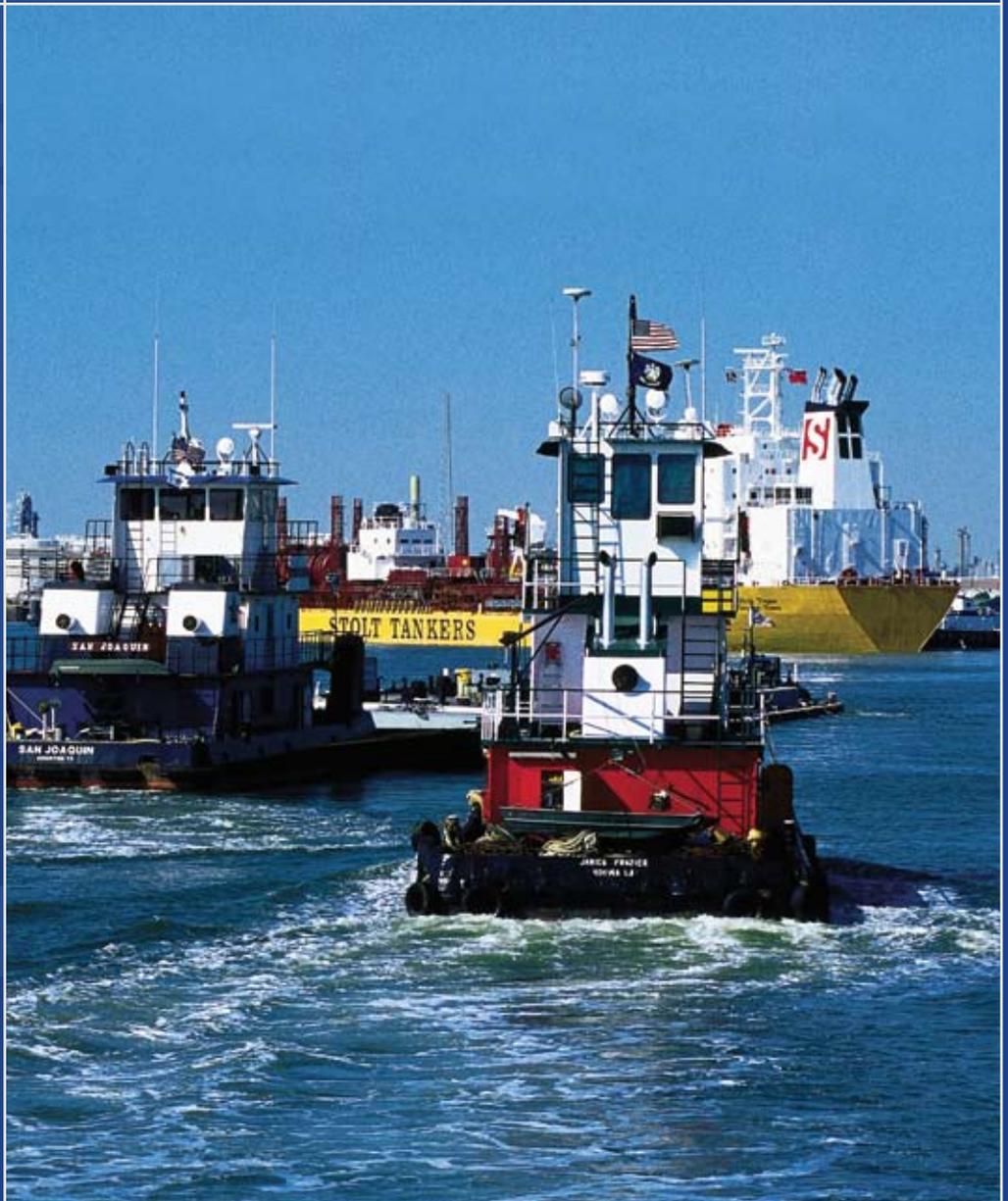


Navigating the Houston Ship Channel

a reference for commercial users





Welcome to the Houston Ship Channel

one of the busiest and most challenging waterways in the world

The Houston Ship Channel hosts more than 50 ships and 300 barge movements each day. Statistics from Vessel Traffic Service indicate a 10% increase in traffic from 2004 to 2005, and with deepening and widening of the Channel complete, further traffic increases are projected.

The deepening and widening of the Houston Ship Channel also means ships larger than ever before are now able to ply the waterway. With a project depth of 45 feet and width of 530 feet, the Channel can accommodate the “Suezmax” tanker, which carries up to 40% more cargo than any ship permitted within the Channel’s previous dimensions.

The deepening and widening of the Houston Ship Channel, with incorporation of its new barge lanes on either side, opens doors to many opportunities for our ports and all who use their facilities. To capitalize on these improvements, however, we must also maintain a safe navigation environment. This means adjusting our operations and procedures to accommodate increased traffic and larger vessels in the Channel. With some simple considerations, and continued cooperation among vessel operators, we can ensure a deeper, wider and *safer* waterway.

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A Deeper & Wider Channel

The deepening and widening of the Houston Ship Channel, completed in 2005, resulted in a main channel with project depth of 45 feet, width of 530 feet, and barge lanes on either side between the Gulf Intracoastal Waterway and Morgan's Point. A cross-section of the improved channel shows:

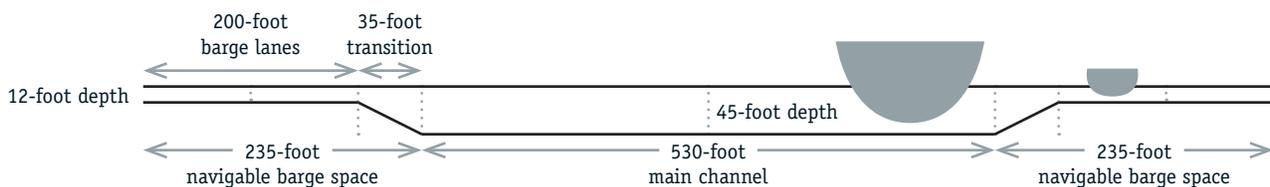
- a main channel dredged to project depth of 45 feet and width of 530 feet;
- 35-foot wide transition slopes on either side of the main channel, measuring 45 feet deep at their innermost point, and 12 feet deep at their outermost point;
- 200-foot wide barge lanes outside of the transition slopes, measuring 12 feet deep; and,
- width of the entire channel along this reach as 1000 feet.

Navigable space within the barge lanes includes the 35-foot transition slope, for a total navigable width of 235 feet on either side of the main channel. The outer edges of the barge lanes are marked with gated beacons in good water, but inner edges are left unmarked.



Tow operators are encouraged to use the lanes as a safe navigation space, leaving the main channel free for faster-moving vessels and deep-draft ships. Operators should be aware, however, of hydraulic effects caused by the new channel configuration. Currents in the barge lanes may run slightly faster due to their shallower depth, and forces exerted by larger displacement ships will be amplified. See the sections on Deepdraft/Tow Interactions and Mooring Issues for additional details on the impact of hydraulic effects.

Dimensions of the Deeper & Wider Houston Ship Channel

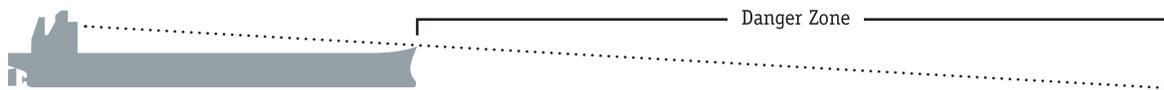


Deepdraft/Tow Interactions

Every vessel type transiting the Houston Ship Channel has its own unique navigational challenges and limitations. In order to maintain a safe environment, it is important to understand the differences between vessel types, and how their operation impacts others on the waterway.

Can you see off that ship?

A ship's configuration and cargo affect the vessel operator's line of sight from the ship's bridge. The blind spot ahead of the bow can be a few hundred feet – or thousands of feet in the case of deep draft container ships. Cranes, containers and cargo canopies can create additional blind spots. Towboat and other vessel operators should exercise extreme caution when attempting to overtake a ship, taking care to avoid blind spots and to communicate intentions when necessary.



How much does that ship hold, and why should I care?

With the deepening and widening project complete, the Houston Ship Channel can accommodate the massive Suezmax tanker. On average, the Suezmax is 70 feet longer and 20 feet wider than the Aframax – the largest vessel permissible in the Channel prior to the deepening and widening project. It is also capable of carrying up to 40% more cargo. The larger size and cargo capacity of the Suezmax tanker mean more weight and greater water displacement in the Channel. This leads to amplification of hydraulic forces exerted on other vessels in the vicinity.



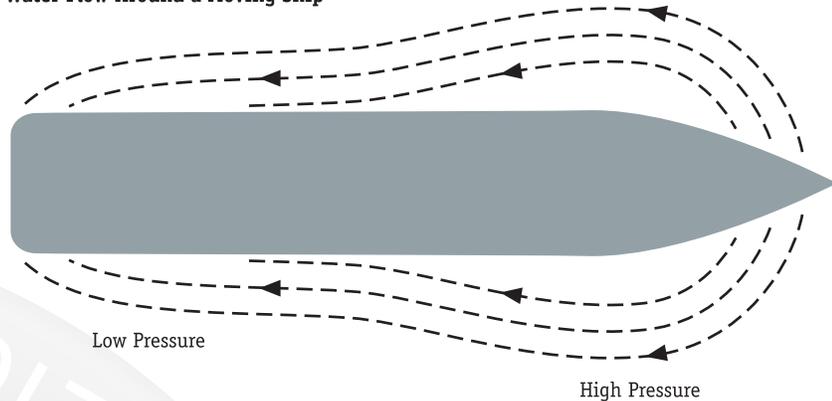
Compensating for hydrodynamics



A moving ship pushes water away from its hull in all directions. As the ship moves forward, water will flow around and under the vessel to fill space in its wake.

Areas of high pressure exist on both sides of the moving ship's bow as water is displaced. As it flows along the sides of the ship, water speed increases until it reaches an area of low pressure near the stern. This is where "ship's suction" occurs. Ship's suction is a hydraulic effect that draws neighboring vessels toward the stern as the ship passes, or pulls the stern near the bank of the channel when transiting close to shore.

Water Flow Around a Moving Ship

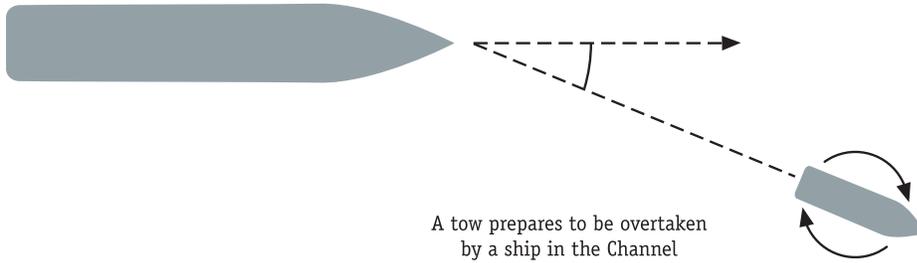


When two ships meet in the Channel, this effect can turn each of them off-course in a counter-clockwise direction (assuming opposing vessels are both on their respective right sides of the Channel). This poses potential danger to vessels following either ship. To avoid this hazard, vessels should maintain following distances large enough to permit meeting ships to correct their course.



The effect of ship's suction on passing vessels can jeopardize those following too closely

In similar fashion, a ship exerts suction on vessels it overtakes in the Channel. To mitigate the effect, tow operators are encouraged to position their vessels at an angle to the ship's path (with the stern pointing toward the ship and the bow pointing away from the ship).



Hydraulic effects on moored vessels are also amplified by the presence of larger ships in the Houston Ship Channel. Please see the section on Mooring Issues for tips on mitigating these effects.

Mooring Issues

With deepening and widening of the Houston Ship Channel complete, ships larger than ever before will be transiting the Channel. These ships – some with as much as 40% more cargo capacity than the largest ships permissible within previous Channel dimensions – can exert much stronger forces on moored vessels.

As a passing ship approaches, the water surge ahead of it will cause a water flow at the pier in the direction of the passing ship. As the ship passes, water flow at the berth will shift direction, drawing the moored vessel in the opposite direction. A third force comes into play as the stern of the vessel passes. This force follows the passing vessel and is diametrically opposed to the previous force. In a short period, the moored vessel will be pushed in different directions three times.

Because these forces are amplified by the transit of larger ships, it is particularly important to pay attention to proper dockside moorings. Mariners should tend their lines carefully and make sure loads are equally distributed. Lines should be tensioned such that no movement is allowed at the dock. If slack lines permit movement of even a few feet, the moored vessel will be subjected to a substantial amount of energy that will surge loads and part overloaded mooring lines.



The Houston/Galveston Navigation Safety Advisory Committee includes a subcommittee whose purpose is to address issues related to mooring safety along the Houston Ship Channel. The group is working with the U.S. Coast Guard to reduce incidents of parted mooring lines and damaged moorings. They are accomplishing this goal by educating mariners and dockhands on the importance of proper mooring leads, adequate mooring lines and optimal use of cleats and bits.

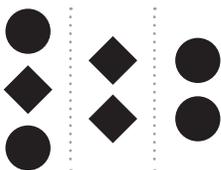
The subcommittee is also working on a comprehensive survey of mooring facilities throughout the Houston, Galveston and Texas City Port complexes, to assess the configuration and condition of docks, wharves and piers, as well as practices in place at those facilities. Subcommittee volunteers offer courtesy reviews of any new waterfront construction involving moorings, providing facility owners a better understanding of the mooring needs of both shallow and deep draft vessels.

Dredge Operations

You can find a working dredge on the Houston Ship Channel at almost any time. It is important to be aware of dredge operations and understand their signals in order to avoid an accident.

During the day, dredges will display a ball-diamond-ball in a vertical line, usually on the centerline near the forward portion of the dredge. This signals that you are approaching a vessel with limited maneuverability. The “safe side” will be marked with two diamonds. Avoid the “danger side,” marked with two black balls. This is the side on which the dredge pipe is connected.

Daytime Dredge Signals

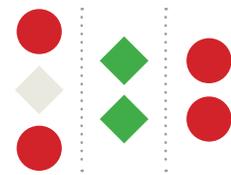


Limited maneuverability,
safe side and danger side

At night, the ball-diamond-ball pattern will instead be represented with a red-white-red pattern. The two diamonds of the safe side will show two green lights, and the two black balls of the danger side will show two red lights. Do not confuse these with navigation lights, and never pass a dredge until you confirm passing instructions with the dredge master on VHF-FM Channel 13.

Dredge operations involve a considerable number of support vessels that are necessary to move the dredge, relocate anchors and anchor balls, place dredging pipe and connecting flanges, and ferry personnel and supplies. These boats are on the move 24 hours a day. Maintain a close lookout, and be prepared for sudden maneuvers by support vessels.

Nighttime Dredge Signals



Limited maneuverability,
safe side and danger side

Areas Requiring Special Attention

There are several locations within the vicinity of the Houston Ship Channel that warrant the special attention of mariners.

- Area** Intersection of the Gulf Intracoastal Waterway and the Houston Ship Channel
- Challenges** Traffic congestion, current, wind and weather, inconsiderate or uncooperative mariners, radio congestion, mariner inexperience, unmanageable tow size, ship speed
- Area** Lynchburg Ferry/San Jacinto
- Challenges** Traffic congestion, line of sight, current, presence of the ferry, blinding lights at the shipyard, poor communication
- Area** Dredge locations (various)
- Challenges** Channel restrictions/closures, poor communication, one-way traffic, uncooperative mariners, location of equipment
- Area** Manchester
- Challenge** Narrow passage, line of sight, congestion
- Area** Morgan's Point Highlines
- Challenge** Barbours Cut and Cedar Bayou intersections, high traffic area subject to congestion

Bolivar Roads Alternate Inbound Route

The Bolivar Roads intersection with the Houston Ship Channel has always been a busy one, but with additional traffic and larger vessels transiting, it is expected to become even more challenging.

The deepening and widening of the Houston Ship Channel brought two important safety features – the addition of barge lanes, and implementation of an alternate route that allows mariners to avoid the Bolivar Roads/Houston Ship Channel intersection. Referred to as the Bolivar Roads Alternate Inbound Route, or BRAIR, the passage acts much like a freeway on-ramp. Westbound traffic exiting Bolivar Roads may enter the Ship Channel via the BRAIR and continue inbound, rather than navigating the difficult 105-degree turn at the intersection.

The BRAIR is intended to serve inbound traffic only. It is marked with oversized buoys and three-pile beacons on both the red and green sides of the route. It also features a new navigation aid called a leading light. The leading light is at the extended centerline of the route's northern end, and is in service 24 hours per day. It functions similar to a range, in that it appears brightest to the vessel approaching the channel centerline, and less bright as the vessel moves to either side.



The Bolivar Roads Alternate Inbound Route is 1700 feet wide at its entrance (lower right), 730 feet wide at its exit (upper left) and one nautical mile in length. A leading light at the extended centerline (indicated by star) helps keep mariners on course.

Anchorage Areas at Bolivar Roads



Anchorage areas at Bolivar Roads are intended for temporary use by vessels of all types. Most vessels use the Bolivar Roads Anchorages while waiting for dock space to clear, for bad weather to pass, or for completion of any required inspections. Other vessels may be waiting to take on fuel and stores.

In accordance with guidelines set forth in the Code of Federal Regulations, mariners should note specific restrictions applicable to Anchorage Area A:

- Unless otherwise authorized by the Captain of the Port of Galveston, vessels shall not anchor in Anchorage Area A for more than 48 hours.
- No vessel with a draft of less than 22 feet may occupy Anchorage Area A without prior approval from the Captain of the Port.
- Anchors shall not be placed in the navigation channel, and no portion of the hull or rigging of any anchored vessel shall extend outside the anchorage areas.

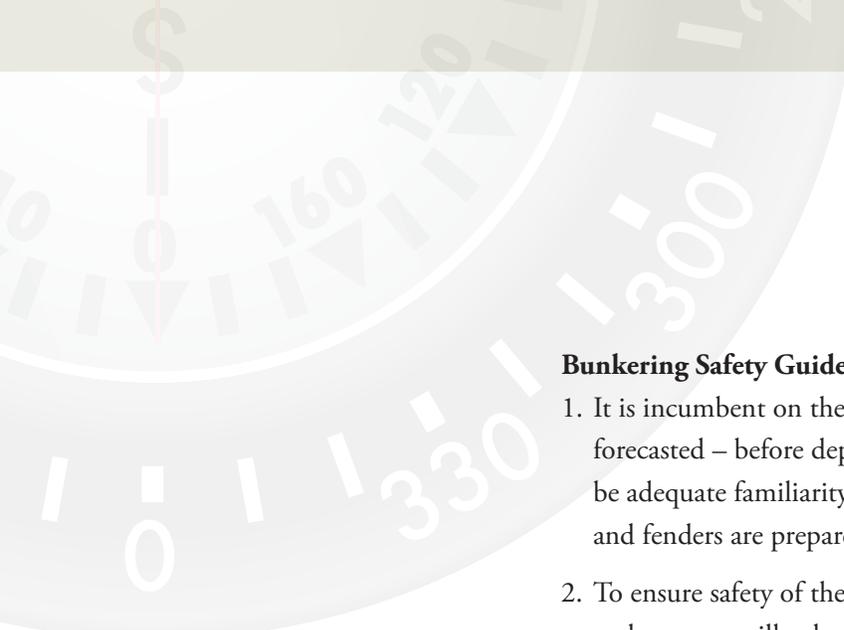
Complete anchorage regulations for this area are set forth in 33 CFR 110.197.

Vessel Traffic Service (VTS) Houston/Galveston oversees daily management of vessels within both anchorages at Bolivar Roads. Should a vessel fail to comply with anchorage restrictions, the VTS watch supervisor will contact the operating company or agent and vessel master. If corrective action is not taken, the Captain of the Port will issue an order directing the vessel to move out of Anchorage Area A.

Bunkering Operations at the Bolivar Roads Anchorages

The Bolivar Roads area is generally a safe place for ships to anchor. Passing traffic and adverse weather conditions that pose little danger to a ship, however, can find the brownwater vessel – either preparing for or conducting bunkering operations – in a hazardous situation.

The master of the towing vessel is responsible for the conduct and safety of the vessel prior to, during, and at the conclusion of bunkering operations. Tow safety can be ensured by taking precautions and following operating procedures. A summary of bunkering safety guidelines is on page 10. Complete text is available at www.uscg.mil/vtshouston (click Bolivar Roads Anchorage Bunkering Safety Guidelines).



Bunkering Safety Guidelines

1. It is incumbent on the master to check weather conditions – existing and forecasted – before departing for the bunkering operation. There should be adequate familiarity with the receiving vessel to ensure appropriate lines and fenders are prepared prior to departure.
2. To ensure safety of the crew, protect the vessel and bunkering operation, and prevent spills, the master should conduct a “pre-critical task conference” with the crew. At minimum, the master and crew should discuss:
 - weather, tide and current
 - duration of the operation
 - lookout procedures
 - communication with the ship
 - definition of crewman responsibilities
 - identification of situations that would require shutting down the transfer
 - the mooring plan, as well as potential placement of lines and fenders
3. Masters should plan to moor on the ship’s shoreward side to minimize the wake effects of passing vessels. While alongside, both the master and crew should continuously monitor conditions – including passing traffic, shifting tides or winds, and changing weather. As conditions change, the master and crew should not hesitate to shift sides or stop the operation if it becomes hazardous.
4. Prior to departing, the crew should ensure that all hoses, valves, and any equipment used in bunkering are secured and properly stowed. Following appropriate notifications, the towing vessel may depart for its next job.

Advance Notice Required

According to 33 CFR 156.118, vessel operators must provide a 4-hour notice of anticipated bunkering operations to the Captain of the Port. This notice is required for all bunkering operations within the Bolivar Roads Anchorage, as defined by 33 CFR 110.197. To make notification, operators must contact Houston Traffic (preferably by phone) at 713.671.5103 or VHF-FM Channel 05A.

Vessel Traffic Service Communications

The Houston/Galveston Vessel Traffic Service (VTS) acts as a communication hub to provide accurate, relevant and timely information to mariners, port authorities, facility operators and local, state and federal agencies. Its primary purpose is to prevent groundings, allisions and collisions by sharing information and implementing appropriate traffic management measures.

Calling the Vessel Traffic Center

The call sign for the Houston/Galveston Vessel Traffic Center (VTC) is “Houston Traffic.” The VTS requires all captains and pilots to use the vessel’s official name when calling the VTC. Houston, Galveston and Texas City Pilots may use their individual identification number in addition to the vessel’s name. All communications must be in English.

Radio Frequencies

VHF-FM Channel 05A

All vessels must first contact Houston Traffic on this frequency before switching to a working frequency.

VHF-FM Channel 11/12

Working frequencies for the Houston/Galveston VTS area include VHF-FM Channels 11 and 12. Use Channel 11 at Baytown Bend (Light 109) and all points above. Use Channel 12 at all points below.

VTS users not maintaining a listening watch on the appropriate VTS frequency (VHF-FM Channel 11 or 12) are required to monitor VHF-FM Channel 16, and bridge-to-bridge frequency VHF-FM Channel 13.



Photo courtesy of (CREDIT)

Channel Obstruction Application

Anyone proposing to conduct maritime operations that may interrupt navigation on a ship channel within the Captain of the Port Houston/Galveston area of responsibility must submit a channel obstruction application to the U.S. Coast Guard at least 96 hours prior to the requested closure. There are two categories of channel obstruction. Applicants should review these categories carefully prior to submitting an application.

Category I Obstructions

Include operations whose impact (or potential impact) to navigation cannot be completely mitigated by unilateral traffic management measures imposed by the Coast Guard. Non-self-propelled vessel movements (such as dead ship transits or offshore rig maneuvers), maritime operations (such as power line installations, pipeline construction and more extensive and intrusive dredging operations) or vessels with larger than normal physical dimensions are all examples, since they are strictly limited to the boundaries of the channel.

Category II Obstructions

Include operations not completely limited to the boundaries of the channel, and with marginal impact on vessel navigation. Heavy-lift evolutions, roll-on/roll-off operations, and most of the Port's rig movements are examples. These obstructions are short-notice undertakings, limited in duration, and must be movable or terminable within one hour of notification from the VTS or Captain of the Port.

Visit www.uscg.mil/vtshouston for additional information or to submit a channel obstruction application.

Channel Reopening Process

Given the large number of vessels simultaneously awaiting arrival or departure following a major closure of the Houston Ship Channel, standard procedures are in place to ensure orderly flow of traffic and maintenance of a safe operating environment. A major closure is typically defined as one lasting 12 hours or more, and may be attributable to weather, destruction of major navigation aids, channel blockage, or other factors.

1. A VTS representative will communicate with the Galveston/Texas City Pilots, the Houston Pilots and the Gulf Intracoastal Canal Association (GICA) to discuss the status of the closure and any anticipated delays to reopening of the Channel.

2. In preparation for reopening, the VTS will review traffic management options with these groups.
3. The VTS will maintain a list of vessels waiting to move within the Port. It is important for vessels to contact VTS on VHF-FM Channel 05A so volume and movement of traffic can be properly assessed and managed. The VTS will consult with the pilot associations to coordinate ship traffic, and with the GICA to coordinate tow traffic.
4. The VTS will consult with the U.S. Army Corps of Engineers, the pilots associations and the GICA to evaluate the need to cease and/or move dredging operations or any other obstructions from the Channel until vessel traffic returns to normal levels.
5. The VTS may require vessels to monitor VHF-FM Channel 11 or 12 until vessel traffic returns to normal levels, reducing the need to repeat advisories, and freeing airwaves for vessels with urgent information to report.

Reporting Aids to Navigation Allisions



The Houston Ship Channel and Gulf Intracoastal Waterway (within the Houston Vessel Traffic Service Area) hold claim to the highest rate of Aids to Navigation (ATON) discrepancies of any U.S. Coast Guard district. More than \$2 million is spent each year to repair or replace aids in these areas. When aids are damaged or missing, navigation safety is jeopardized.

It is a mariner's legal obligation to report any incident involving damage to or destruction of an ATON. Failure to report not only puts all other mariners in harm's way, but also comes with severe penalties including fines and/or imprisonment, along with revocation and/or loss of license. By reporting an incident immediately, the Coast Guard's limited resources may be put to most efficient use, and risk to other mariners can be removed as quickly as possible.

Because ATON damage and destruction are not self-reported in the majority of cases, those aids most vulnerable to damage are now monitored by Automatic

Identification System (AIS) and VHF technology. This enables the Coast Guard not only to respond promptly with repair or replacement, but also to identify the offending vessel.

Mariners are required to report all ATON incidents as soon as they occur to avoid prosecution. The Coast Guard has historically been very lenient on mariners who self-report, and recognizes them in the Captain of the Port's Hall of Honor.

To report ATON damage, contact the nearest Aids to Navigation (ANT) Unit. If you are unable to reach an ANT Unit, contact the corresponding Sector Command, which monitors radios 24 hours per day. If you are still unsuccessful in making contact, report the incident to local Vessel Traffic Service (VTS) where VTS is available.

Sector Corpus Christi

Sector Command 361.939.6393 VHF Channel 16

Sector Houston/Galveston

Sector Command 713.678.9057 VHF Channel 16

VTS Houston 713.671.5103 VHF Channel 11, 12 or 05A

Security



Waterway operators are often identified as a first line of defense against terrorism. Considering the wealth of resources situated adjacent to the Houston Ship Channel and the volume of commerce on its waters, vessel operators should be particularly watchful for suspicious activity in this environment.

The Port of Houston Authority and other industry partners implemented many new security measures in recent years to limit the possibility of attack on the Port or its facilities. The success of these efforts, however, depends on the vigilance of everyone navigating the Channel or working at Port facilities.

If you witness any unusual activity, do not hesitate to report it. Follow your company's security policy or alert the nearest Coast Guard contact.

U.S. Coast Guard Maritime Security Levels

The Coast Guard has a three-tiered system of Maritime Security (MARSEC) levels consistent with the Homeland Security Advisory System (HSAS). MARSEC levels provide a means to easily communicate coordinated, pre-planned, and scalable response to heightened levels of threat. Levels are set to reflect the prevailing threat environment to the marine elements of the national transportation system, including ports, vessels, facilities, and critical assets and infrastructure located on or adjacent to waters subject to U.S. jurisdiction. The Commandant of the U.S. Coast Guard sets MARSEC levels in close alignment with threat conditions of the HSAS, but because of the unique nature of the maritime industry, MARSEC levels will not correlate precisely.

- **MARSEC Level 1:** minimum appropriate security measures shall be maintained at all times. MARSEC 1 generally applies when HSAS Threat Condition Green, Blue, or Yellow is in effect.
- **MARSEC Level 2:** appropriate additional protective security measures shall be maintained for a period of time as a result of heightened risk of a transportation security incident. MARSEC 2 generally corresponds to HSAS Threat Condition Orange.
- **MARSEC Level 3:** further specific protective security measures shall be maintained for a limited period of time when a transportation security incident is probable, imminent, or has occurred, although it may not be possible to identify the specific target. MARSEC 3 generally corresponds to HSAS Threat Condition Red.

Additional Resources

- American Waterways Operators
www.americanwaterways.com
- Bolivar Roads Anchorage Bunkering Safety Guidelines
www.uscg.mil/vtshouston
- Foret Enterprises, Inc.
www.foretinc.com
- Gulf Intracoastal Canal Association
www.gicaonline.com
- Houston Pilots
www.houston-pilots.com
- Physical Oceanographic Real-Time System (PORTS) Houston/Galveston
www.co-ops.nos.noaa.gov/hgports/hgports.html
- Port of Galveston
www.portofgalveston.com
- Port of Houston Authority
www.portofhouston.com
- Port of Texas City and Texas City Terminal Railway Company
www.railporttc.com
- U.S. Coast Guard
www.uscg.mil
- Vessel Traffic Service Houston/Galveston
www.uscg.mil/vtshouston
- Wheelhouse Report
www.wheelhoureport.org
- US Army Corps of Engineers, Galveston District
www.swg.usace.army.mil

Contact Information

If you have questions or comments about the information in this publication, or would like to obtain additional copies, please contact the Gulf Intracoastal Canal Association at 281.996.6915.

Presented by Foret Enterprises, Inc., the Houston/Galveston Navigation Safety Advisory Committee and the Houston Pilots. Photos courtesy of the Port of Houston Authority unless otherwise noted.



