



# LAGNIAPPE

John C. Stennis Space Center

Volume 11 Issue 6

[www.nasa.gov/centers/stennis](http://www.nasa.gov/centers/stennis)

June 2016

## Getting ready to test

RS-25 rocket engine No. 0528 is lifted onto the A-1 Test Stand at Stennis Space Center on May 31. Beginning in July, a series of developmental hot-fire tests will be conducted on the engine as NASA engineers continue to collect data on the performance of a new engine controller and of the RS-25 engine itself at the operating levels needed for flights of the new Space Launch System (SLS). NASA is building SLS to carry humans deeper into space than ever before, including to such destinations as an asteroid and Mars. The new vehicle will be powered at launch by a pair of solid rocket boosters and four RS-25 engines. Stennis will test all of the RS-25 engines used on the vehicle. Testing on engine No. 0528 is scheduled to begin in mid-July.



**2016 Hurricane Season Guide appears at end of this issue**

**W**hew! I think we are done with those brief weeks of spring now. I hope you are ready for another hot south Mississippi summer – and I am talking about more than just the weather. Things are heating up around here as well with a summer full of testing scheduled.

Just the other day, I was talking to my cousin Wally. He is thinking of taking a trip this way and was wondering if anything much was going on spacewise these days. He was already packing before I could finish telling him about all the activity on the Stennis testing calendar.

It is just too bad he could not have called earlier and been here when the S-IC-15 Saturn V rocket stage came up the Pearl River this month. The article on the next page tells you all about the stage, but there is a part of the story it does not include.

See, I was here when the S-IC-15 stage came to Stennis for the first time to be tested. It was in the second half of 1970, and those were not good days for the folk here at Stennis, which was called the Mississippi Test Facility at that time.

It already had been decided to end Saturn V testing, and that would happen at the end of October 1970 with a final Saturn V stage II test. Leaders here were working hard to locate other agencies to the site and were having some success. As for testing, though, it looked for all the world to be coming to a sudden end.

I tell you – there was never anything so quiet as the way this place sounded when that final stage test ended. I was not the only one wondering if that sound would ever be heard here again. Everybody stood and watched that last steam plume slowly disappear.

Of course, that was not the end of testing here, as you well know. Still, it was not until the following March that a decision was announced to test space shuttle main engines here – and it took another year for the president actually to agree to move ahead with the shuttle program. But that is a story for another time.

This month, watching that rocket stage turn the corner and come into view on the river, it just felt good – really, really good – to know the days of having to prove the value of this place are past. As long as humans reach for space, Stennis will have work to do.



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Access monthly copies at: [www.nasa.gov/centers/stennis/news/publications/index.html](http://www.nasa.gov/centers/stennis/news/publications/index.html)

Contact info – (phone) 228-688-3749; (email) [ssc-pao@nasa.gov](mailto:ssc-pao@nasa.gov); (mail) NASA OFFICE OF COMMUNICATIONS,

Attn: LAGNIAPPE, Mail code IA00, Building 1100 Room 304, Stennis Space Center, MS 39529

Managing Editor – Valerie Buckingham

Editor – Lacy Thompson

Staff Photographer – Danny Nowlin



## FULFILLING NASA'S EXPLORATION MISSION



## Destination: Space

RS-25 rocket engine No. 2059 is removed from the A-1 Test Stand at Stennis Space Center on May 19, 2016. The engine was tested March 10 on the stand and is ready for use on NASA's new Space Launch System (SLS) vehicle. NASA is developing the SLS to carry humans deeper into space than ever before. The SLS core stage will be powered by four RS-25 engines. Engine No. 2059 is scheduled for use on the first crewed SLS mission, Exploration Mission-2, which will carry American astronauts beyond low-Earth orbit for the first time since 1972. The photo above shows the engine, as well as the yellow thrust frame adapter above it, which holds the engine in place for testing.

## History calling – Saturn V stage travels to Stennis

**H**istory both repeats and foreshadows itself with transport of the S-IC-15 Saturn V rocket stage to NASA's Stennis Space Center this month.

It repeats in literal fashion. The stage is being transported from NASA's Michoud Assembly Facility for display at the INFINITY Science Center, via the same water route it took more than 45 years ago to undergo testing at Stennis.

Meanwhile, it foreshadows the future in taking the same route that NASA's Space Launch System (SLS) first stage will travel next year when it arrives for its own testing at Stennis – on the very same B-2 Test Stand that housed and tested the Saturn V stage.

As if such historical connections are not enough to demand notice of the stage arrival, there also is the sheer spectacle of watching the mammoth rocket stage in transport. The S-IC-15 was one of fifteen Saturn V first stages built during those early years of the American space program. These are the stages that lifted astronauts on Apollo missions to the moon – powerful, towering units that burned like giant candlesticks in the sky during launch.

The S-IC-15 stage headed to INFINITY is a prime example of the units. It is 138 feet long (or tall depending on its orientation) and 33 feet in diameter. Empty, it weighs 300,000-plus pounds. Loaded with fuel, it weighs 4.8 million pounds – or 2,400 tons.

Powered by five Aerojet Rocketdyne F-1 engines firing simultaneously, the stage supplied 7.5 million pounds of thrust for two-and-a-half minutes at launch.

Anyone at Stennis on Sept. 30, 1970, heard and witnessed the power of such thrust during the S-IC-15 test firing that lasted a few seconds over two minutes. For the test, the stage was installed in vertical position on the test stand, and all five of its engines were fired at the same time, just as during a launch.

The firing marked the penultimate Saturn V stage test at Stennis. The final test came just a month later when a Saturn V booster stage was fired on the A-2 Test Stand.

Following the Sept. 30 test, the S-IC-15 stage was transported back to Michoud, where it had been assembled. Initially, it was planned for transport across open water to Kennedy Space Center in Florida for use on the Apollo 19 mission.

However, in the fall of 1970, the final three Apollo missions were canceled. Ironically, if the normal rotation process had been followed in assigning crews to those missions, Apollo 19 would have been commanded by Fred Haise, a native of Biloxi, Mississippi, pilot of the Apollo 13 mission that was unable to land on the moon and a longtime supporter of Stennis Space Center and INFINITY.



Saturn V rocket stage S-IC-9 is lifted onto the B-2 Test Stand for test firing on Jan. 10, 1969. In its early years of operation, Stennis tested the large rocket stages that powered the Apollo Program and carried humans to the moon.

Instead of undertaking that journey, the stage remained at Michoud until it traveled to Stennis by water and to INFINITY by specialized transport for display at the science center. There, it symbolizes many aspects of the American space program, including Stennis' close involvement with the historic lunar missions.

The story of Stennis' involvement with the nation's space program has many several chapters, including a new one now being written as the rocket engine site tests the RS-25 engines and SLS stages that will carry humans deeper into space than ever before, to an asteroid and eventually Mars.

RS-25 engines are currently being tested on the A-1 Test Stand. Next year, an SLS first stage will arrive at Stennis for testing. It is even larger and heavier than its Saturn V sister, which has

required considerable modification of the B-2 test stand.

Testing of the SLS stage will involve installing it on the test stand and firing its four RS-25 engines simultaneously, generating about 2 million pounds of thrust. Following the test, the SLS stage also will return to Michoud, where it then will break with the repetition of history. Instead of remaining at Michoud, the stage will take the journey denied to S-IC-15. It will be transported to Kennedy Space Center for use on the uncrewed SLS Exploration Mission-1 flight in 2018.

With that launch, NASA will fully enter its new era of exploration, and Stennis Space Center will add to its tradition of powering the nation's space dreams.

## FULFILLING NASA'S EXPLORATION MISSION



This stunning Earth image taken by the Expedition 47 crew on May 31, 2016, from the International Space Station looks from northwestern China on the bottom into eastern Kazakhstan. The large lake in Kazakhstan with golden sun glint is the crescent-shaped Lake Balkhash, the second largest lake in Central Asia. Lake Balkhash sits in the Balkhash-Alakol depression in southeastern Kazakhstan and stretches over 7,115 square miles (18,428 sq. km).

## NASA in the News

### NASA finds clues to black holes

Using data from NASA's Great Observatories, astronomers have found the best evidence yet for cosmic seeds in the early universe that should grow into supermassive black holes. Researchers combined data from NASA's Chandra X-ray Observatory, Hubble Space Telescope and Spitzer Space Telescope to identify the possible black hole seeds. Scientists believe a supermassive black hole lies in the center of nearly all large galaxies. They have found some of these supermassive black holes, which contain millions or even billions of times the mass of the sun, formed less than a billion years after the start of the universe. One theory suggests black hole seeds built up by pulling in gas from their surroundings and by mergers of smaller black holes, a process that should take much longer than found for these quickly forming black holes. New findings suggest instead some of the first black holes formed directly when a cloud of gas collapsed. For more on NASA's observatories, visit: (Spitzer telescope) <http://www.nasa.gov/spitzer>; (Hubble telescope) <http://www.nasa.gov/hubble>; and (Chandra observatory) <http://www.nasa.gov/chandra>.

### NASA awards suborbital contract

NASA has selected Blue Origin LLC to integrate and fly technology payloads near the boundary of space on their New Shepard suborbital spacecraft in support of NASA's Flight Opportunities Program. This is the sixth company selected for an indefinite-delivery, indefinite-quantity contract under the Suborbital Reusable Launch Vehicle Flight and Payload Integration Services solicitation. Blue Origin now will compete with the other program companies for task orders to deliver payload integration and flight services. "Adding additional flight providers enables NASA and the broader aerospace community to demonstrate and transition space technologies, developing new capabilities faster and, potentially, at lower cost," said Steve Jurczyk, associate administrator for NASA's Space Technology Mission Directorate. Blue Origin will join the following firms currently under contract: Masten Space Systems, Inc.; Near Space Corporation; UP Aerospace Inc.; Virgin Galactic LLC; and World View Enterprises Inc. For more on the Flight Opportunities Program, visit: <http://go.usa.gov/chCv5>.

Access all NASA news releases online at: <http://go.usa.gov/3f3KW>.

## 1970s: Dr. (Wernher) von Braun discusses the next decade in space

*Note: For more than 50 years, NASA's John C. Stennis Space Center has played a pivotal role in the success of the nation's space program. This month's Lagniappe provides a glimpse into the history of the south Mississippi rocket engine test center.*

In the History Office collection is a copy of an undated Q&A titled, *Dr. Von Braun Discusses the Next Decade in Space*. Dr. von Braun, a German rocket scientist, served as the first director of Marshall Space Flight Center in Huntsville, Alabama, and retired as NASA's deputy associate administrator in 1972.

**Q.** The first decade in space has produced manned landings on the moon, operational weather satellites, communications satellites, and a tremendous quantity of scientific data. What do you predict the second decade in space will produce in manned and unmanned space flight?

**A.** The duality of our space program – the distinction between manned and unmanned space flight that was the trademark of the first decade – will probably disappear to a very great extent in the next decade. Now that we know that man can fly through space, that he can survive the space environment, that he can do something useful in space, it becomes important to put man to use as an explorer, a researcher, an operator, a maintainer of scientific equipment.

**Q.** What types of projects do you think we will be doing by the late 1970s to 1980s?

**A.** I consider the shuttle the most exciting program that NASA is involved in at the moment. I think it will drastically change the mode in which space flight will be conducted. In the first place, the shuttle can reduce transportation costs to orbit. At the moment, it still costs anywhere between \$500 and \$1,000 to put a pound of payload into a low-Earth orbit. I think there's reason to believe that this cost can be reduced to something like \$50 to \$100 per pound in orbit.

But this is not the only significant cost saving that the shuttle will bring about. Equally important will be the fact that it will enable us to get more out of our payloads for the dollar. Let me give you an example in the field of astronomical research.

The present mode of conducting astronomical research from outer space is to build a scientific spacecraft for a very long lifetime and give it a capability to accept certain instructions from the ground. Of course, this basic spacecraft cannot collect data beyond what it was originally designed for. But, with a shuttle that can fly up into orbit like an airplane, and that can return with that same payload that it takes up, you can conduct astronomical research from orbit much as NASA presently does from high altitude airplanes.

**Q.** Do you expect that we will have big multi-manned space stations in orbit toward the end of the 1970s?

**A.** Yes, I think so. On the other hand, I believe since the shuttle will also be a very

effective carrier for space science, in the sense of an oceanographic research ship that the space station will more and more concentrate on those kinds of space science and applications missions that require longer duration. In addition, the shuttle will play a major role as a support facility for science operations.

For example, you may have a telescope in orbit that requires repeated reloading of the cameras, or taking out of videotapes. You would dock that telescope onto a space station, do your work from the space station, and then release the telescope again for independent operation.

So the space station will become more and more a combination hotel, restaurant, kitchen, medical dispensary, and spare-part supply station – the railroad station for the shuttles. It will be a computer center. It will be a communications center insofar as it will provide the basic utilities that all space science applications operations will have in common.

**Q.** How large do you envision U.S. space stations will be? And how long do you think men will stay in such labs without a crew change?

**A.** Well, at the moment, NASA is firmly engaged in developing a first generation space station. We call it the Skylab project. The Skylab will never have more than three men up there because each crew goes up and returns before the next crew comes up in its own spacecraft. Skylab has its limitations because all its subsystems for life support and for electrical power generation support are spun off the Apollo program. We have just stretched out its utility a few months by bringing more consumables up. Nevertheless, there will be a lot of science conducted even from Skylab.

The second generation of space station, envisioned for the latter part of the 1970s, will be a modularized unit, designed for long stays – kind of a permanent space station. Each module will accommodate 12 men and these modules can be stuck together. In a way, it's an open-ended thing. It depends on how many modules you put together. But the most important thing about this second generation space station is that all its life support systems will be built for long duration.

**Q.** What activities will we conduct on the moon in the next decade?

**A.** By the end of the next decade, we are likely to have several small lunar base camps, from which surface exploratory operations are conducted with the help of roving vehicles pretty much like in Antarctica.

**Q.** Do you expect that there will be any manned flights to planets other than the moon in this period?

**A.** I don't think we'll have a man on Mars by 1980, mainly because there are so many interesting things to do near Earth.

*(The second part of this Q&A will continue in the July 2016 issue of Lagniappe.)*



Wernher von Braun

## Stennis hosts Old Timers' Day



Former Stennis Space Center employees enjoyed a return to the site for Old Timers' Day activities May 20. The annual fellowship was attended by retirees, guests and employees. The gathering was sponsored by the Stennis Recreational Association, with contributions from several companies and organizations.

### Hail & Farewell

#### NASA bids farewell to the following:

Christopher Knudsen	AST, Experimental Facility Development Center Operations Directorate
Rebecca Strecker	Administrative Manager Office of the Director

#### And welcomes the following:

Firesola Akinbuli	Student Trainee (Engineering) Engineering and Test Directorate
Asean Davis	Student Trainee (Engineering) Engineering and Test Directorate
Brian Douglass	Student Trainee (Engineering) Engineering and Test Directorate
Joshua Greiner	Student Trainee (Engineering) Engineering and Test Directorate
Kelley Martin-Rivers	Education Program Specialist Office of Education
Peyton Pinson	Student Trainee (Engineering) Engineering and Test Directorate
Justin Urban	Student Trainee (Engineering) Engineering and Test Directorate

## Office of Diversity and Equal Opportunity

# Two remarkable individuals of resilience and ability

This month highlights two individuals who have shown amazing resilience and a desire to nurture and strengthen others by their innate abilities.

The first is a woman that ran the 2016 Boston Marathon on one leg. Three years after a professional ballroom dancer lost her left leg below the knee during the 2013 bombing at the Boston Marathon, she ran the race.

More than 30,000 runners crossed the starting line in Hopkinton, Massachusetts, for the iconic 26.2 mile race to Boston's Back Bay neighborhood. Among the 120th Boston Marathon runners was 35-year-old Adrienne Haslet. She is one of 31 members of the One Fund group of survivors and their families and supporters that ran this year. "A lot of people think about the finish line," she said. "I think about the start line."

Haslet is one of 17 people who lost a limb in the 2013 attacks. Three people lost their lives, and more than 260 were injured in terrorist attacks that shook the nation.

Haslet had to adjust to running with the blade, which requires more energy, because one of her legs is slightly longer than the other. She also overcame a hip flexor injury while training. "It was about finding another challenge and finding a new day," she said. "There was a point in my life (that) I wasn't a ballroom dancer either."

She ran with a four-person team on behalf of the Oklahoma City-based Limbs for Life Foundation, which provides prosthetics to people who cannot afford them.

The other remarkable individual highlighted is Beverly Cleary. She reached 100 years old in April, but she has always thought like a kid.

Beverly Cleary was a children's librarian before she became an author. "Boys particularly asked: Where were the books about kids like us? And there weren't any at that time," she recalled.

Cleary grew up on a farm. She remembers she had a "very bad adjustment" to school when her family moved to Portland.

Cleary now has sold 85 million copies of 41 books. Though the world was a very different place when Cleary was a child, she has always maintained that kids pretty much stay the same, which explains the ongoing popularity of her beloved characters, like Ramona Quimby, Henry Huggins and Ralph S. Mouse.

Cleary was in her early 30s and working part-time in a bookstore when she sat down at a typewriter to see if, just maybe, she could write a book for kids. She had worked as a librarian before World War II, and she wished she'd had books for young readers about children living everyday lives.

Ramona Quimby was a supporting character in Cleary's first book, *Henry Huggins*. "Ramona just appeared on her own and kept growing in each book," Cleary said. "I think children want to read about normal, everyday kids. That's what I wanted to read about when I was growing up. I wanted to read about the sort of boys and girls that I knew in my neighborhood and in my school. I think children like to find themselves in books."

Cleary wrote *The Mouse and the Motorcycle* for her son. "He was in about the third grade and was disillusioned with school and reading and I said, 'Well, what would you like to read about?' And he said: 'Motorcycles.'"

Cleary, remembers being a "very well-behaved child." She wanted Ramona to be more rambunctious. "What child is perfect?" she asks.

"My ancestors crossed the plains in covered wagons," Cleary's daughter, Marianne, said, "and so my mother is from Pioneer stock. She's very disciplined. She would write every morning. She would sit down after breakfast, my brother and I would go to school, and she'd write till noon or so. She never waited for inspiration, she just got to it."

It worked. Her books have hooked generations of children, including a young Jeff Kinney, who grew up to become the author of the *Diary of a Wimpy Kid* series. "I must have been about 8 or 9 years old when I first read Beverly Cleary," Kinney recalled. "The book that really grabbed me was *Ramona Quimby, Age 8*. She looked feral. I needed to get to know this character."

Kinney has 165 million books in print, and he knows a thing or two about writing for children. "Most kids have parents, teachers, bullies, we all experience these things," he said. "And Beverly Cleary tapped into that. Her work is still as relevant today as when it first came out."

Now, generations of children have been fortunate enough to enjoy her stories of Klickitat Street. So thanks, Beverly Cleary. And happy 100th birthday.

*(This report uses material from the Associated Press.)*

# Hurricane Guide

The 2016 hurricane season has arrived – and NASA’s John C. Stennis Space Center has prepared this four-page guide as a resource for Stennis employees.

The guide offers invaluable information: a hurricane tracking map, storm-rating information and contact numbers for emergency situations. It also serves as an important reminder for every Stennis employee to be prepared and alert for whatever the 2016 storm season may deliver.

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## Stennis Space Center WILL NOT serve as a shelter to any workers or families (to include families of ride-out personnel).

As part of their hurricane season preparation, individuals are urged to contact county/parish offices to identify available shelters in their areas.

In both Mississippi and Louisiana, persons are reminded they may call 2-1-1 to obtain information about health and human services available in their areas.

The number is staffed 24 hours a day in Louisiana and on weekdays, 7 a.m. to 6 p.m., in Mississippi. It offers information on various services, including food, clothing, shelters and transportation assistance.

Stennis employees are reminded to discuss their evacuation plans with supervisors so they can be contacted after a storm or to acquire their company/agency policy on contacts after a storm.

NOTE: If NASA employees cannot contact Stennis due to downed communications after a storm, they should call 877-776-4654 to report their status.

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### Emergency preparation checklist

- Gather a two-week inventory of emergency supplies, such as flashlights, batteries, a battery-operated radio, blankets and pillows, canned and dried food, non-electric can opener, eating/cooking utensils, emergency cooking facilities (grill or camp stove), fuel, cash and/or credit cards, clothes, toiletries, water (1 gallon per person a day), prescription medications, first-aid kit/handbook, fully-charged cell phone, towels, sleeping bags, etc.
- Back up computer files.
- Collect valuable papers, such as social security cards, birth certificates, marriage and death records, insurance policies, savings and checkbooks, etc.
- Prepare an inventory of household goods.
- Gather basic post-storm cleanup and repair supplies, such as axes, brooms, a camera to record damage, cleaning supplies, mosquito repellent, trash bags, hand tools, a chain saw, duct tape, plastic tarps, extension cords, a ladder, generator and fuel, etc.

### National resource information

American Red Cross ( <a href="http://www.redcross.org">www.redcross.org</a> ) .....	800-REDCROSS (733-2767)
Federal Emergency Management Agency ( <a href="http://www.fema.gov">www.fema.gov</a> ).....	800-621-FEMA (3362)
National Oceanic and Atmospheric Administration (NOAA).....	<a href="http://www.noaa.gov">www.noaa.gov</a>
NOAA National Hurricane Center .....	<a href="http://www.nhc.noaa.gov">www.nhc.noaa.gov</a>
NOAA National Weather Service Southern Region ( <a href="http://www.srh.noaa.gov">www.srh.noaa.gov</a> ) .....	Jackson 601-965-4638 Mobile 251-633-6443 Slidell 985-649-0357
U.S. Department of Homeland Security .....	<a href="http://www.dhs.gov">www.dhs.gov</a>
National Flood Insurance Program ( <a href="http://www.floodsmart.gov">www.floodsmart.gov</a> ) .....	888-379-9531

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### Mississippi resource information

Mississippi Emergency Management Agency ( <a href="http://www.msema.org">www.msema.org</a> ) .....	866-519-MEMA (6362) (24 hrs) 800-222-MEMA (6362)
Mississippi Department of Transportation ( <a href="http://www.mdot.ms.gov">www.mdot.ms.gov</a> and <a href="http://www.mdottraffic.com">www.mdottraffic.com</a> ) .....	866-521-MDOT (6368)
Mississippi Highway Safety Patrol ( <a href="http://www.dps.state.ms.us">www.dps.state.ms.us</a> ) .....	601-987-1212 (*HP from any cell)
Mississippi Public Broadcasting ( <a href="http://www.mpbonline.org">www.mpbonline.org</a> ) .....	(24-hour hotline) 601-326-1184
Governor’s Office ( <a href="http://www.governorbryant.com">www.governorbryant.com</a> ) .....	601-359-3150
Mississippi Insurance Department ( <a href="http://www.mid.ms.gov">www.mid.ms.gov</a> ) .....	800-562-2957
U.S. Coast Guard - Sector Mobile ( <a href="http://www.uscg.mil/D8">www.uscg.mil/D8</a> ) .....	251-441-5720
Mississippi Power ( <a href="http://www.mississippipower.com">www.mississippipower.com</a> ) .....	800-487-3275
Coast Electric Power ( <a href="http://www.coastepa.com">www.coastepa.com</a> ) .....	877-769-2372

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### Louisiana resource information

Office of Homeland Security and Preparedness ( <a href="http://www.gohsep.la.gov">www.gohsep.la.gov</a> ) .....	225-925-7500
Louisiana Department of Transportation ( <a href="http://www.dotd.louisiana.gov">www.dotd.louisiana.gov</a> ).....	877-4LA-DOTD (452-3683)
National Weather Service Forecast Office (New Orleans/Baton Rouge) .....	504-522-7330
Louisiana State Police ( <a href="http://www.lsp.org">www.lsp.org</a> ) .....	225-925-6006 (*LSP from any cell phone)
Louisiana Traveler Information ( <a href="http://www.511a.org">www.511a.org</a> ) .....	dial 511 within state; 88-ROAD-511 (888-762-3511) outside state
Louisiana Governor’s Office ( <a href="http://www.gov.louisiana.gov">www.gov.louisiana.gov</a> ) .....	866-366-1121
Louisiana Department of Insurance ( <a href="http://www.ldi.louisiana.gov">www.ldi.louisiana.gov</a> ) .....	800-259-5300 or 225-342-5900
U.S. Coast Guard - Sector New Orleans ( <a href="http://www.uscg.mil/D8/sectNOLA/">www.uscg.mil/D8/sectNOLA/</a> ) .....	504-365-2200
Cleco Corporation ( <a href="http://www.cleco.com">www.cleco.com</a> ) .....	800-622-6537
Entergy ( <a href="http://www.energy-louisiana.com">www.energy-louisiana.com</a> ) .....	800-ENTERGY (368-3749) Power outages: 800-9OUTAGE (968-8243)
Washington-St. Tammany Electric Cooperative ( <a href="http://www.wste.coop">www.wste.coop</a> ) .....	985-643-6612 Power outages: 866-672-9773

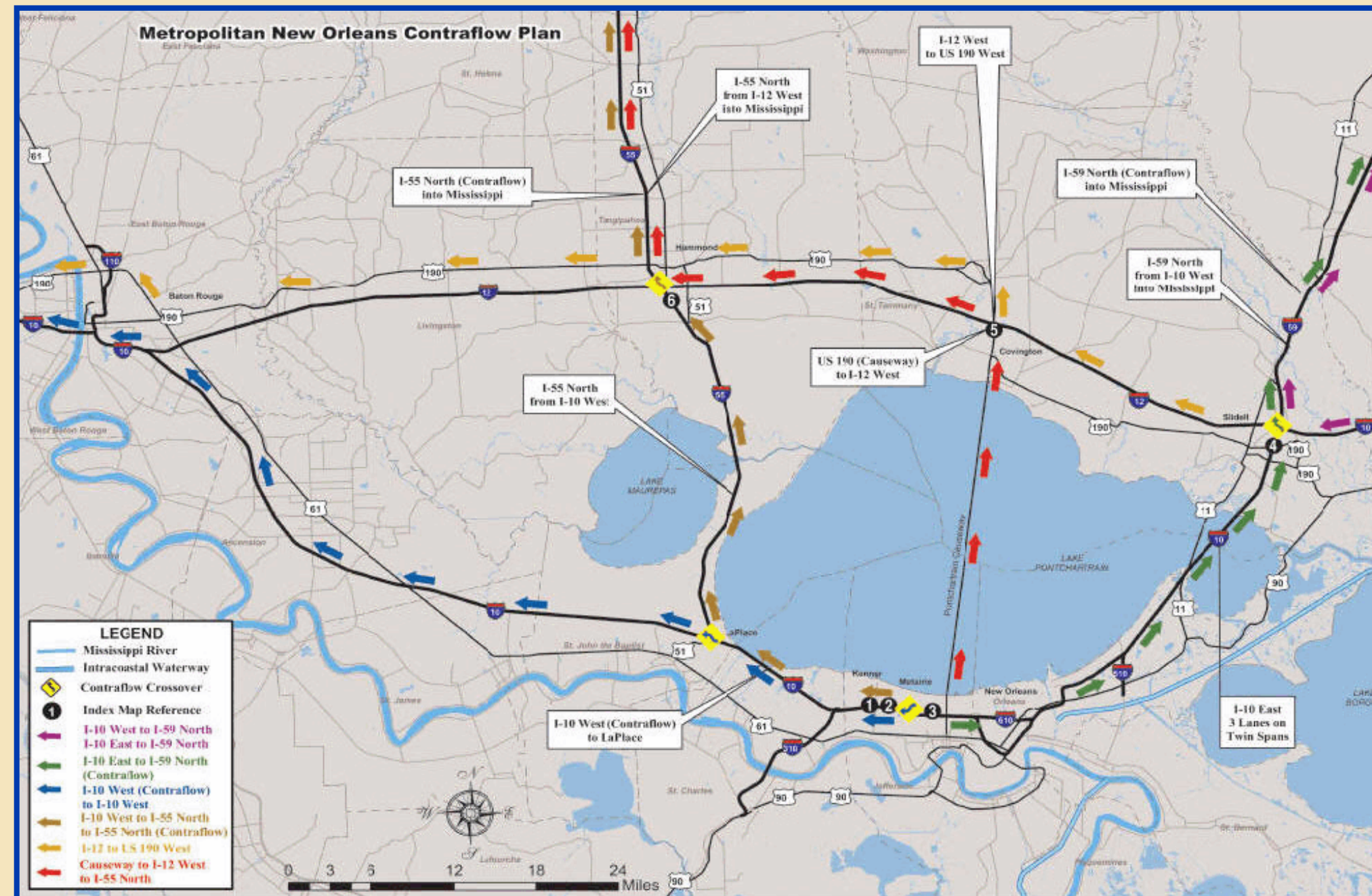
# Louisiana-Mississippi interstate contraflow plan

In an effort to assist Louisiana in the event of a mandatory hurricane evacuation, the Mississippi Department of Transportation will implement contraflow (lane reversal) for I-59 and I-55 when requested by Louisiana and approved by the Mississippi governor.

- A contraflow decision is not automatic and will only be used when absolutely necessary. Citizens should not delay evacuation plans in anticipation of contraflow.
- I-59 contraflow will begin in Louisiana, extend into Mississippi and end just south of Poplarville.

- I-55 contraflow will begin in Louisiana, extend into Mississippi and end just south of Brookhaven.
- Exits within the contraflow sections of the interstate highways will remain open as conditions allow. Law enforcement officers will assist with traffic control.
- Shoulders of both Interstates 59 and 55 should be kept clear for emergency vehicles. Motorists needing to stop should use the next available exit.
- Motorists traveling west into Louisiana on I-10 will be routed north onto I-59 at the I-10/I-12 split.

- Tune in to public broadcasting radio stations for emergency information and road conditions.
- The following procedures will be enforced in the Hattiesburg area to avoid severe congestion:
  - Northbound traffic on Hwy. 49 may not be allowed to exit at either Hwy. 98 or I-59.
  - Northbound traffic on I-59 can only exit at Hwy. 11 (Exit 60) or west onto Hardy Street/Hwy. 98 (Exit 65).
  - Westbound traffic on Hwy. 98 will not be allowed to exit onto Hwy. 49, but directed to merge onto I-59 instead.



## Hurricane strength

### Category One

Winds 74-95 mph. Storm surge 4-5 feet.

### Category Two

Winds 96-110 mph. Storm surge 6-8 feet.

### Category Three

Winds 111-129 mph. Storm surge 9-12 feet.

### Category Four

Winds 130-156 mph. Storm surge 13-18 feet.

### Category Five

Winds greater than 157 mph. Storm surge more than 18 feet.

## Severe weather terms

### Storm surge

An abnormal rise of sea/gulf water along a shore as the result, primarily, of winds from a storm.

### Watch

Adverse conditions are *possible* in the specified watch area, usually within 36 hours. A watch may apply to thunderstorms, tornadoes, floods or hurricanes.

### Warning

Adverse conditions are *expected* in the specified warning area, usually within 24 hours. A warning may apply to thunderstorms, tornadoes, floods or hurricanes.

## Public shelter information

Shelters are operated by trained individuals and are designed to ensure the safety, security and basic needs of sheltering residents are met. As a reminder, no one is allowed to shelter at Stennis Space Center.

### What to bring to a shelter

Residents seeking shelter should bring a change of clothing, a blanket and a pillow for each person in their family or group. Residents also should bring their disaster supply kit, including food, medications, comfort items and special items for infants or elderly persons.

### What not to bring to a shelter

No weapons, drugs or alcohol are allowed.

## Hurricane preparedness apps

### Alert FM

Functions as a weather radio, with unique local alerts from emergency officials.

### FEMA

Provides safety tips, interactive aids and maps of shelters and recovery centers.

### Know Your Plan

An Insurance Information Institute app with various preparation and mitigation aids.

### Way to Geaux

A Louisiana roads hands-free, eyes-free, location-based audio traffic alert system.