The solar arrays were subcontracted to Lockheed for the Boeing Rocketdyne division in Canoga Park, Calif.

Since the hardware's arrival at KSC, in early 1998, engineers and technicians have outfitted the 45-foot-long and 34,508-pound element with a complement of equipment, including orbital replacement units and the power storage batteries.

The hardware has also undergone a series of extensive tests, including the multi-element integration tests (MEIT) that are conducted in the Space Station Processing Facility high bay. The MEIT qualifies the Station's systems for flight and assembly in space by checking the electrical connections, power controls, gyros, fluid assemblies, software and hardware.

Additional pre-flight testing and checkout will be conducted by NASA and the Boeing's payload ground operations contract before the hardware is installed in the Space Shuttle Endeavour's cargo bay in preparation for launch.

High-gain antenna for ISS

Workers in the Space Station Processing Facility at KSC move a high-gain antenna for installation onto the Integrated Truss Structure Z1. The Z1, already in the SSPF, is an early exterior framework for the International Space Station that will allow the first U.S. solar arrays, on mission STS-97, to be temporarily installed on Unity for early power. The Z1 is a payload scheduled on mission STS-92, the fifth flight to the Space Station.

Study shows effects of CO_2 on scrub oak environment

A life sciences study at Kennedy Space Center is showing that rising levels of carbon dioxide (CO_2) in our atmosphere, caused by the burning of fossil fuels, could spur plant growth globally.

Higher levels of CO_2 also could change the survival odds of certain plants, insects and animals, and thus the balance of those species in various ecosystems across the world.

While the changes might not be so dramatic as to create a *Jurassic Park* environment within the new millennium, the environmental effects could be significant.

Some of the early results of the four-year-old study of elevated levels of CO_2 on a natural scrub oak environment at KSC were recently shared and discussed by 20 scientists and students who gathered at the Apollo Saturn V Center.

The CO_2 study is a collaborative research project of NASA and the Smithsonian Institution with support from the Department of Energy and participation from a variety of other government agencies and universities.

"Levels of carbon dioxide continue to rise in our environment, so it's important for us to understand the effects," said Dr. Bert Drake, the Smithsonian's principal investigator on the project. "We still have a lot to learn, but now at least we have a rich data set."

Researchers have learned through the study that although scrub oaks grow faster in a CO_2-rich environment, their leaves are less nutrient rich. That means insects that feed upon the leaves spend more time feeding, have more exposure to predators and thus higher death rates. Also, certain scrub oak scrub species do better than others in the enriched CO_2 environment.

"All the small changes created by CO_2 add up and could cause major changes it's impossible to imagine," Drake said. "By studying the reaction of a natural ecosystem to high CO_2 levels we will have a better idea of what we may be facing in years to come.."

Scientists and students continue to collect data from the CO_2 test site, which is about a half mile north of KSC's VAB (100 yards north of the Apollo Saturn V Center). The site is a natural scrub oak area where 12-foot diameter areas of scrub oak have been enclosed in 16 open-top test chambers. CO_2 is blown into the test chambers to study its effect on the growth of scrub oak and the insects and other creatures that feed on and around the scrub oak.

Five scientists from NASA and the Smithsonian Environmental Research Center in Edgewater, Md., work at the site to monitor experiments and keep the site running. In addition, about 15 scientists and students from the University of Northern Arizona, Old Dominion University, The University of Illinois in Champaign and the Desert Research Institute participate in studies at the site.

At left, CO_2 site manager and plant physiologist Graham Hymus examines scrub oak foliage while project engineer David Johnson looks on. Below, scientists and students meet at the Apollo Saturn V Center to discuss results of CO_2 site study.

The scientists hope to continue the study another five to 10 years to determine long-term effects of high levels of CO_2 on a natural ecosystem.

The study is one of a number of collaborative life sciences research projects of the Biological Sciences Branch of KSC's new Spaceport Engineering and Technology Directorate.

This research directly supports the NASA Strategic Plan to advance our understanding of the Earth and to enhance our health and quality of life and the KSC Plan for Implementing NASA Strategies to further develop environmental technologies, implement our lead center efforts, align the use of institutional resources to support KSC and Agency priorities, and is globally important.

Sign up for 50th anniversary launch gala

Time is running out to sign up for the 50th Anniversary of Launches Gala at the Radisson Resort at the Port in Cape Canaveral.

The gala is being held on July 15 to honor the Bumper 8 launch team and to commemorate the 50th anniversary of Bumper 8, the first rocket launched from the Cape on July 24, 1950.

The master of ceremonies for this black-tie event will be NBC News correspondent Jay Barbree. A segment of the Band of the U.S. Air Force Reserve called "Reserve Generation" will provide music.

Scheduled guest speakers include U.S. Congressman Dave Weldon and Lt. Gen. Roger Dekok, vice commander of Air Force Space Command, Peterson AFB, Colo.

Cost to attend the gala, which begins with a social hour at 6 p.m. is $50 per person. For more information or to RSVP, call Dave Froiseth at (321) 242-5996.

Checks can be made out to the "Air Force Association" and sent to: 468 Lake Victoria Circle, Melbourne, FL 32940.

John F. Kennedy Space Center

Spaceport News

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Editor. . . . . Kathy Hagood

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