



MARSHALL STAR

Serving the Marshall Space Flight Center Community

Dec. 13, 2007

'Shaking it up' at the Marshall Center

An interview with Kathy Kappus, lead test engineer for Ares I Ground Vibration Test

What is your area of research?

I work in the Structural Dynamic Test Branch in the Test Laboratory of Marshall's Engineering Directorate. I am on the Modal Test Team where we measure the modes of vibration of various space shuttle hardware and payloads, and experiments for the International Space Station. Modal testing uses experimental measurements to help understand a structure's modes of vibration. From this testing, we can see how the structure will behave under certain conditions and can determine how much it can withstand.

I am currently serving as the lead engineer in the Test Laboratory for the upcoming Ares I Integrated Vehicle Ground Vibration Test to be conducted in the historic Dynamic Test Stand in the East Test Area. I am working with a great team of people across the Engineering Directorate and in the Ares Flight and Integrated Test Office to plan and execute this test. Prior to flying a crew on the Ares I launch vehicle, a dynamic test — commonly called a modal test or a ground vibration test — will be conducted on the complete vehicle. This test will be an important step in "human rating" the vehicle by increasing our confidence that Ares I can fly a crew safely.

The vibration test will include several test configurations which represent the Ares I launch vehicle at different time points during its flight. For example, one test configuration will represent the rocket just after liftoff. For this configuration, we will have the entire 327-foot vehicle stacked vertically in the Dynamic Test Stand. We will instrument the test article with hundreds of accelerometers and then use dynamic shakers to vibrate the test article. This experimental data



Emmett Owen/MSCF

Kathy Kappus, in front of Marshall's Dynamic Test Stand in the East Test Area, is the lead test engineer for the Ground Vibration Test of Ares I. The test will be conducted in the facility.

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Marshall surpasses highest Combined Federal Campaign goal ever

At the close of the nine-week Combined Federal Campaign fundraiser, the Marshall Center exceeded its \$600,000 goal, donating a total of \$665,372 to local, state and national charitable organizations.

Eleven Huntsville and Tennessee Valley charities and non-profit organizations are expected to benefit from this year's campaign. For a complete list of local organizations and links to their Web sites, visit <http://cfc.msfc.nasa.gov/agencies.html>.

More than 350 Marshall volunteers also gave their time and service to these organizations during "Community Service Days" Oct. 8 to Nov. 16. Marshall team members also supported a trio of early events hosted by the Salvation Army, Habitat for Humanity and the Special Olympics.

"I'm so proud of our team," said Irene Taylor, executive chairperson for Marshall's CFC effort. "We know we can't solve all the problems in our community, our state and our nation, but the Combined Federal

Campaign gives us a great opportunity to help make a real, tangible difference. It's always been our goal to provide support wherever we can, as much as we can, as often as we can. Doing it together at this time of year helps inspire people to go out and do it all year long.

"Each Marshall team member who contributed now is personally involved in giving to something greater than all of us as individuals," Taylor said.

CFC annually makes it possible for federal employees to donate monetary gifts to more than 1,100 charitable entities. The Marshall Center is part of the joint Tennessee Valley Combined Federal Campaign, which is supported by nearly 30 federal agencies in the area.

The 2007 campaign concluded Dec. 7, but employees are welcome to continue making donations. Visit Marshall's CFC Web site, <http://cfc.msfc.nasa.gov> for more information.

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will be used to determine the modes of vibration of the Ares I. We have six test configurations planned. The Ares I dynamic test is scheduled to begin in 2011 and will take about a year to complete.

What is your background?

I received a bachelor's degree in mechanical engineering in 1984 from the University of Alabama in Huntsville. I was a co-op student at Teledyne Brown Engineering in Huntsville starting in 1982, and then worked as a structural dynamics analyst for the company after receiving my degree. I supported the Payload Mission Integration contract, conducting structural dynamics analysis on space shuttle payloads, including many Spacelab payloads. Spacelab was used to conduct science experiments in the space shuttle's payload bay.

As a dynamic analyst, I built and used finite element models of these shuttle payloads to conduct the analysis. Structural dynamics analysis is one of many ways to assure structures can withstand the forces exerted during different phases of the shuttle flight.

While working as a dynamics analyst, I participated in several structural dynamics tests conducted at the Marshall Center. In 1987, I was the dynamics analyst during a test of the ASTRO-1 payload at the Kennedy Space Center. ASTRO-1 was an array of telescopes for exploring the universe by ultraviolet and X-ray astronomy. During this test, I developed an interest in structural dynamics testing. Not long after the ASTRO-1 test, in 1988, I had an opportunity to come to work for NASA in structural dynamics testing. As a Marshall employee, I was fortunate to be selected for full-time study and earned my master's in engineering in 1993, also from the University of Alabama in Huntsville.

What is structural dynamic testing?

There are many types of structural dynamic testing, including acoustic, vibration, pyrotechnic shock and modal testing.

A modal test is conducted by installing accelerometers on the test article and then shaking the structure to measure how it vibrates in response to the applied dynamic forces. This experimental data is used to estimate the structure's modes of vibration. Many people are familiar with vibration qualification testing where large shaker tables subject payloads to actual launch-level vibration environments. Modal testing is conducted at

vibration levels much lower than launch levels and typically using portable shakers.

The primary objective for a majority of modal tests is to provide data to verify finite element models of the structure being tested. These finite element models are used for various structural dynamic analyses to ensure the structural integrity of the payload or launch vehicle. The modal test provides experimental data used to either confirm or improve model accuracy.

Have you developed any technology? If so, what influenced you to develop this technology?

While working in structural dynamic testing at Marshall, I have been involved in technology development related to alternative boundary conditions for dynamic testing of space shuttle payloads. Shuttle payloads are typically tested using "fixed-base" boundary conditions. That means that the payload interfaces are constrained at the locations where they will connect in the space shuttle payload bay. Usually these payloads have five or six cylindrical projections, called trunnions, which are clamped into the shuttle payload bay. Building stiff test fixtures to constrain a large shuttle payload at these trunnion interfaces can be both time-consuming and costly. To minimize some of the cost and schedule impacts caused by designing and building these large test fixtures, several alternative boundary condition modal test methodologies have been proposed. These methods include mass-additive testing and residual flexibility testing.

Both mass-additive testing and residual flexibility testing are conducted with the test article in a "free-free" boundary condition which typically uses air bags or bungee cords to suspend the structure. Mass-additive testing is conducted by attaching large masses to the payload's trunnion interfaces to make the trunnions bend at lower frequencies. Residual flexibility testing involves making some supplemental measurements at each of the trunnion interfaces. Mass-additive and residual flexibility testing are not appropriate for all payloads, but if they are determined acceptable for specific payloads, the expense and time of building large test fixtures can be avoided. Our branch, in conjunction with the dynamics analysts, has conducted research and actual testing of payloads using both of these alternative methodologies, and the data acquired has been used to compare with traditional fixed-boundary testing.

How does your expertise help NASA in accomplishing its mission?

As we move forward in the Ares project, understanding the structural

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Marshall Modal Test Team member Rusty Parks, left, shows Kappus a space shuttle fuel flowliner. The flowliner — part of the system that contains the space shuttle main engine liquid fuel — was recently delivered to Marshall for structural dynamic testing by the modal team.

Emmett Given/MSFC

NASA targets space shuttle Atlantis launch for Jan. 2

By Sanda Martel

Space shuttle Atlantis' STS-122 mission to the International Space Station now is targeted to launch no earlier than Jan. 2 from NASA's Kennedy Space Center, Fla. The liftoff date depends on the resolution of a problem with the engine cutoff, or ECO, sensor system in the shuttle and its external fuel tank.

Shuttle managers postponed Atlantis' planned launches on Dec. 6 and Dec. 9 because of false readings from the sensor system that monitors the liquid hydrogen section of the tank. The system is one of several that protects the shuttle's main engines by triggering their shut down if fuel runs unexpectedly low.

NASA has formed a troubleshooting team to develop a forward plan of action to address the problem. The team will present its findings and recommendations to the Space Shuttle Program on Dec. 18.

The main objective of Atlantis' 11-day mission is to install and activate the European Space Agency's Columbus laboratory, which will provide scientists around the world the ability to conduct a variety of life, physical and materials science experiments.

For the latest information about the STS-122 mission and the ECO sensor system, visit <http://www.nasa.gov/shuttle>.

The writer, an ASRI employee, supports the Office of Strategic Analysis and Communications.

This month in history ...

Fifty years ago this month, attention focused on U.S. Army preparations for the launch of America's first satellite in January 1958. At the same time, work was progressing in other areas of missiles and rocketry in the United States. On Dec. 17, 1958, the



U.S. Air Force conducted the first successful firing of its Atlas Intercontinental Ballistic Missile. The missile landed in the target area after a flight some 500 miles, on the 54th anniversary of the Wright brother's first flight.

NASA announces final major Ares I contract

NASA hosted a news conference Dec. 12 at 3 p.m. at NASA Headquarters to announce the selection of a contractor for the upper stage instrument unit avionics for the Ares I rocket. The avionics unit is the central system that provides guidance,

navigation and control for the launch vehicle during ascent as it carries the Orion spacecraft to low-Earth orbit.

The details of the selection were not available at Marshall Star press time. The press release will appear in the Dec. 20 issue.

Kappus

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dynamics of the Ares I and Ares V launch vehicles is critical. There are numerous examples of failures of launch vehicles due to structural dynamic instabilities. There are also many lessons-learned from previous launch vehicle dynamic test programs that may have prevented the loss of vehicle and crew. The fundamental frequencies of the Ares I vehicle are very low, so understanding them is especially important both for loads and for flight control analyses of the vehicle.

How critical is technology development and cultivation of technologists to the future of Marshall as a successful NASA center?

I believe it is important to have people with a good understanding of many disciplines and who see the "big picture." These skills are crucial for good systems engineering and to ensure our payloads, experiments, spacecraft and vehicles are well-integrated. But also it is important to have experts in various disciplines who make sure our products meet or exceed expectations

from a technical perspective. To really make technology advancements, our engineers and scientists need both time and resources to spend in their labs, and I believe they should be rewarded for becoming technical experts and continuing to advance technology in their respective disciplines.

I think technologists should be encouraged to be innovative and to be involved in hands-on activities. It is difficult to become an expert at something by watching others do it. I continue to be amazed by the skills and creativity of many of the engineers, scientists and technicians that I work with in the Test Laboratory and across Marshall.

To continue to be successful, we need to make efficient use of our limited resources and to stay focused on our mission — to continue to fly the space shuttle safely, to complete construction of the International Space Station, and to build and test the new Ares launch vehicles. As much as possible, we need to facilitate the work of our technologists by minimizing obstacles that slow progress.

Lori Meggs, an ASRI employee in the Office of Strategic Analysis and Communications, contributed to this article.

Clyde "Chip" Jones appointed chief operating officer for NASA's Michoud Assembly Facility

Clyde "Chip" Jones has been appointed to the Senior Executive Service position of chief operating officer of NASA's Michoud Assembly Facility in New Orleans for the Marshall Center. In this position, he will be responsible for daily operations of the 830-acre Michoud facility, with over 4,000 employees. Jones replaces Patrick Scheuermann who transferred to NASA's Stennis Space Center in Bay St. Louis, Miss., in August.

The Senior Executive Service is the personnel system covering top managerial positions in approximately 75 federal agencies.

Most recently, Jones served as manufacturing and assembly manager for Marshall's Ares I Upper Stage where he was responsible for delivery of all development, test and flight hardware for NASA's newest launch vehicle. In this position, he led the planning for personnel, budget, and the development and qualification of new

manufacturing technologies for the upper stage.

Prior to joining Ares I Upper Stage, Jones was Michoud's external tank resident manager, overseeing the shuttle's external tank manufacturing during the return-to-flight period.

Jones began his NASA career at Marshall in 1981 and has held positions including team lead for metallic processes for the super lightweight tank and for development of friction stir welding for the external tank. He also served as group lead for Non Destructive Evaluation and Tribology, and group lead for Metallic Materials and Processes, where he was responsible for metals development, testing, and welding in the Materials and Processes Laboratory at Marshall.

Jones earned a bachelor's degree in electrical engineering from the University of Alabama in Huntsville and has completed graduate studies in control systems. He has received numerous awards, including a U.S. patent award, the NASA Medal for Exceptional Achievement, a Space Act Award and a Director's Commendation.



Chip Jones

Schools rule! Marshall helps launch new NASA Explorer Schools

In October and November, the Marshall Center helped kick off the 2007-2008 school year at three new NASA Explorer Schools. Each uses NASA's unique missions and educational support tools to inspire students to pursue careers in science, math, technology and

engineering. The schools — Northeast Nodaway R-V School District in Ravenwood, Mo.; Church Point Middle School in Church Point, La.; and Harding Middle School in Des Moines, Iowa – will be NASA Explorer Schools for a three-year term.



Emmett Given/MSEC

Marshall Center Deputy Director Robert Lightfoot, left, and former NASA astronaut Roger Crouch, center, are hailed by students of Northeast Nodaway R-V School District in Ravenwood, Mo. During their two-day visit to the community, Lightfoot and Crouch spoke to students, teachers and area residents about NASA's mission and the role to be played by the next generation of young explorers.

Jose Matienzo, right, an engineer in the Marshall Engineering Directorate's Spacecraft & Vehicle Systems Department, demonstrates to classes at Church Point Middle School in Church Point, La., how propulsive power overcomes gravity to loft objects into the sky. Matienzo and other NASA representatives congratulated students and teachers at the new 2007 NASA Explorer Schools. They encouraged students to stay in school and seek careers to help further the nation's space exploration goals.



Former NASA astronaut John Herrington encourages listeners at a community outreach event to follow their dreams during the NASA Explorer Schools kickoff at Harding Middle School in Des Moines, Iowa. The two-day visit by NASA and Marshall representatives sparked excitement among students about NASA's plans to return to the moon and explore the solar system.



David Higginbotham/MSFC

Scouting for next-generation explorers

Two dozen students from the Tennessee School for the Blind in Nashville visited the Marshall Center Oct. 23 to tour center facilities, meet with employees and attend a live broadcast of the STS-120 launch in Morris Auditorium in Building 4200. Shannon Raleigh, left, a Marshall Center exhibits and education outreach specialist with United Space Alliance of Huntsville, explains to the gathered students how the space shuttle's complex propulsion systems work. The annual visit – part of Marshall's commemoration of National Disability Employment Awareness Month – is designed to inspire young people from all walks of life to pursue careers vital to NASA's continuing mission of exploration across the solar system.

Classified Ads

To submit a classified ad to the Marshall Star, go to Inside Marshall, to "Employee Resources," and click on "Employee Ads – Submit Ad." Ads are limited to 15 words, including contact numbers. No sales pitches. Deadline for the next issue, Dec. 20, is 4:30 p.m. Thursday, Dec. 13.

Miscellaneous

Antique Willett cherry dining table, 85 1/2 x 44, \$650; walnut mantel clock, \$125; oak china cabinet, \$325. 881-4135
 Step2 Woodland Climber, \$120; Classic Cozy Coupe, \$20; Step2 coaster, \$40; all for \$150. 655-7124
 Everlast 40-pound boxing bag, speed bag, heavy-duty stand, two sets of gloves, \$100. 882-3753
 Eight-quart, cut-glass punch bowl, ladle, 18 cups, \$50. 883-8257
 Kasson-Auburn pool table, fruitwood, Queen Anne feet, leather pockets, all accessories, \$1,950. 880-6563
 Brown cloth recliner, Stainsafe protection, \$100. 658-8171
 Boykin Spaniel puppies, \$500. 721-1296
 Toshiba 65-inch TV, \$450; round, glass-top table set; HP digital cameras, printer. 891-1550
 Two Cerwin Vega AT-12 speakers, \$125. 837-5480
 14x21 rubber heating mats, thermostat controlled, \$40 each; six-light antique gold bathroom fixture, \$25. 655-6348
 2006 Apple MiniMac, 1.5 GHz, 512 MG RAM, 60G, combo drive, Intel, \$300. 534-9678
 Kittens, white and black, one boy, two girls, 12 weeks old, all shots, \$10 each. 776-9684
 Hardwood flooring, prefinished, 3/4 by 2 1/4, golden oak, 225 square feet, \$450. 417-5754
 Baby green iguana, aquarium, food, lighting, care instructions, \$75. 586-7297
 Leblanc Normandy four-wood clarinet, \$600; iPod Shuffle, silver, \$50. 890-2128
 .75 carat diamond solitaire ring, wrap, .50 carat diamond band, diamond/sapphire ring, \$1,100 obo. 426-7862
 5-by-8 Tilt utility trailer, \$400. 565-9918
 Total Gym 3000XL, still in box, \$1,100. 852-4883
 2006 Gold Tone five-string banjo, case, \$600. 828-1556
 Mohawk Solo 14 Royalite canoe, 39 pounds, \$475. 971-0571
 Thomas the Tank Engine lined bedroom curtain set, four panels, valance, light blue, \$30. 851-7406

AT&T 8525 Smartphone, camera, \$200; Palm Treo 650, no camera, car adapters, \$80. 520-4750
 TomTom Go 910 GPS, accessories, North America maps, \$230 firm. 739-2768
 Kenmore gas stove, white/gray, 4 years old, \$250 obo. 606-1717
 Franchi 20-gauge 48AL shotgun, choke tubes, 26-inch barrel, \$500. 214-1645
 20-month-old Rottweiler, fully trained, good temper, \$125. (813) 391-9673
 Book, "50 Years of Rockets and Spacecraft in the Rocket City," may be reprinted. 534-6949
 Sony 27-inch FD Trinitron WEGA TV, pictures, model information available, \$300. 682-5570
 AKC Scottish Terrier puppies, males, females, black/brindle, 6 months old, \$300 each. 200-0513
 Yard Machines lawn tractor, 16.5HP, 42-inch cut, \$775. 651-8264
 Panasonic 44-inch TV, rear-projection, new bulb, one-year warranty, \$750. 565-3534
 Canon ultrasonic lenses, EF100-300, \$75; EF28-80, EOS Elan 35mm camera body, \$75. 882-2654
 1/5 carat princess-cut diamond promise ring, 10k white gold, \$150 obo. 541-4445
 Aura bass shakers, six pairs, for home theater seats, \$35 each. 520-1970
 Ibanez RG170R electric guitar, black, \$100. 655-6293
 Computer desks, \$100, \$75; magazine table, \$50; gold/green sofa, \$75; formals, sizes 12-16, \$10-\$35. 534-0939
 Panasonic 52-inch LCD HD TV, 1 year old, delivery available, \$895. (931) 224-8562
 Broyhill kitchen hutch, white, glass sides, doors, \$575; wood kitchen table, four chairs, \$375. 975-1667
 Clayton-Marcus couch, \$350; sofa chair, hassock, \$350. 426-4903
 Baby crib, wood, natural finish, converts to toddler bed, mattress, \$250; baby car seat, \$75. 551-0276
 Washing machine, \$40; auto engine stand, \$30; large ceiling fans, Tiffany-style shades, \$30 each. 325-2919
 Curio cabinet, \$175; desk, eight drawers, \$75; dresser, nine drawers, mirror, \$60; bookshelf, \$30. 489-6260
 Dining table, leaf, oak veneer, six chairs, \$200. 728-5768
 Oak veneer double bookcase, 48x44 inches, three media shelf units, \$200. 518-9869

Vehicles

2007 Honda TRX450R Sport ATV/quad, electric start, plastics black/flames, red frame, \$4,950. 345-9555
 2006 Toyota Avalon XL, metallic mirage blue, 22k miles, 31 MPG, \$22,500. 655-6348
 2005 Honda VTX1300R motorcycle, accessories, 8,800 miles, \$7,500. 564-7499
 2005 Suzuki Hayabusa, black/red, new tires, warranty, jacket, helmet, gloves, tank bag, \$8,300. 658-3104
 2004 Harley-Davidson Road King Classic, pearl white, 14k miles, \$13,900. 776-0811
 2004 VW Jetta, manual, heated leather seats, sunroof, new tires, 41k miles, \$13,000 obo. 426-7862

2004 Ford Taurus SES, silver, moonroof, CD, gray leather, 67k miles, \$7,000. 759-2863 or 489-6260
 2003 Escalade, loaded, \$20,000; 2007 Chrysler 300, warranty, 23k miles, \$18,000; 1988 Mitsubishi, \$1,000. 520-2802
 2001 Mazda Miata LX, tan leather, power windows, black, 61k miles, \$10,900. 883-6894 or 468-6894
 2001 Saturn L200, four door, 120k miles, \$3,900. 682-7165
 2001 Honda XR100 dirt bike, 100cc, helmet; \$990. 325-3696
 2001 Honda 250 Recon four-wheeler, \$2,500; 2002 Honda 70 dirt bike, \$700. 509-3392
 2001 Tahoe, power windows/seats, rear air, CD, 105k miles, \$12,000. 497-4116
 2000 Jeep Wrangler Sport, 6.0 cylinder, automatic, soft top, red, 65k miles, \$12,500. (931) 625-1144
 1999 4x4 Jeep Cherokee Sport, black, loaded, receiver hitch, 142k miles, \$5,000 obo. 244-0161
 1998 Dodge Ram truck, quad, 4x4, loaded, 190k miles, \$6,800. 653-8311
 1997 Chevrolet Tahoe, white, four door, leather, auto, V8, 177k miles, \$5,000. 694-2042 or 586-6193
 1995 Cadillac Seville SLS, leather, power windows/seats, cruise, 103k miles, \$3,495. 882-9591
 Lexus ES350, all options, Bluetooth, Levinson audio, CD, MP3 cap, 4,500 miles, \$30,000. 587-6343 or 609-8838
 Refurbished bass boat, gutted interior, sides, bottom, fiberglass, \$50. 541-3525

Wanted

Poker supplies, chips, timers, table tops, felt, rule books. 520-7364
 Music City Bowl tickets. 230-3655
 Computer monitor, used, LCD, flat screen, 15 inches or smaller. 461-6337
 Suspended ceiling panels, 24-inch cross-tees, older style for 25- to 40-year-old grid system. 233-0705
 Working treadmill. 777-8229
 White furniture for girl's bedroom, must be in good condition. 684-6923
 Fuser to HP LaserJet 5. 883-2757
 iPod, at least 4GB, coin operated washer, dryer, pool table. 509-7907
 Two tickets, Chick-fil-A Bowl, Auburn-Clemson, Dec. 31. 682-4223

Found

One black leather glove, 4200 parking lot; silver hex keys for a freezer, men's bathroom, ground floor, Building 4200; reading glasses, outside Building 4487; Stanley thermos, men's bathroom, second floor, Building 4610. 544-4680

Free

Two brown mixed female puppies, 7 weeks old, first shots, wormed, pictures available. 659-6164
 Lab-mix chocolate puppies, two females, 16 weeks old, third set of shots, rabies vaccinations. 509-3392



Artic Herditch/Walker County Schools

Marshall opens remote link to moon monitoring

This 14-inch telescope at the Walker County Science and Technology Center in Chickamauga, Ga., is part of a new lunar observatory to be used by Marshall Center astronomers to record video of the night-side of the moon to detect flashes produced by meteoroid impacts. Rob Suggs and Bill Cooke of Marshall's Engineering Directorate's Space Environments Team recently opened this site to compliment their moon-monitoring observatory at Marshall. The team uses Earth-based observations of the dark portion of the moon to establish the sizes of large meteoroids — greater than 1 pound in mass — and the speeds at which they travel when striking the lunar surface. As NASA prepares to return to the moon, these studies are vital to understanding and designing spacecraft, vehicles, habitats and astronaut suits to withstand the harsh lunar environment. The Georgia location was chosen because of its distance from the Marshall observatory, its rural location away from light pollution, its clear horizons to see the moon when it is low, and its excellent Internet connectivity and network security — needed for remote control of the telescope and instruments.

'Focus on Marshall' looks at visual time machine, visits hazardous waste area

By Lori Meggs

Ever wonder where we get some of those incredible X-ray images from space? In the December episode of "Focus on Marshall," you'll learn about the Marshall Center's role in the development of the Chandra X-ray Observatory — NASA's space-based X-ray telescope.

Chandra, managed by the Marshall Center since spacecraft development began in the late 1970s, provides us with astounding glimpses into the universe beyond our solar system and acts as a visual "time machine" by capturing celestial events as they occurred millions — even billions — of years ago. Viewers will see some of these incredible images delivered by the orbiting telescope, including a spectacular photo first made public during a symposium in Huntsville celebrating eight years of out-of-this-world science.

Another "Focus on Marshall" segment features the Environmental

Engineering and Occupational Health Office and highlights such work as environmental audits, chemical and hazardous waste management and the Marshall Medical Center.

Viewers will see Marshall's hazardous waste holding area and learn what qualifies as a hazardous material, how materials are tracked with barcoding, and how they are disposed. The segment also visits the Marshall Medical Center to learn about the services it provides to employees, including 24/7 emergency operations.

"Focus on Marshall" is broadcast on Marshall TV the first and third Tuesday and Thursday of each month at 11 a.m., noon and 1 p.m. It also is available on NASA TV, Inside Marshall and on the NASA Portal.

The writer, an ASRI employee, supports the Office of Strategic Analysis and Communications.

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