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SPACE CENTER Roundup

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Extraterrestrial liquid found in second meteorite

A team led by NASA-JSC scientist Dr. Michael Zolensky recently announced that, for the first time, liquid water had been found in an object from space. This discovery was reported in the August 1999 issue of the journal *Science*.

Shortly after this discovery was announced, news of another meteorite that fell in 1998 in Morocco was reported. This second meteorite contains dark blue halite – a mineral found in the meteorite examined by Zolensky’s team – and has inclusions of a fluid, believed to be water.

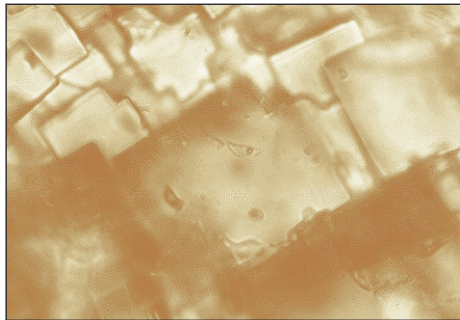
This second discovery supports Zolensky’s belief that meteorites containing water are probably not scarce. But by the time researchers get their hands on the meteorites, halite and other minerals that trap the water have dissolved away, and the water has evaporated. “This phenomenon of having liquid water in meteorites might be fairly common,” says Zolensky.

On March 22 last year in Monahans, Texas, a meteorite streaked across the sky and fell to Earth. Upon quitting their basketball game, a group of seven boys went over to inspect it. What they found was a black, grapefruit-size rock.

The next day, NASA-JSC space scientist Dr. Everett Gibson arrived and took the meteorite, later named Monahans 1998, back to JSC for analysis. In a JSC clean room two days later, the rock was carefully opened with a hammer and chisel. Researchers found halite crystals inside, and within these crystals they found bubbles of water, marking the first time that anyone has found liquid water in an object recovered from space—and a potential indication that life may exist outside our planet.

Because Monahans 1998 was recovered rapidly and isolated from terrestrial contaminants such as moisture from our atmosphere within two days after it hit Earth, researchers had an atypically fresh sample to test. The scientists were excited to find blue and purple crystals of halite inside. Halite is a salt crystal that is usually formed from evaporation of briny water.

The crystals have turned blue and purple because of the radiation they received from the radioactive decay of potassium 40 within the salt. JSC scientists Dr. Larry Nyquist and Dr. Don Bogard have dated the halite and found it to be 4.5 billion years old. That means that the trapped water could predate the sun and planets in our solar system.



The crystals were up to 3 millimeters (about a tenth of an inch) in size. These are the largest halite crystals ever seen

NASA JSC Photo S99-12148 by James Blair

by scientists in any extraterrestrial material. The presence of briny water inside the crystals was confirmed by shining a laser beam through the bubbles and measuring the resultant light spectrum. The brine could have been flowing within the asteroid itself when it was in space or it could have been deposited on the asteroid by a passing object, such as a comet.

“Water has been recognized previously in meteorites but it is usually chemically combined within selected low-temperature phases,” said Gibson.

“Discovering liquid water within the halite trapped within high-temperature silicates of the meteorite was the real surprise. The water was essentially fluids left over from

the time of formation of our solar system.”

Scientists did not expect to find water in the type of meteorite in which it was found. “We have been looking for water in meteorites for generations, so we were prepared to find it,” said Zolensky.

“But researchers have been looking for water in meteorites that are considered to have been formed from water and contain clay minerals.”

Researchers were equally surprised to find water in halite, a mineral they never expected to find in a meteorite. Sodium chloride, or table salt, is commonly found on Earth. Having this in a meteorite implies that there were tremendous quantities of water on this asteroid—much more than researchers had hitherto thought.

The brine inclusions discovered in Monahans 1998 provide the first opportunity for the direct analysis of a meteoritic water sample, but such an analysis is difficult because of the small size of the inclusions. Each inclusion contains on the order of a picomole of water, which is beyond the capability of high-precision mass spectrometers by about a factor of a thousand. But according to Zolensky, scientists in England have access to instruments that can perform this analysis.



NASA JSC Photo S99-12531 by James Blair

The Monahans 1998 Meteorite Team members include, from left, Dan Garrison (Lockheed Martin), Dr. Mike Zolensky (NASA), Kathleen McBride (Lockheed Martin), Dr. Larry Nyquist (NASA), and Dr. Don Bogard (NASA) (above).

Dr. Everett K. Gibson shows a model of one of the two Monahans (1998) meteorites bearing the unusual salt crystals (at left).

Researchers found halite crystals (table salt) inside the meteorite, and within these crystals they found bubbles of water (below left).

Plans call for this research to be completed within a year.

In the coming year, researchers plan to look for more samples, searching for liquid water inclusions not only in halite but also in other minerals in meteorites. Scientists also have arranged to have other collaborators examine the contents of the fluid in Monahans 1998. Knowing how much calcium, iron or magnesium is in the fluid will help researchers determine where this water has been and how long it has been in the asteroid. Thirdly, researchers will try to find out what the isotopic composition of the water itself is by looking at the oxygen and hydrogen isotopes in the water. This analysis will tell scientists more about the origin of the water—whether it came from our solar system or from somewhere else. ■



Astronauts use new robotic arm in training.

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Safety & Total Health Day best ever.

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Staying active is best remedy for aging.

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International Space Station Update

Astronauts use new robotic arm for space station assembly training



NASA JSC Photo S99-12315 by James Blair

Multi-use Remote Manipulator Development Facility team members, from left, front (kneeling): Mike Montz (project manager), Ken Ngo, Issa Zaid, Dago Rodriguez, Ken Alder, Matthew Ha, John Tran, Duane Johnson, Dean Landry, Alan Bell, Paul Bielski, Alberto Trujillo, Toby Martin (integration manager); middle: J.B. Buentello (kneeling), John Peck (kneeling), Heather Baker (standing), Anita Kemmerling (standing), Kim Baker (standing); back: Jim Brock, Larry Merkel, Tony Doran, Richard Bussey, Doug Seiler, Frank Moore, Joe Hubbard, Garlan Moreland, Andre Sylvester (branch chief), Richard Pedersen, P.D. Lambert, Lebarian Stokes, Sam Bishop, Ed Van Maulden, Rob Bailey, Dana Snyder. Not pictured: West Womack (Lockheed integration manager), Alex Lin, Lucien Junkin, Scott Killingsworth, Kent Talbot, Anna Gutkowski, Zack Cruess.

With the completion of the massive Multi-use Remote Manipulator Development Facility in Bldg. 9, JSC has acquired an important new addition to its array of astronaut training tools.

This 15-ton, 60-foot-long "robotic arm" is a full-scale replica of the Canadian-built Space Station Remote Manipulator System, designed to operate in a gravity environment. The flight SSRMS is currently at the Kennedy Space Center in Florida being readied for launch into space aboard the space shuttle next summer.

The MRMDF will provide pre-flight training for astronauts who will eventually operate the actual SSRMS on orbit to assemble the space station. The MRMDF can simulate activities that will be conducted by the SSRMS such as removing modules from the shuttle payload bay, moving them around the station, and positioning them for final assembly.

The MRMDF has seven degrees of freedom. Taking these in order from the fixed end, which is the shoulder end, they are the shoulder roll, shoulder yaw, shoulder pitch, elbow pitch, wrist pitch, wrist yaw, and wrist roll. Astronauts use two joystick-type controllers to command desired motions. The operator may control single joints or command a trajectory for the motion at the tip of the arm. Closed-circuit TV camera views provide visual cues.

"It's strong enough to lift 500 pounds when fully extended, 60 feet in length, flexible enough to reach around large space station modules, and rigid enough to simulate the Canadian arm," said NASA Integration Manager Toby Martin. "Each joint is capable of turning plus or minus 270 degrees at speeds as low .08 degrees per second and as high as 5.0 degrees per second.

Within these speed ranges, the arm can recreate the operations scenarios required for crew training." Two additional joints reconfigure the base of the MRMDF arm to simulate arm operations from different locations on the space station.

Ensuring that the MRMDF would be capable of joint operation at low speeds was one of the major challenges in designing and constructing the facility. "In space, moving the arm and payloads too fast would be dangerous," said Mike Montz, who served as the MRMDF project manager. "So, arm motion in the training facility had to smoothly simulate the low speeds normally used in space. This was a challenge with such a large mechanical device, and it took a dedicated team effort from NASA and contractor employees to make it successful."

To simulate the space station environment, mockups representing various station locations will be built and positioned around the MRMDF

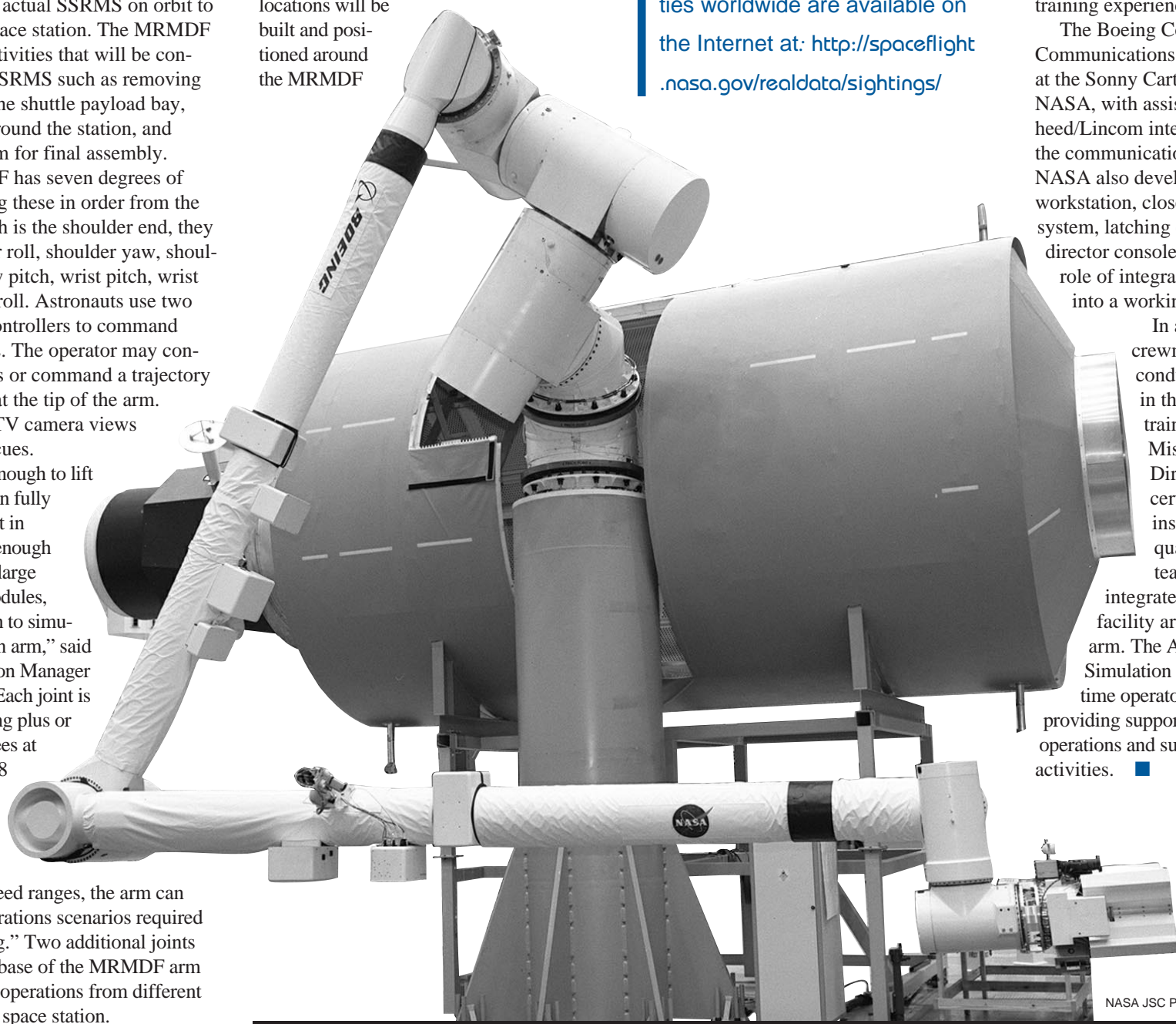
Circling the Earth every 92 minutes, the International Space Station is orbiting at an altitude with a high point of 248 statute miles and a low point of 230 statute miles. Since Zarya was launched last November, the station has completed more than 5,000 revolutions of the planet. Space station viewing opportunities worldwide are available on the Internet at: <http://spaceflight.nasa.gov/realdatasightings/>

arm. Essentially, the arm will remain stationary while the simulated space station changes around it. Mockups that are currently in use include the Node, Laboratory Module, Orbiter Payload Bay, Airlock and Spacelab Pallet.

"The MRMDF is an important training aid for International Space Station astronaut crews," said Andre Sylvester, chief, Dynamic Systems Test Branch. "It is the only dynamic hardware simulation for high-fidelity Intra-Vehicular Activity training available to the crewmember operators. It has been determined by the crewmembers that manipulation of actual hardware provides them with a useful training experience."

The Boeing Company's Space and Communications Division built the arm at the Sonny Carter Training Facility. NASA, with assistance from the Lockheed/Lincom integration team, developed the communications and control software. NASA also developed the cupola training workstation, closed-circuit television system, latching end effector and test director console. Lastly, NASA had the role of integrating all of these elements into a working training system.

In addition to the astronaut crewmembers who will be conducting flight procedures in the MRMDF during their training operations, the Mission Operations Directorate provides certified robotic training instructors who are qualified operators, and the team members who integrated the arm into the facility are certified to operate the arm. The Automation, Robotics and Simulation Division will be the full-time operator of the facility, providing support for maintenance, operations and sustaining engineering activities. ■



NASA JSC Photo S99-12316 by James Blair

J S C * s S H I N I N G S T A R**Duncan lives the dream as part of JSC's Aircraft Operations team**

Years ago, visions of war-torn aircraft thundering through smoke filled skies in the World War II flick Tora! Tora! Tora! inspired Nickie Duncan to pursue her own aviation dreams.

A quality assurance specialist at JSC's Aircraft Operations Directorate at Ellington Field since 1989 and a recent Embry-Riddle Professional Aeronautics graduate, Duncan is living her dream — working and flying among aviation's elite.

"This is the only place I ever really wanted to work," said Duncan. "I just like being around airplanes. There's nothing like it!"

Shortly after graduating from Magnolia High School, Duncan joined the U.S. Air Force and served as an aircraft mechanic on C-141As. She left in 1979 to join Northrop Worldwide Aircraft Services, Inc., but returned to the Air Force Reserves in 1985 as a flight engineer on C-5A/B aircraft.

"I really liked the traveling," Duncan said of her days in the armed service. "I went around the world a few dozen times and visited many countries. Too many to count."

After Desert Storm, Duncan left the military and returned to NASA's aviation team at Ellington Field where she puts her skills from the Air Force to work for the country's astronaut corps.

"I have approximately 3,800 total hours of flight time," explained Duncan. "I was C-5A/B flight engineer and instructor, flight simulation engineer (FSE) on the Shuttle Training Aircraft, back-seat flyer on the T-38, and as a private pilot, I fly Cessna 172s."

Her on the ground responsibilities at Ellington include reviewing contract policies and the airworthiness of as many as five NASA aircraft.

"The flying is my favorite part," said Duncan. "As an FSE on the STA, I really



NASA JSC Photo S99-11686 by Robert Markowitz
Nickie Duncan

enjoyed watching new astronaut pilots finally make it to the left seat. We train them on the STA from when they start at NASA as an ASCAN to when they finally make commander of the shuttle. As a QA specialist, I don't always like being the aviation police but you have to look at it in a simple way — we're helping keep the aircraft safe and, with our experience and background, we also help keep the bosses out of trouble."

Duncan plans to continue her education through Embry-Riddle's graduate program and pursue a Masters in Aircraft Operations and Aviation Safety.

"Ms. Duncan is a dedicated and hard working team member of the Aircraft Operations Division Team," said Harry Drott, aircraft systems quality assurance branch chief. "She is an asset to NASA, Aircraft Operations and the Quality Assurance Branch." ■

More than a fun run: *JSC employees train for upcoming marathons*

By Nicole Cloutier

Some JSC employees are running around like crazy to get ready for exotic trips to Honolulu and Cozumel.

Bobby Kann, GB Tech, Margie (Frances) Schafman, Boeing, and Victoria Valadez, Enterprise Advisory Services, are just a few local runners participating in a program that not only raises funds for leukemia research and patient assistance, but also prepares the runners to finish a marathon or bicycling century throughout the U.S., Canada and Mexico.

Leukemia is the number one disease-killer of children under 15 and also is the leading killer of young men and women under 35. With that in mind, more than 23,000 bicyclists, runners or walkers participate in this program nationwide to raise millions of dollars to fight it and other related illnesses.

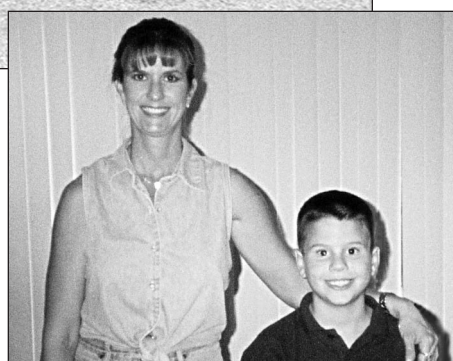
Although all the participants are introduced to the program in different ways, it's the singular goal of helping to conquer leukemia that prompts them to enlist in the cause. For Schafman, it was a very personal mission.

"My son Conrad, now 9, was diagnosed with leukemia in 1994," explained Schafman, who plans to participate in the Cozumel Marathon in Mexico this month. Her son underwent two years of chemo-therapy treatment, and later had to have a cancerous tumor removed.

"He's been off the chemo treatment now for seven months," said Schafman. "Training for a run like this gives you a sense of purpose — something to work towards and strive for." It's a similar feeling for the other runners.



NASA JSC S99-11868 Photo by Benny Benavides



Margie and Conrad Schafman

"Before I committed to joining the program, I attended a group outing of runners for Michael, an 11-year-old boy in remission from leukemia and that was it. I was hooked," said Valadez, a regular runner at Gilruth. "Just seeing Michael in person, and meeting someone who is going to benefit from your efforts, is really inspiring."

Each runner is designated an Honor Patient Hero of someone challenged with leukemia, lymphoma, multiple myeloma or Hodgkin's disease, who puts a face to the cause. The Honor Patients add inspiration and motivation as the runners prepare for the race's financial and physical demands.

Valadez now meets with Mark Anderson, NASA, who leads the training and provides coaching tips, and a group of about 15 other Clear Lake participants every Saturday morning to train for the upcoming marathons.

"Getting up that early in the morning is tough," said Kann of the 6:30 a.m. training sessions. "Sometimes I don't get out there till 7:30 and I have to catch up!"

"But you know if you don't make it out, everyone else is going to talk about you," teases Anderson. This is Anderson's first coaching role, but he says it's a unique way to contribute to the cause. "This has been a lot of fun, working with people who are new to marathoning and even to fitness. It's fun to pass on my experience and to see them get excited."

"The best motivation, in addition to finding a cure, is knowing that it's helping young children," added Kann, who will be running in Honolulu for his aunt who died of cancer, as well as Charlie, a six-year-old leukemia patient in Pearland. "Knowing that children are going through all the testing and chemotherapy keeps me motivated to pursue my fundraising goals and never give up during the long strenuous runs." ■

Runners Victoria Valadez and Mark Anderson train for Leukemia Society marathons.

Local airshow highlights thrills of aviation

Celebrating its 15th year, the Wings Over Houston Airshow Festival delivered another action packed and fun-filled weekend for hordes of people out at Ellington Field. Despite a threat of inclement weather, the skies held throughout the weekend for the more than 95,000 spectators who came to see one of the world's largest airshows.

The airshow served as one of the first sites for JSC's new *Benefits of Space On-Tour* mobile theater. Organizers estimate that nearly 2,000

airshow enthusiasts visited the trailer during the weekend.

The flight festival regularly exhibits one of the largest collections of vintage and modern aircraft in its on-the-ground display. Airshow visitors were able to get up-close to the planes that shaped our country's history as well as the planes used to protect its future, such as an F-117A Stealth. NASA aircraft, including several T-38s, the KC-135, a Shuttle Training Aircraft, the WB-57 high altitude aircraft and the Super Guppy Transport plane were

also among those exhibited.

In addition to many of the perennial air-act favorites, including the legendary Tora! Tora! Tora! Pearl Harbor bombing re-enactment, the 1999 airshow featured flight demos from our nation's elite military aircraft. Streaking overhead were an F-15 Eagle, F-16 Falcon, AH-64 Apache Helicopter and a Stealth fighter. The skies also provided the backdrop for aerobatic performances from national favorites such as Sean Tucker and Kent Gordon. ■

Safety & Total Health Day

Speakers mix humor, challenge, and hard facts

By Mary Peterson

The master of ceremonies at Teague Auditorium, Phil West, pegged it right when he said, "Can you believe it? A doctor with a sense of humor." From JSC's own Space and Life Sciences Directorate, Dr. Dave Williams, to guest doctors Robert Conn and Tom Marshburn, the audience was in for more than a few laughs mixed in with some very serious subject matter.

Marshburn, who preceded Conn's keynote, spoke on a subject of concern to all of us at some time or other: cholesterol. Speaking about how the history of food and diet evolved, Marshburn said, "In the old days, there wasn't much more around [to eat] than squirrels, nuts, and berries, and you had to chase after much of that because it was either hard to find or ran away." As time went on, though, things changed. "Now," Marshburn said, "we have progressed to 'happy meals' – Ding Dongs, Twinkies, and pizzas. And, much of it we don't have to chase after. It even comes to us." The point being, fast food can be a fast road to heart attacks. "This," he said, "has given rise to incredible buildings (hospitals), and a chance to know its occupants (doctors) better than



Dr. Robert Conn

what you eat. Keep your cholesterol below 200, LDL at less than 160, and HDL above 35. Emphasize, as your mother told you, a lot of fruits and vegetables in your diet. Be active. Don't pick up the phone every time you want to call someone across the office. Walk over to talk to them. Take the stairs. Park farther from your destination. Walk! Walk! Walk!

And, of course, choose your parents wisely. Well, we can't do that exactly, but Marshburn reminded that genetics do play an important role in our physical makeup and longevity. Still, though, genetic predisposition can be somewhat managed by careful attention to diet and exercise.

In an earlier talk, Dr. Williams touched upon things more serious. For

you ever wanted to." He even showed a picture of a fancy yacht that we can, and probably do, contribute to.

Marshburn's message was true and clear. Watch

openers, he predicted the imminent new year, 2000, to be a time of curious new resolutions and also of much sadness. "Having worked as an emergency trauma center physician, I have seen a lot of accidents related to drinking and driving – something that can, and should, be avoided. Don't let it happen to you.

"We at JSC are as concerned about your safety at home as at work, and don't think things can't happen to you," Williams warned. He told the story of a fellow physician who died quite unexpectedly of a heart attack – at age 50.

Another instance involved a personal friend, the senior emergency physician at the trauma center where he worked and whom he considered a mentor. "My friend didn't show up for work one day. Upon checking, he was found dead at the base of the stairs in his apartment. He had slipped and suffered an apparent fall, breaking his neck. He would have been 48 years old." A simple accident, it was a reminder that slips, trips, and falls also account for the majority of injuries on site.

Williams said most of us give more thought to financial management than we do to our personal time and risk management. Why? "It's the changing of our culture," he said. "Things we

wouldn't have thought of doing just a few years ago are now commonplace. Take extreme sports for example."

Williams cited a number of activities that push risk to the limit, including snowboarding, scuba diving, rock climbing (a popular version of which is without a safety belt), skydiving, skateboarding, and freestyle skiing, to name a few. "People even take ridiculous new social risks. Ever been to a punchbowl party?" he asked. This, he explained, is where people bring any drugs and medications they can find and drop them into a punch bowl. Guests then pull out and consume whatever they get. "You could get young men strung out on something as crazy as birth control pills combined with antidepressants. Some combinations could have disastrous results. When you work 10 years as a trauma center physician, you see everything, and, sadly, much of it preventable."

In closing, Williams charged, "Take responsibility for your own risk management, because you can make a difference in your own health and safety."

These words segued nicely into those of Dr. Robert Conn, next to speak, who has made a crusade of teaching risk management. ■

Best Safety & Total Health Day ever! *say employees*

By Mary Peterson

No question about it. Safety & Total Health Day 1999 was the biggest, the boldest, and the best received of any of its predecessor events. And that's not hype. That's the consensus of the people the day was designed to benefit, the employees.

"You only had to walk among the booths, stroll around the pond area, or eavesdrop at a seminar," said Gail Bowie, a publications specialist, "to hear positive remarks. They had to do with being able to pick up some needed information on a health problem, learning some new aspect of safety, or someone's delight at being able to have something personal done, like having their cholesterol screened. I wish I could have taken in even more of the events myself."

According to Booth Committee co-chairs Jonathan Manning and Terri Blackwelder, more than 60 booths, the

most ever, participated this year, and requests for more booth setups had to be turned down as late as two days before the event. "We think this upsurge of interest is attributable possibly to two things," said Manning. "One, Safety & Total Health Day has established itself as an important event at the center, and, two, our employees are taking the day a lot more seriously – taking part, making suggestions, and even encouraging others to bring something to the day."

That kind of enthusiasm was not lost on Barrios employees either. Spearheaded by Sharon Kemp, an administrative assistant, the company asked everyone to take an active role this year. She said, "We told our people that we wanted their commitment to volunteer on S&TH Day and contribute something beyond the Barrios program."

The chance to do something different was appealing, and soon volunteers were everywhere. And work they did – putting

up signs, placing posters, table tents, flyers, banners, and whatever else the already overburdened Communications Office needed help with. "They were a godsend," said Rindy Carmichael, of Safety Communications. "Not only that, I think they benefited from feeling a part of the production. We need that kind of involvement."

Besides the individual directorate activities, employees had a wealth of things to see and do. The cholesterol screenings, the blood drive, the Texas-New Mexico Power Company arc demonstration, the JSC Clinic M*A*S*H* tent, the JSAT VPP "Why I Work Safely" booth, the motorcycle safety booth, CPR training, the great Max-Q Band, the child car seat check were very popular as was the Health Run/Walk event that closed out the day. A sizable number of employees took in at least one of the several outstanding seminars that were offered.

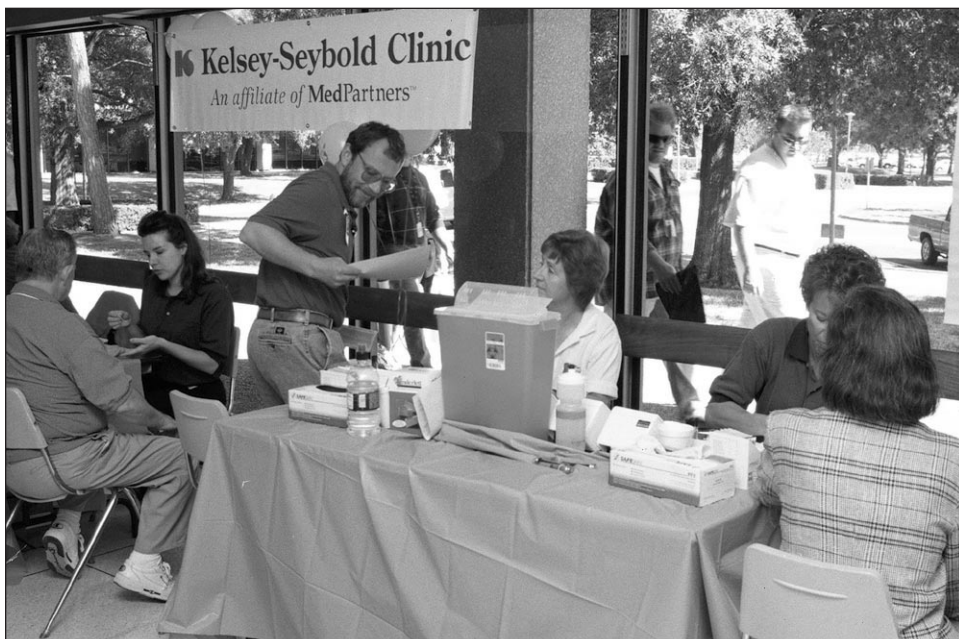
Even Barbara Zelon, JSC's busy PAO director, took time to participate in

some of the booth activities. Zelon walked one of the therapy-trained dogs, a beautiful, friendly wheaten terrier, who was part of the Pet Partners Animal-Assisted Therapy exhibit. "If seeing one of these wonderful dogs work won't raise your spirits, nothing will," Zelon said.

New this year were the Pictionary Contest and the presentation of the "George Award." Winners and details will appear in the next *Roundup*.

This S&TH Day will be a tough act to follow in 2000. Can they do it? This year's co-chairs Perry Bennett and Chuck Sawin think so. "We had a great committee who knew what to do and how to get it done," said Bennett. "They were the key. But, most of all," he said, "if injuries and lost workdays continue to go down, all the time and effort were more than worth it." ■

Let's not disappoint!



Employees take advantage of free cholesterol screening offered by the JSC Clinic on Safety and Total Health Day. NASA JSC S99-13241 Photo by Steve Candler



Want fries with that? It could be you. Texas-New Mexico Power Co. employees dramatically demonstrate electrical safety do's and don'ts. NASA JSC S99-13240 Photo by Steve Candler

Fit for life: *Staying active is best remedy for aging*

By Nicole Cloutier

Temperatures are cooling and the sky is getting dark earlier. As winter nears, many of us may tend to slow down our level of physical activity and get less exercise than we did during the warmer months. But maybe a quick glance at what some of our older peers are up to will inspire you to keep the spring in your step and do the daily workout you always intended to do.

Take for instance Anne Bush Brenton. A JSC program analyst for more than 32 years, Brenton is now retired but still works out at the Gilruth Center three times a week.

"It's just amazing how good you feel afterward," says Brenton.

NASA JSC Photo S99-11666 by James Blair

"Getting up and getting started is tough, but I just make it a point to do it and not let it slip by."

Pretty impressive for someone in the 65 and up group, doing more than many of us in the 50 and below age bracket. But she's not alone. Our campus is filled with ambitious seniors that continue, or even in some cases, increase their fitness regimen as they grow older.

Stanley Blackmer, also a regular at Gilruth and part time payload avionics engineer, uses the stationary bicycle and other workout equipment five times a week. Blackmer started the fitness program when he was 50 years old.

"It's pretty obvious to me that staying active allows you to delay the aging process, which is inevitable," said Blackmer. "You can always find an excuse not to exercise if you want one. The trick is to get started and make it a routine."

Attitude can make the difference for anyone when it comes to getting out of the chair and into the gym.

Jeff Fox sees that first hand. His dad, NBL Manned Test Support Group Supervisor Mike Fox, has always been involved in sports.

"It's all about attitude," says Jeff Fox, who is on a recreational softball team with his father. "If you think it's going to be hard,

then it will be hard.

We have 20-, 30-, 40- and 50-year-olds on our team and no one can complain because what can they complain about? They have a 66-year-old on their team who's got aches and pains but he's not quitting."

A retired master chief hospital corpsman from the U.S. Navy, the senior Fox

has excelled at most sports he's tried, and the list is long. Aside from being a Navy diver, he played on all-Navy softball and bowling teams and even had a stint on the pro-boxing circuit after winning the welterweight all-Navy title. Other hobbies included golf, hockey, sky diving, and jogging, not to mention coaching dozens of Little League teams and a youth bowling league.

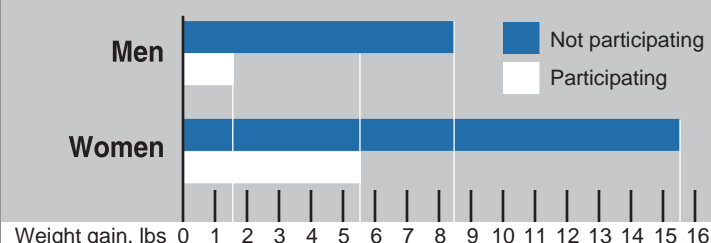
Contrary to what he says, his activities have only slowed slightly. He's still on the softball team, but has added roller-blading, white-water rafting, and bodysurfing at Galveston to his roster. Additionally, he walks three miles each night, uses the PowerRider regularly and is planning his first snow ski trip for this winter.

"Age is catching up with me but I'm trying to outrun it," says Fox. "But what I value most from having stayed in shape is that I am able to do active things with my kids at this age. We all know people

who say, 'Oh, I wish I had done this or that' – I tell myself, 'I am going to do this.' You can't stop [working out] – You'll never get back to the condition you're in now."

He makes a good point. According to Dr. Larry Wier, JSC's director of health-related fitness, the average age at time of death is about 75. If a person lives to age 62, he or she has better than 50 - 50 odds of living to age 80, but the remaining 12 years of life are not commonly characterized by good health. However, Wier points out, many senior citizens maintain a youthful lifestyle and retain their independence. Maintaining a fitness regimen helps mitigate the negative effects of aging.

Impact of fitness on weight gain



This chart reflects the mean weight gain after ten years of NASA/JSC employees not involved in the JSC Fitness Program vs. those who participate in the program.

"There's no doubt there is a physiological effect to aging," said Wier, who has authored several studies on the impact of regular fitness activities on people as they grow older. "But an active lifestyle helps retain your youth."

JSC's Health and Fitness Program includes an initial medical screening and individualized 3-day a week fitness program. The program lasts three months, but encourages quarterly follow-ups.

Wier stresses the importance of taking care of your body and incorporating some level of exercise into your lifestyle, even if you've had heart problems, which scares a lot of people from the gym.

"I get lots of calls from people after they've had surgery, wondering if it's safe," said Wier. "You definitely can be active despite heart disease. Walking and jogging programs have the most success."

The most important thing anyone should keep in mind when starting a fitness program is to ease into it. "Don't try to be an Olympian the first week," advises Wier. He recommends starting out slowly and then building up. ■

Maintaining an active lifestyle as you mature can help ensure that you can keep up with your kids, as shown by rollerbladers Mike Fox, left, and his son Jeff.

Although retired, Anne Bush Brenton continues to visit the Gilruth Center regularly.



NASA JSC Photo S99-06132 by James Blair

People interested in more information about the Health-Related Fitness Course should call Wier at x30301.

Tips for just starting out...

Walking: Start out by walking four times a week for 30 minutes, adding three minutes each week with the goal of walking five or six times a week for 45 minutes to an hour each time.

Jogging: Start out with a light jog for 15 minutes, then add three minutes each week until you are running four or five times a week for 35 to 40 minutes. Remember to completely stretch out before and AFTER each activity.

Wier has helped hundreds of people incorporate fitness into their lives and needs little more proof of the positive impact it can have on your quality of life.

"I have some patients maybe 65 or 70 years old exercising regularly in our facility; some have even hiked the Appalachian Trail," said Wier. "The big difference between these people and those of the same age who are immobilized by conditions such as heart attack or stroke, is their level of habitual activity. The key to staying fit for a lifetime is staying active."

Activity is the name of the game but once you start, there's nothing you can't do. Remember Anne Brenton. Bringing down high blood pressure is what prompted her to start getting into better shape, but now she's got higher goals, including working on her pilot's license. And Stanley Blackmer? He's still racing around on his 30-foot sailboat while many of his 60-year-old friends are winded before reaching the dock. It's never to late – so start with a stretch and take the next step towards getting fit.

Ripped from the ROUNDUP

Ripped straight from the pages of old Space News Roundups, here's what happened at JSC on this date:

1 9 6 4

NASA is developing an instrument to detect different colors on the surface of the Moon.

Called a "Moon Blink," the instrument already has proved itself by helping three men detect a red spot, October 27, in the crater Alphonsus near the center of the Moon.

The instrument is helpful in locating spots of color on the Moon by making the spots appear to blink. The blinking effect is caused by rotating colored filters across the light reflected in the mirror of a telescope.

To detect a red spot on the Moon, red and blue filters are rotated across the light causing the spot to blink in and out of the image.

1 9 6 9

A fragment of moon rock brought to Earth by the crew of Apollo 11 went on public display Wednesday in the front lobby of Bldg. 1.

The exhibit is the second such official display of returned lunar surface material in the nation; the first public display of moon rock was opened at the Smithsonian Institution in Washington, D.C. last month.

The rock fragment will be changed periodically as geologists in the MSC Lunar Receiving Laboratory conduct experiments on the Apollo 11 rock samples.

1 9 8 9

Commander Don Williams flew *Atlantis* to a smooth space shuttle landing Monday, cutting the STS-34 mission short by two orbits because of anticipated strong winds at Edwards Air Force Base.

Bill Lenoir, NASA associate administrator for space flight, said the most significant aspect of the mission was the launch of Galileo, which if successful will be the first probe to stop and take a close look at one of the outer planets.

The crew of *Atlantis* – Williams, Pilot Mike McCulley and Mission Specialists Ellen Baker, Franklin Chang-Díaz and Shannon Lucid – reported a smooth ride home and was ecstatic about the successful deployment of the Galileo spacecraft.

Benefits from space on display in NASA semitrailer



By John Ira Petty

Americans will get a closer look at the benefits they receive from the U.S. space program through a new semitrailer exhibit focusing on technology transfer.

Technology from the space program touches all our lives each day. Examples include things now taken for granted – things like common home smoke detectors and cordless tools. More recent technologies just now coming into wider use include a miniature, implantable heart assist device based on space shuttle fuel pumps and protective clothing for a variety of applications based on spacesuit technology.



The semitrailer, owned and operated by JSC, is designed to visit special events throughout the country. Schedule permitting, it also will stop at malls, universities and schools, said Sandy Griffin of JSC's

Technology Transfer and Commercialization Office, who is responsible for scheduling the visits.

This exhibit will show the American people the impact of space-related technology in their daily lives, said Henry L. Davis, JSC's director of technology trans-

fer and commercialization. It also shows the tremendous potential for even greater future benefits for the public from space, he added.

The semitrailer is 53 feet long. The sides expand to increase its width from 8.5 feet to about 16 feet. It is divided into two sections. Each can accommodate 30 people.

The first section, the Technology Hall of Fame, features exhibits on a dozen space program spinoffs. After seeing the exhibits, visitors walk into the Surround-Sound

Theater, where a 10-minute video on the benefits of the space program is shown.

Griffin said the vehicle will visit about six events per month. It will be on the road about 240 days a year. ■

Inman, Glenn get Secretarial Excellence Awards

Cheryl A. Inman of the Safety, Reliability, and Quality Assurance Directorate and Martha A. Glenn of the Engineering Directorate each recently received the Marilyn J. Bockting Secretarial Excellence Award in recognition of their exceptional contributions to the effective operation of JSC through professional competence and personal dedication.

Inman was recognized in August for her contributions as the division secretary in the Space Shuttle Division. She manages the division's secretarial activities and has consistently demonstrated exceptional administrative skills, organizational ability, and an outstanding ability to work well under stressful conditions. She has organized her work and time in a manner that has enabled her not only to support the widely varying functions of the office but

to improve the effectiveness and efficiency of the entire office.

Since forming the newly created division in March 1998, Inman has set up

Glenn was recognized in September for her contributions as secretary to the chief, Power Systems Branch, since 1985. She consistently performs her secretarial

and administrative duties in an exemplary manner and is always looking for ways to improve the efficiency of administrative processes to minimize the impact to the engineers that she supports.

Glenn was recently reassigned as a member of the Division's Office Support Team. This team concept is a major change in the normal way of doing business, and Glenn accepted the chal-

lenge to define and implement the support team. Her willingness to assist in the reorganization contributed to the success of this effort. As part of the office support team, she has taken on new responsibilities for the whole division and expanded her knowledge and capabilities. ■



Cheryl A. Inman



Martha A. Glenn

TICKET WINDOW

Exchange Store hours

Monday-Friday
Bldg. 3 7 a.m.-4 p.m.
Bldg. 11 9 a.m.-3 p.m.

All tickets are nonrefundable.
Metro tokens and value cards are available.
Franklin Planners now available.
For more information, please call x35350.

Book Fair

November 16-19
Bldgs. 3 and 11

The following discount tickets are available at the Exchange Stores

General Cinema Theaters	\$5.50
Sony Loew's Theaters	\$5.00
AMC Theaters	\$4.75
Moody Gardens (2 of 6 events) (does not include Aquarium Pyramid)	\$10.75
Moody Gardens (Aquarium only)	\$9.25
Sea World	adult .. \$27.25 child (age 3-11) .. \$18.25
Space Center Houston	adult .. \$10.25 child (age 4-11) .. \$6.50
(JSC civil service employees free.)	
Space Center Houston annual pass	\$18.75
Entertainment Books	\$20.00

October 2 - November 14

Texas Renaissance Festival .. adult .. \$15 child .. \$6.50

November 25

Thanksgiving Day Parade reserved seating .. \$16.00

Rockets Tickets available in Bldg. 11

Sweet Water pecans for holiday baking .. \$6.00

Please bring your driver's license to pay by personal check.



A team effort: JSC Safety Action Team readies for 2000



1999 JSAT Star Award Recipients

George Abbey
 Polly Aucoin
 Chuck Barbour
 Bill Bates
 John Beall
 Frank Benz
 David Beverly
 Doug Blanchard
 Leon Blum
 Lee Briscoe
 Jeri Brown
 Cindy Bush
 Vicki Cantrell
 Jerry Condon
 Cindy Coker
 Rindy Carmichael
 Hank Davis
 Pat Dickson
 Rich Dinkel
 Emmerson Edwards
 John Fields
 Bob Gaffney
 Juan Galvez
 Dan Garrison
 Abel Garza
 Ginger Gibson
 Estella Gillette
 Sandy Griffin
 Bob Hall
 Jim Hansen
 Greg Hayes
 Jimmy Jaax
 Bill Jeffs
 Deborah Johnson
 Gary Johnson
 Jennifer Jones
 Sharon Kemp
 Mary McLain
 Lenoard Nicholson
 Scott Osborne
 Kathy Packard
 Bill Parsons
 Vicky Pendergrass
 Connie Prichard
 Mary Alice Pruessner
 Ralph Schomburg
 Debbie Sharp
 John Stanford
 Deborah Washington
 Mike Winchell
 Rachel Windham

JSC CELEBRITY CROSSING GUARDS, from left, Bill Parsons, Vicky Pendergrass, Rachel Windham, Gary Johnson, Ginger Gibson, Deborah Johnson, Frank Benz, Mary McLaine, Estella Gillette, Jim Jaax, Lee Briscoe, Rich Dinkel and Mike Winchell receive JSAT Star Award.

NASA JSC Photo S99-11971 by Benny Benavides



Marking the end of its inaugural year, JSC's Safety Action Team (JSAT) presented Star Awards to its most valuable players and passed the torch to the team that will lead the team into the year 2000.

During the past year, Julie Kramer, JSAT chairman and JSC structural engineer, and Donna Shafer, JSAT deputy and JSC attorney-advisor, together with about 50 committed JSAT volunteers molded the committee into a safety and health task force for the center.

Among many notable achievements, JSAT's most significant accomplishment likely was its work on the OSHA Voluntary Protection Program (VPP). The organization spearheaded JSC's preparation, and ultimate success, in attaining a VPP Star.

"Our activities ranged from working on the application, working with PAO to produce a video, VPP introductory briefings and center-wide dry runs in preparation for the audit," said Kramer. "I think it is fair to say that our efforts in this area paid off handsomely."

In addition to the work for VPP, JSAT coordinated several other health and safety related programs for the center. These included the "JSAT Jingle" program, which posts clever safety messages on JSC's roads, and regular safety feature stories in the *Roundup*. They also organized Crosswalk Awareness Week including a crosswalk comedy workshop, an emergency preparedness drill and celebrity crossing guards to help "diffuse growing tensions" between drivers and pedestrians said Kramer.

"Our approach was light hearted, fun and action packed," explained Kramer, who says JSAT intends to monitor "Close Call" reporting trends to help them measure their program's success. "Only time will tell if our work was successful in improving crosswalk awareness."

With all that said, the outgoing JSAT leaders have already put the wheels into motion for additional working groups to address other center safety issues, and is looking to the new team, and new volunteers, to help them continue the JSAT success.

"JSAT is just beginning," said Julie Kramer, the 1999 JSAT chairman. "It is the participation of the individuals which make these types of efforts successful. That will be the challenge for our successors – to continue to tap into the energy and creativity that exist here at JSC among each individual."

This month, Bob Gaffney, JSC Emergency Preparedness manager, and Chuck Barbour, safety coordinator, Johnson Engineering Corp., take the reins of the group to carve a path for JSAT into the new millennium.

"Chuck and I want to continue the standard set by the previous JSAT leadership by emphasizing the greatest influence for safety at work, home and recreation is each of us," said Gaffney. "With the active participation of center employees and management support, we hope to continue to identify opportunities to work safely at all times. The JSAT provides a proactive forum for employees to share safety information with other organizations as well as internally, and to promote safe operations at JSC."

As a finale for the 1999 committee, JSAT officers recognized their most valuable players with JSAT Star pins

and certificates. Center Director George W.S. Abbey was honored with the first JSAT Star award.

"Through the JSAT, JSC employees have been provided an opportunity to actively participate in JSC safety and health programs," said Shafer. "We could not have this opportunity without the leadership and the support of our director who created this team."

Employees interested in JSAT should contact Gaffney at x34249 or Barbour at 281-853-2906 for volunteer information. ■



NASA JSC Photo S99-11970 by Benny Benavides

Chuck Barbour, left, and Bob Gaffney will head the JSC Safety Action Team during the upcoming year.

GILRUTH CENTER NEWS

<http://www4.jsc.nasa.gov/ah/exceaa/Gilruth/Gilruth.htm>

Nutrition intervention program:

Six-week program includes lectures, a private consultation with the dietician. Program is open to all employees, contractors and spouses. For details call Tammie Shaw at x32980.

Defensive driving: One-day course is offered once a month at the Gilruth Center. Pre-registration required. Cost is \$25. Call for next available class.

Stamp club: Meets every second and fourth Monday at 7 p.m. in Rm. 216.

Weight safety: Required course for

employees wishing to use the Gilruth weight room. Pre-registration is required. Cost is \$5. Annual weight room use fee is \$90. The cost for additional family members is \$50.

Step/bench aerobics: Low-impact cardiovascular workout. Classes meet from 5:15-6:15 p.m. Tuesdays and Thursdays. Cost is \$32 for eight weeks. Kristen Tarazewski, instructor.

Yoga: Stretching class of low-impact exercises designed for people of all ages and abilities in a Westernized format.

Meets Thursdays 5-6 p.m. Cost is \$32 for eight weeks. Call Darrell Matula, instructor, at x38520 for more information.

Ballroom dancing: Classes meet from 6:30-7:30 p.m. Thursdays for beginners, 8:30-9:30 p.m. for intermediate and 7:30-8:30 p.m. for advanced. Cost is \$60 per couple.

Country and western dancing: Beginner class meets 7-8:30 p.m. Monday. Advanced class (must know basic steps to all dances) meets 8:30-10 p.m. Monday. Cost is \$20 per couple.

Fitness program: Health-related fitness

program includes a medical screening examination and a 12-week individually prescribed exercise program. For details call Larry Wier at x30301.

Aikido: Martial arts class for men and women meets 5 - 6 p.m. Tuesdays and Wednesdays. No special equipment or knowledge is needed to participate. Beginning and advanced classes start each month. Cost is \$35 per month.

Exercise: Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays. Cost is \$24 for eight weeks.

PEOPLE *on the* MOVE

Human Resources reports the following personnel changes:

Key Management Assignments

Charlie Justiz was selected as chief, Aviation Safety Office, Flight Crew Operations Directorate.

Scott Reagan was named aviation safety officer, Flight Crew Operations Directorate.

Promotions

Krystine Bui was selected as a contracting officer in the Projects Acquisition Office, Procurement Office.

Carol Neeley was selected as a contracting officer in the Space Station Acquisition Office, Procurement Office.

Monica Ruiz-Cortez was selected as lead secretary in the ISO 9000 Office.

Arlene Andrews was selected as division secretary in the Flight Avionics Division, Mission Operations Directorate.

Reassignments Between Directorates

Jerry Elliott moves from the Technology Transfer and Commercialization Office to the Space Shuttle Program Office.

Don Schmalholz moves from the Engineering Directorate to the International Space Station Program Office.

Barbara Smith moves from the Mission Operations Directorate to the International Space Station Program Office.

Beverly Braddy moves from the Engineering Directorate to the Space Shuttle Program Office.

Reassignments to Other Centers

Ray Shaughnessy of the International Space Station Program Office moves to Marshall Space Flight Center.

Retirements

Charlie Mendel of the EVA Project Office.

Resignations

Scott Hankins of the Engineering Directorate.

Craig Carothers of the Technology Transfer and Commercialization Office.

Linda Kurz of the International Space Station Program Office.

Todd Lucht of the White Sands Test Facility.

DATES & DATA

November 9

Aero Club meets: The Bay Area Aero Club will meet at 7 p.m. November 9 at the Houston Gulf Airport clubhouse at 2750 FM 1266 in League City. For more information call Larry Hendrickson at x32050.

CLA-NSS meets: The Clear Lake area chapter of the National Space Society will meet at 6:30 p.m. November 9 at the Freeman Memorial Branch Library, 16602 Diana Lane. For more information call Murray Clark at (281) 367-2227.

NPMA meets: The National Property Management Association will meet at 5 p.m. November 9 at Robinette and Doyle Caterers, 216 Kirby in Seabrook. Dinner costs \$14. For more information call Sina Hawsey at x36582.

November 10

Astronomy seminar: The JSC Astronomy Seminar Club will meet at noon November 10, 17 and 24 in Bldg. 31, Rm. 248A. For more information call Al Jackson at x35037.

IAAP meets: The Clear Lake/NASA Chapter of the International Association of Administrative Professionals (formerly Professional Secretaries International) will meet at 5:30 p.m. November 10 at Bay Oaks Country Club. Cost is \$16. For more information and reservations, call Tami Barbour at (281) 488-0055, x238.

Spaceland Toastmasters meet: The Spaceland Toastmasters will meet at 7 a.m. November 10, 17 and 24 at the House of Prayer Lutheran Church. For more information, call George Salazar at x30162.

Spaceteam Toastmasters meet: The Spaceteam Toastmasters will meet at 11:30 a.m. November 10, 17 and 24 at United Space Alliance, 600 Gemini. For more information call Patricia Blackwell at (281) 280-6863.

November 11

Airplane club meets: The Radio Control Airplane Club will meet at 7 p.m. November 11 at the Clear Lake Park building. For more information call Bill Langdoc at x35970.

Communicators meet: The Clear Lake Communicators, a Toastmasters club, will meet at 11:30 a.m. November 11, 18, and 25 at Freeman Library, 16602 Diana Lane. For more information, call Allen Prescott at (281) 282-3281 or Mark Caronna at (281) 282-4306.

MAES meets: The Society of Mexican-American Engineers and Scientists will meet at 11:30 a.m. November 11 in Bldg. 16, Rm. 111. For more information, call George Salazar at x30162.

November 12

Astronomers meet: The JSC Astronomical Society will meet at 7:30 p.m. November 12 at the Center for Advanced Space Studies, 3600 Bay Area Blvd. For more information, call Chuck Shaw at x35416.

November 14

Westside NSS meets: The "Westside" group of the Clear Lake area chapter of the National Space Society will meet at 2 p.m. November 14 at Silicon Graphics, 11490 Westheimer, Suite 100. For more information, call Murray Clark at (281) 367-2227.

November 17

Scuba club meets: The Lunar fins will meet at 7:30 p.m. November 17. For more information, call Mike Manering at x32618.

November 18

Directors meet: The Space Family Education board of directors will meet at 11:30 a.m. November 18 in Bldg. 45, Rm. 712D. For more information on this open meeting contact Lynn Buquo at x34716.

JSC NMA meets: The JSC National Management Association chapter will meet at the Nassau Bay Hilton November 18 at 11:30. Steve Smith, Brown and Root project manager for Enron Field, will be the guest speaker. More information is available at www.jsc.nasa.gov/nma/.

November 22

Alzheimer's support group meets: The Clear Lake Alzheimer's Caregiver Support Group will meet at 7:30 p.m. to 9 p.m. November 22 in the first floor conference room, St. John Hospital West building, Nassau Bay. For additional information, contact Nancy Malley at (281) 480-8917 or John Gouveia (281) 280-8517.

December 2

Warning System Test: The site-wide Employee Warning System will perform its monthly audio test at noon November 4. For more information, call Bob Gaffney at x34249.

December 6

NSBE meets: The National Society of Black Engineers will meet at 6:30 p.m. December 6 at Texas Southern University, School of Technology, Rm. 316. For additional information, call Kimberly Topps at (281) 280-2917.

NASA BRIEFS

NASA SELECTS 200 SMALL BUSINESS PROJECTS

As part of its mission to encourage the development of new and advanced technologies, NASA has selected 290 research proposals for negotiation of Phase I contract awards for its 1999 Small Business Innovation Research Program. The total value of the awards is expected to be more than \$20 million and will be conducted by 220 firms in 34 states.

In addition to stimulating innovation, the SBIR program aims to increase the number of small businesses, including women-owned and disadvantaged firms, conducting federal research and commercializing the results of federally funded research.

NASA received more than 2,260 proposals from small, high-technology businesses located throughout the United States.

NASA's field centers reviewed proposals for technical merit, feasibility and relevance to NASA research and technology requirements. The selected firms will be awarded fixed-price contracts worth up to \$70,000 to perform a six-month Phase I feasibility study.

Companies which successfully complete the Phase I activities are eligible to compete for Phase II selection the following year. The Phase II award allows for a two-year, fixed-price contract of up to \$600,000.

STARRY BULGES YIELD SECRETS OF GALAXY GROWTH

NASA's Hubble Space Telescope is uncovering important new clues to a galaxy's birth and growth by peering into its heart — a bulge of millions of stars that resemble a bulbous center yolk in the middle of a disk of egg white.

Hubble astronomers are trying to solve the mystery of which came first: the stellar disk or the central bulge?

Two complementary surveys by independent teams of astronomers using Hubble show that the hubs of some galaxies formed early in the universe, while others formed more slowly, across a long stretch of time.

Hubble confirms that the evolutionary paths of bulges and disks are connected. The central bulge stabilizes a galaxy's development and largely controls the ebb and flow of star birth in the core. The central bulge holds secrets as to how and when a galaxy formed. Before Hubble, astronomers had detailed information only about the complex core of our galaxy, which has a small bulge peppered with massive young star clusters and a telltale bar structure funneling gas to the center. Hubble allows astronomers to see bright star clusters, bars and other structures deep inside the bulges of other galaxies.

A group led by Reynier Peletier from the University of Nottingham, in the United Kingdom, has confirmed that the central bulges of more tightly wound spirals were all created at more or less the same time in the early universe.

A second team, led by C. Marcella Carollo of Columbia University in New York, surveyed galaxies that have small bulges and bar-like structures that bisect the nucleus like the slash across a no-smoking sign. They found that the bulges in these galaxies grew more recently, through markedly different processes happening within the galaxy's disk.

Both surveys used Hubble's precise resolution to peer into bulbous hubs of more than 200 neighboring galaxies, out to a distance of 100 million light years. Using Hubble's visible-light and infrared cameras to penetrate deep into the cores of the galaxies, astronomers were able to untangle the stars' true colors — a measure of age — from their apparent colors, which are made redder by interstellar dust.

SPACE CENTER **Roundup**

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