

UNCLASSIFIED

**ENCLOSURE (2)**

REPORT ON THE COLLISION BETWEEN USS JOHN S MCCAIN (DDG 56)  
AND MOTOR VESSEL ALNIC MC

23 OCT 2017

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## **1. EXECUTIVE SUMMARY - USS JOHN S MCCAIN**

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### **1.1 Introduction**

USS JOHN S MCCAIN collided with Motor Vessel ALNIC MC on 21 August 2017 in the Straits of Singapore.

JOHN S MCAIN is a Flight 1 Arleigh Burke Class Destroyer, commissioned in 1994 and homeported in Yokosuka, Japan, as part of the Forward Deployed Naval Forces and Carrier Strike Group FIVE. Approximately 300 sailors serve aboard MCCAIN. MCCAIN is 505 feet in length and carries a gross tonnage of approximately 9,000 tons.

ALNIC MC is a Liberia flagged oil and chemical tanker built in 2008. ALNIC MC is approximately 600 feet long and has a gross tonnage of approximately 30,000 tons.

The collision between JOHN S MCCAIN and ALNIC resulted in the deaths of 10 U.S. Sailors due to impact with MCCAIN's berthing compartments, located below the waterline of the ship. ALNIC suffered no fatalities. U.S. Sailor fatalities were:

ETC Charles Nathan Findley of Amazonian, Missouri, 31 years old.

ICC Abraham Lopez of El Paso, Texas, 39 years old.

ET1 Kevin Sayer Bushell of Gaithersburg, Maryland, 26 years old.

ET1 Jacob Daniel Drake of Cable, Ohio, 21 years old.

IT1 Timothy Thomas Eckels Jr. of Baltimore, Maryland, 23 years old.

IT1 Corey George Ingram of Poughkeepsie, New York, 28 years old.

ET2 Dustin Louis Doyon of Suffield, Connecticut, 26 years old.

ET2 John Henry Hoagland III of Killeen, Texas, 20 years old.

IC2 Logan Stephen Palmer of Harristown, Illinois, 23 years old.

ET2 Kenneth Aaron Smith of Cherry Hill, New Jersey, 22 years old.

## 1.2 Summary of Findings

The Navy determined the following causes of the collision:

Loss of situational awareness in response to mistakes in the operation of the JOHN S MCCAIN's steering and propulsion system, while in the presence of a high density of maritime traffic.

Failure to follow the International Nautical Rules of the Road, a system of rules to govern the maneuvering of vessels when risk of collision is present.

Watchstanders operating the JOHN S MCCAIN's steering and propulsion systems had insufficient proficiency and knowledge of the systems.

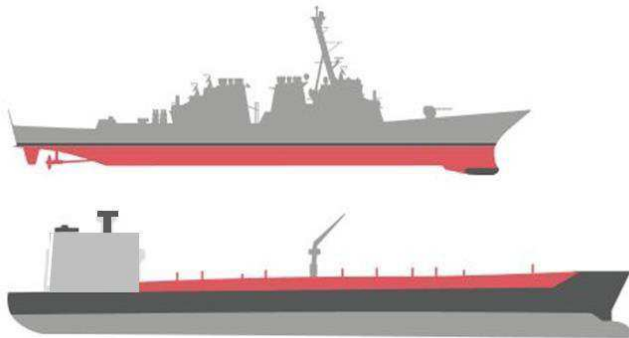
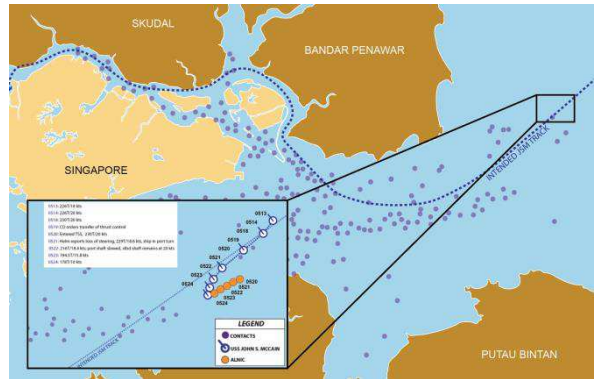
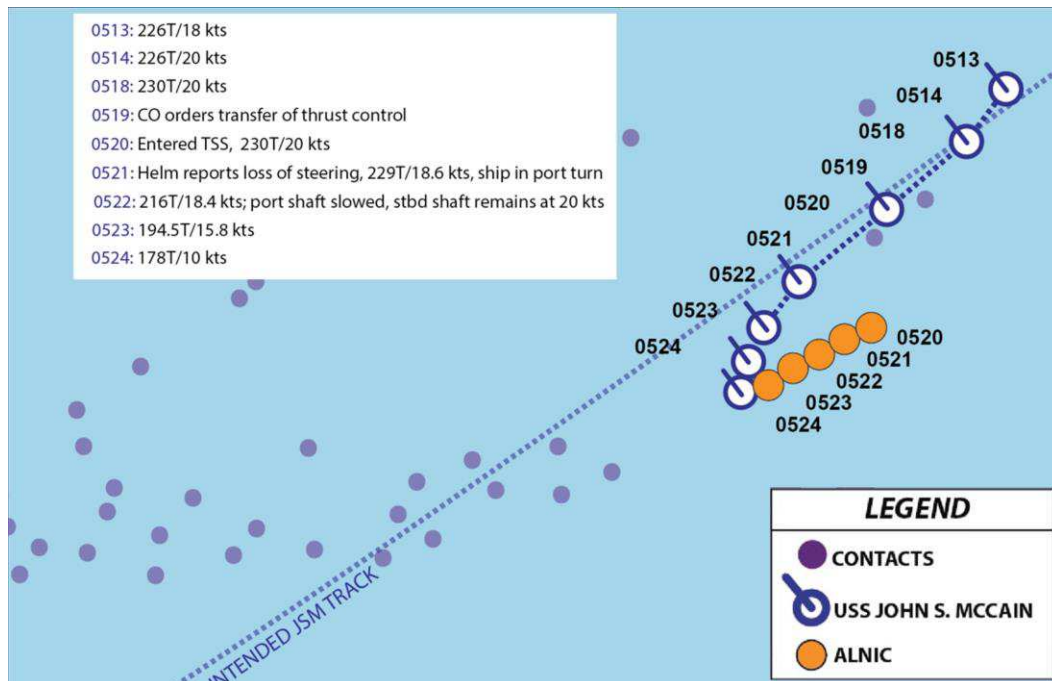


Figure 1 – Relative size of USS JOHN S MCCAIN



\*Diagrams are only intended to represent the approximation location of the collision\*

Figure 2 – Illustration Map of Approximate Collision Location



\*Diagrams are only intended to represent the approximation location of the collision\*

Figure 3 – Illustration Map of Approximate Collision Location

## **2. DESCRIPTION OF EVENTS**

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### **2.1 Background**

JOHN S MCCAIN departed its homeport of Yokosuka, Japan on 26 May 2017 for a scheduled six month deployment in the Western Pacific, which at the time of the collision had included operations in the East and South China Seas, and port visits in Vietnam, Australia, Philippines and Japan. On the morning of 21 August, JOHN S MCCAIN was 50 nautical miles east of Singapore, approaching the Singapore Strait and Strait of Malacca, in transit to a scheduled port of call at Changi Naval Base, Singapore. These Straits form a combined ocean passage that is one of the busiest shipping lanes in the world, with more than 200 vessels passing through the straits each day. JOHN S MCCAIN was transiting through the southern end of the Strait. See Figure 2. In the predawn hours of 21 August 2017, the moon had set and the skies were overcast. There was no illumination and the sun would not rise until 0658. Seas were calm, with one to three foot swells. All navigation and propulsion equipment was operating properly.

At 0418, JOHN S MCCAIN transitioned to a Modified Navigation Detail due to approaching within 10 nautical miles from shoal water. This detail is used by the Navy when in proximity of water too shallow to safely navigate as occurs when entering ports. This detail supplemented the on watch team with a Navigation Evaluator and Shipping Officer, providing additional personnel and resources in the duties of Navigation and management of the ship's relative position to other vessels.

JOHN S MCCAIN was scheduled to enter the Singapore Strait Traffic Separation Scheme less than an hour later. Traffic separation schemes are established by local authorities in approaches to ports throughout the world to provide ships assistance in separating their movements when transiting to and from ports. The Commanding Officer had been physically present on the bridge since 0115, a practice common for operations with higher risk, such as navigating in the presence of busy maritime traffic at night. The Executive Officer (XO) reported to the bridge at 0430 to provide additional supervision and oversight to enter port. Although JOHN S MCCAIN entered the Middle Channel of the Singapore Strait (a high traffic density area) at 0520, the Sea and Anchor Detail, a team the Navy uses for transiting narrower channels to enter port, was not scheduled to be stationed until 0600. This Detail provides additional personnel with specialized navigation and ship handling qualifications.

JOHN S MCCAIN was operating by procedures established for U.S. Navy surface ships when operating at sea before sunrise, including being at "darkened ship." "Darkened Ship" means that all exterior lighting was off except for the navigation lights that provide identification to other vessels, and all interior lighting was switched to red instead of white to facilitate crew rest. The ship was in a physical posture known as "Modified ZEBRA," meaning that all doors inside the ship, and all hatches, which are openings located on the floor between decks, at the main deck and below were shut to help secure the boundaries between different areas of the ship in case of flooding or fire. Watertight scuttles on the hatches (smaller circular openings that can be opened or closed independently of the hatch) were left open in order to allow easy transit between spaces.

## 2.2 Events Leading to the Collision

At 0519, the Commanding Officer noticed the Helmsman (the watchstander steering the ship) having difficulty maintaining course while also adjusting the throttles for speed control. In response, he ordered the watch team to divide the duties of steering and throttles, maintaining course control with the Helmsman while shifting speed control to another watchstander known as the Lee Helm station, who sat directly next to the Helmsman at the panel to control these two functions, known as the Ship's Control Console. See Figures 3 and 4. This unplanned shift caused confusion in the watch team, and inadvertently led to steering control transferring to the Lee Helm Station without the knowledge of the watch team. The CO had only ordered speed control shifted. Because he did not know that steering had been transferred to the Lee Helm, the Helmsman perceived a loss of steering.

Figure 4 – Bridge Schematic of JOHN S MCCAIN

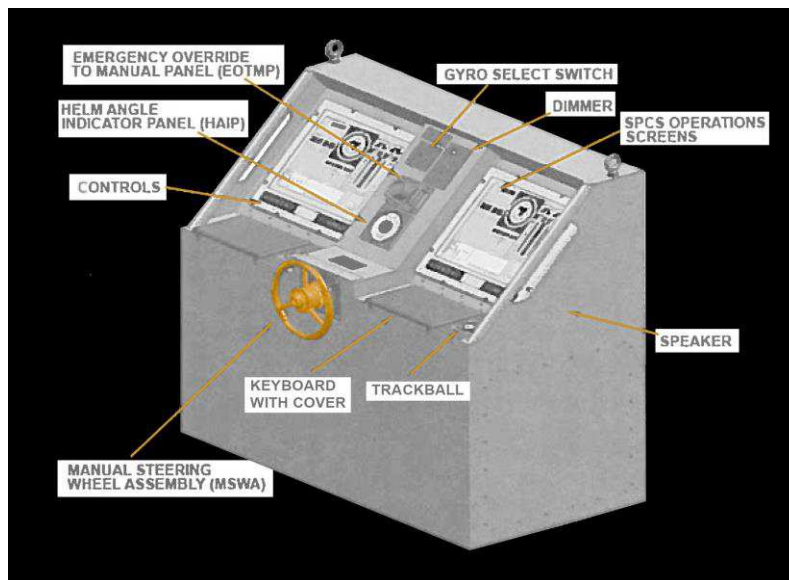
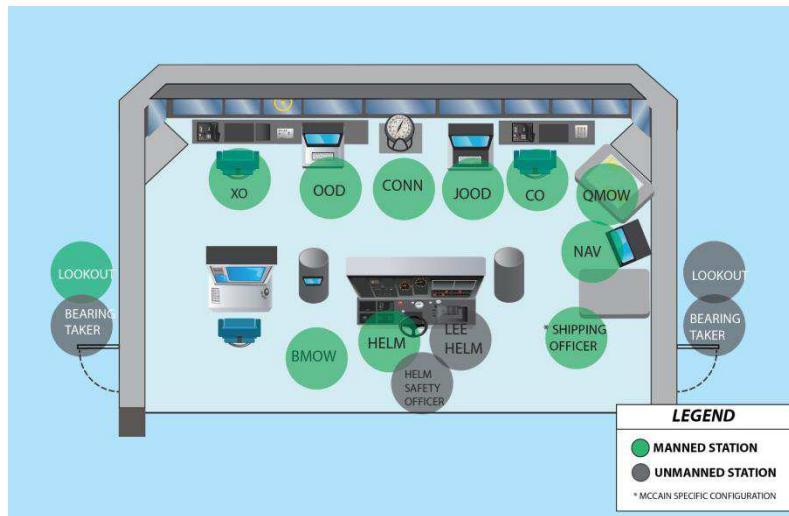
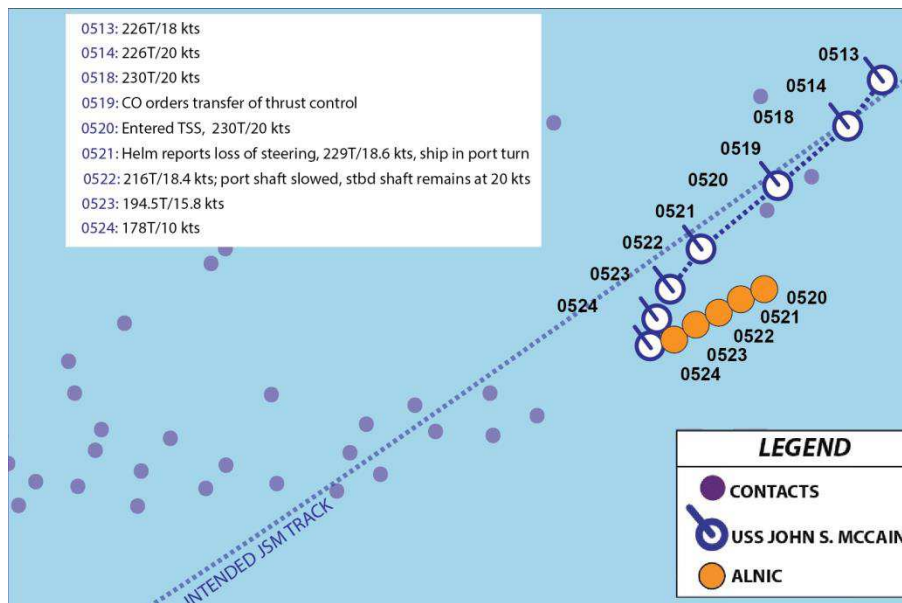


Figure 5 – Illustration of Ship Control Console on JOHN S MCCAIN

Steering was never physically lost. Rather, it had been shifted to a different control station and watchstanders failed to recognize this configuration. Complicating this, the steering control transfer to the Lee Helm caused the rudder to go amidships (centerline). Since the Helmsman had been steering 1-4 degrees of right rudder to maintain course before the transfer, the amidships rudder deviated the ship's course to the left.

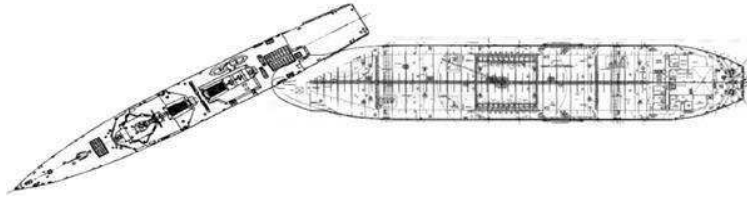
Additionally, when the Helmsman reported loss of steering, the Commanding Officer slowed the ship to 10 knots and eventually to 5 knots, but the Lee Helmsman reduced only the speed of the port shaft as the throttles were not coupled together (ganged). The starboard shaft continued at 20 knots for another 68 seconds before the Lee Helmsman reduced its speed. The combination of the wrong rudder direction, and the two shafts working opposite to one another in this fashion caused an un-commanded turn to the left (port) into the heavily congested traffic area in close proximity to three ships, including the ALNIC. See Figure 5.



**Figure 6 – Illustration Map of Approximate Collision Location**

Although JOHN S MCCAIN was now on a course to collide with ALNIC, the Commanding Officer and others on the ship's bridge lost situational awareness. No one on the bridge clearly understood the forces acting on the ship, nor did they understand the ALNIC's course and speed relative to JOHN S MCCAIN during the confusion.

Approximately three minutes after the reported loss of steering, JOHN S MCCAIN regained positive steering control at another control station, known as Aft Steering, and the Lee Helm gained control of both throttles for speed and corrected the mismatch between the port and starboard shafts. These actions were too late, and at approximately 0524 JOHN S MCCAIN crossed in front of ALNIC's bow and collided. See Figure 6.

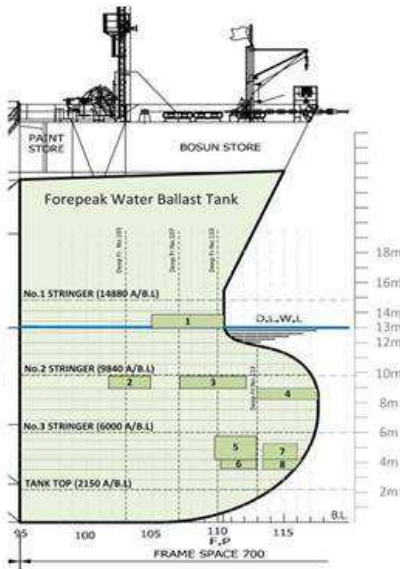


**Figure 7 – Approximate Geometry and Point of Impact between USS JOHN S MCCAIN and ALNIC MC**

Despite their close proximity, neither JOHN S MCCAIN nor ALNIC sounded the five short blasts of whistle required by the International Rules of the Nautical Road for warning one another of danger, and neither attempted to make contact through Bridge to Bridge communications.

**3. IMPACT OF THE COLLISION**

The bulbous bow of ALNIC MC impacted JOHN S MCCAIN on the port (left) aft side. The impact created a 28-foot diameter hole both below and above the waterline of the JOHN S MCCAIN. See Figures 7, 8, and 9.



**Figure 8 – Bulbous bow of ALINIC MC and damage to hull from bow to stern**



**Figure 9 – Point of impact on JOHN S MCCAIN from ALINIC MC**

The point of impact was centered on Berthings 3 and 5 as noted in Figure 9. All significant injuries occurred to Sailors that were in Berthing 3 at the time of the impact. All ten of the fallen Sailors were in Berthing 5 at the time of impact.





**Figure 10 - Depiction of Approximate Location of Point of Impact**

ALNIC MC and JOHN S MCCAIN initially remained attached to each other after the collision. Sailors describe this as lasting up to a couple of minutes. The prolonged contact kept the ship from taking a list (tilt to one side) immediately. Sailors on the bridge and on the external deck of the ship immediately after the collision could see ALNIC MC's bow (front of the ship) still lodged into the side of JOHN S MCCAIN. However, within 15 minutes JOHN S MCCAIN had developed a four degree list to port as the ship flooded.

The collision was felt throughout the ship. Watchstanders on the bridge were jolted from their stations momentarily and watchstanders in aft steering were thrown off their feet. Several suffered minor injuries. Some Sailors thought the ship had run aground, while others were concerned that they had been attacked. Sailors in parts of the ship away from the impact point compared it to an earthquake. Those nearest the impact point described it as like an explosion.

As required by Navy procedures, the Executive Officer ordered the collision alarm sounded to alert personnel to begin damage control efforts. The Commanding Officer remained on the bridge and the Executive Officer departed to the Combat Information Center and eventually to Berthing 3 to provide oversight in damage control efforts. The Command Master Chief, the senior assigned enlisted Sailor onboard, went to the area where damage control efforts, known as the Central Control Station, were managed and then moved about the ship, assisting damage control efforts. After the situation on the bridge stabilized, the Commanding Officer then proceeded to Central Control Station to check on the status of the damage control efforts.

The CO ordered the watch team to announce the collision on the Bridge-to-Bridge radio, which alerted other ships in the area to the collision and the damages. At 0530, JOHN S MCCAIN requested tugboats and pilots from Singapore Harbor to assist in getting the ship to Changi Naval Base.

JOHN S MCCAIN changed its lighting configuration at the mast to one red light over another red light, known as "red over red," the international lighting scheme that indicates a ship that is "not under command." Under the International Rules of the Nautical Road, this warns other ships that, due to an exceptional circumstance, a vessel is unable to maneuver as required.

Most of the electronic systems on the bridge were inoperable until the two ships parted. Main communications systems on the bridge stopped working after the collision and the bridge began



using handheld radios to communicate with aft steering. Sound powered phones, which do not require electrical power to transmit communications, and handheld radios were the main means of communication from the bridge. Aft Internal Communications, a space adjacent to Berthing 5 with communications control equipment, quickly flooded and was likely responsible for the loss of bridge communications.

All U.S. Navy ships are designed to withstand and recover from damage due to fire, flooding, and other damage sustained during combat or other emergencies. Each ship has a Damage Control Assistant, working under the Engineering Officer, in order to establish and maintain an effective damage control organization. The Damage Control Assistant oversees the prevention and control of damage including control of stability, list, and trim due to flooding (maintaining the proper level of the ship from side to side and front and back), coordinates firefighting efforts, and is also responsible for the operation, care and maintenance of the ship's repair facilities. The Damage Control Assistant ensures the ship's repair party personnel are properly trained in damage control procedures including firefighting, flooding and emergency repairs. The Damage Control Assistant is assisted by the Damage Control Chief (DCC), a chief petty officer specializing in Damage Control. The officer in charge of damage control efforts, the Damage Control Assistant, called away General Quarters to notify the crew to commence damage control efforts.

General Quarters is a process whereby the crew reports to pre-assigned stations and duties in the event of large casualties such as flooding. General Quarters is announced by an alarm that sounds throughout the ship to alert the crew of an emergency situation or potential combat operations. All crewmembers are trained to report to their General Quarters watch station and to set a higher condition of material readiness against fire, flooding, or other damage. This involves securing additional doors, hatches, scuttles, valves and equipment to isolate damage and prepare for combat. Navy crews train on Damage Control continuously, with drills being run in port and underway frequently to prepare the teams for damage to equipment and spaces. During any emergency condition (fire, flooding, combat operations), the Damage Control Assistant coordinates and supervises all damage control efforts from one of the three Damage Control Repair Lockers.

Damage Control Repair Lockers are specialized spaces stationed throughout the ship filled with repair equipment and manned during emergencies with teams of about 20 personnel trained to respond to casualties. There are three repair lockers on the JOHN S. MCCAIN: Repair Locker 2, Repair Locker 5, and Repair Locker 3. Repair Locker 2 covers the forward part of the ship, Repair Locker 5 covers the engineering spaces and Repair Locker 3 covers the aft part of the ship. Each locker is maintained with similar equipment. Personnel assigned to repair lockers are trained and qualified to respond to and repair damage from a variety of sources with a specific focus on fire and flooding. Each repair locker can act independently but is also designed to support the others and can take over the responsibilities for any locker if damage prevents that locker's use. The repair lockers are normally unmanned unless the ship sets a condition of higher readiness like General Quarters when they would be manned within minutes.

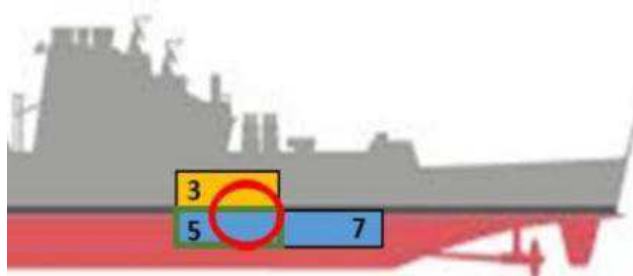
Sailors began to locate, report and track flooding, fire, and structural damage to the ship immediately. Significant damage was reported throughout the ship in the moments after the

collision, including flooding, internal fuel leakage, loss of ventilation and internal communications, and degradation of many of the ship's other systems.

JOHN S MCCAIN began the process of accounting for all crew members immediately after the collision. This process continued even as the crew made emergency repairs, battled flooding, and helped each other out of damaged spaces. The damage control efforts made confirming the location of personnel difficult. Varying reports of missing Sailors were made in the first minutes after the collision. However, by the submission of the third complete report, there was reasonable confidence that the crew had been accounted for was correct because all of the ten missing Sailors had been consistently reported missing and all lived in Berthing 5, a space that was inaccessible and flooded.

### 3.1 Impact to Berthing 5

Berthing 5 is located aft (near the back of the ship) on the port side. See Figure 10. It is approximately 25 feet by 15 feet and has 18 racks, stacked as bunk beds three-high. Each row of racks has a locker for Sailors' belongings. There is a lounge with seats, a small table, and a wall-mounted television. There is a head with one toilet, one shower stall, and one sink.



**Figure 11 - Relative Positions of Berthings 3, 5 (in green), and 7, and point of impact**

There are two means to exit Berthing 5: the primary egress (ladderwell) through a hatch with a scuttle (Figure 11) and an escape scuttle into Berthing 3 on the deck above (Figure 12).



**Figure 12 – Primary egress from Berthing 5**  
**Left: from within Berthing 5**  
**Right: Above on the deck outside Berthing 5**



**Figure 13 – Escape Scuttle from Berthing 5**  
**Left: From within Berthing 5**  
**Right: Above in Berthing 3**

During Modified ZEBRA, the hatch is closed, but the scuttle is open for ease of access. The escape scuttle is normally closed at all times, as it was at the time of the impact. The collision knocked debris in Berthing 3 on top of the escape scuttle connecting Berthing 3 to Berthing 5 below it. This would have made any attempts to open and exit through the escape scuttle very difficult.

Most of the Berthing 5, a space that is normally 15 feet wide, was compressed by the impact to only 5 feet wide. There were 17 Sailors assigned to Berthing 5. At the time of the collision, all were aboard the ship and five were on watch or outside the space. Based on the size of the hole, and the fact that Berthing 5 is below the waterline, the space likely fully flooded in less than a minute after the collision.

Two Sailors who were in Berthing 5 at the time of the collision escaped from the space. The first Sailor was on the second step of the ladder-well leading to the deck above when the collision occurred. The impact of the collision knocked him to the ground, leaving his back and legs bruised. Fuel quickly pooled around him and he scrambled up and back onto the ladder. The Sailor climbed out of Berthing 5 through the open scuttle, covered in fuel and water from the near instantaneous flooding of the space. He did not see anyone ahead of or behind him as he escaped. He reported seeing two other Sailors in the lounge area, one preparing for watch duties and another standing near his rack. Both of these Sailors were lost, along with the eight shipmates who were in their racks to rest at the time of the collision.

The second Sailor who escaped from Berthing 5 heard the crashing and pushing of metal before the sound of water rushing in. Within seconds, water was at chest level. The passageway leading to the ladder-well was blocked by debris, wires and other wreckage hanging from the overhead. From the light of the battle lanterns (the emergency lighting that turns on when there is a loss of normal lights due to power outage) he could see that he would have to climb over the debris to get to the ladder-well.

As he started his climb across the debris to the open scuttle, the water was already within a foot of the overhead, so he took a breath, dove into the water, and swam towards the ladder-well. Underwater, he bumped into debris and had to feel his way along. He was able to stop twice for air as he swam, the water higher each time, and eventually used the pipes to guide him towards the light coming from the scuttle. The Sailor found that the blindfolded egress training, a standard that requires training to prepare Sailors for an emergency and was conducted when he reported to the command, was essential to his ability to escape.

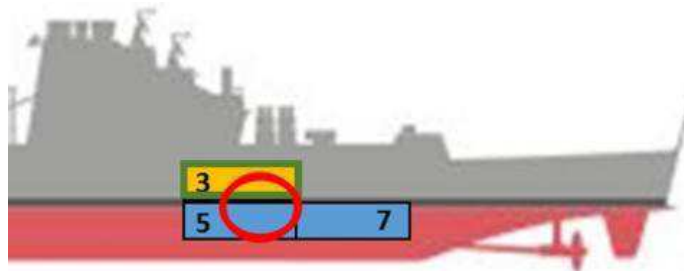
One Sailor was alerted by the first Sailor who escaped Berthing 5 that others were still inside the space, and he went to assist them. When he first reached the closed hatch and open scuttle, the water in Berthing 5 was at the top of the third rung. He tried to enter the space, but was forced back up the ladder by the pressure of the escaping air and rising water, which within seconds had risen to within a foot of the hatch. He saw a Sailor swimming toward the exit and pulled him out of the water through the scuttle between the two decks. This was the second and last Sailor to escape from Berthing 5. His body was scraped, bruised, and covered with chemical burns from being submerged in the mixture of water and fuel.

An additional Sailor who came to assist observed the rescue and, looking down into the berthing, saw “a green swirl of rising seawater and foaming fuel” approaching the top of the scuttle. As the final Sailor to leave Berthing 5 was pulled to safety, the Sailors at the top of the scuttle checked to see if there was anyone behind him. They did not see anybody. By then, so much water was already coming up through the scuttle that it was difficult to close and secure. The fuel mixed in with the water made one of Sailor’s hands so slippery that he cut himself while using the wrench designed to secure the scuttle, but the two were able to secure it to stop the rapid flooding of the ship.

### 3.2 Impact on Berthing 3

Berthing 3 is immediately above Berthing 5, but spans the width of the ship. There are two points of egress from each side of Berthing 3; on the port side there is a ladder-well leading down into the center of the berthing and an escape scuttle that is located in the forward section of the space leading up to the next deck. There were 71 Sailors assigned to Berthing 3.

At 0530, the DCA began receiving reports of a ruptured fire main and water and fuel flooding into Berthing 3. The port side of Berthing 3 suffered substantial damage, including a large hole in the bulkhead. See Figure 13. Racks and lockers detached from the walls and were thrown about, leaving jagged metal throughout the space. Cables and debris hung from the ceiling.



**Figure 14 - Relative Positions of Berthings 3, 5, and 7 and point of impact**

A Sailor from Berthing 3, who was later medically evacuated from the ship, sustained his injuries as the wall next to him blew apart in the collision and threw him to the ground. Water and fuel quickly pooled around him in the short time he was on the ground, and he began crawling over debris to escape. Another Sailor went to him and helped pull him to the lounge area and toward the ladder. On the way, the Sailor who was being assisted fell on the slippery floor and hit his head. Two other Sailors, also injured, helped him reach the flight deck.

Limited lighting guided the remaining Sailors as they left the berthing space. Sailors had to climb over lockers and other debris to escape, using the high vantage point to also minimize the risk of electrocution from traveling through the rising water. Some escaped in only their underwear, and many were bruised and bloodied from injuries sustained in the collision and covered in fuel. At least one Sailor attempted to move the metal rack pinning a trapped shipmate, and realized that he could not move it alone. The Sailors who escaped Berthing 3 provided some of the first reports to CCS that the space was severely damaged, that it was rapidly taking on water, and that Sailors were trapped inside.

Hearing reports that Sailors were trapped in Berthing 3, the Executive Offer and a group of Sailors, including some who evacuated Berthing 7, went to check on their shipmates. Several Sailors were pinned in their racks as a result of the collision, but, as the two ships pulled apart, the twisted metal shifted and most of the Sailors in Berthing 3 were able to escape as the debris moved. One of these Sailors was pinned in his rack underneath two racks that had collapsed and a number of lockers that became dislodged during the collision. He was able to escape after ALNIC MC detached. See Figures 14 and 15.



**Figure 15 – Berthing 3 facing port**



**Figure 16 – Berthing 3 facing port after collision**

However, two Sailors remained pinned in their racks even after the ships separated. Four members of the crew entered Berthing 3 through the jagged metal and rising water to rescue them. The first of these rescuers heard Sailors shouting for help from inside Berthing 3 and tried to enter on the port side; however, the door was blocked by debris, so he ran to the entrance on the starboard (right) side of the berthing.

One of the Sailors trapped in Berthing 3 had been asleep at the time of the collision and was awoken by it. When he opened his eyes, he understood that he was pinned in his rack, with one of his shoulders stuck between his rack and the rack above. He felt both air and water moving around him. He could hear shouting and began shouting himself, which alerted his others that he was trapped. Only his hand and foot were visible by those outside of the rack. The one battle lantern in the area provided the only light for rescuers to find the trapped Sailor. Water was already at knee level when rescuers reached him. The debris was too heavy for the rescuers to move, and a Portable Electric All-Purpose Rescue System, a “jaw of life” cutting device, was required to cut through the metal, separate the panels of the rack, and pull the panels out of the way. After approximately 30 minutes, these efforts allowed the trapped Sailor to pull his arm free. Moments later, the rescuers pulled him from between the racks by his foot. Stretcher bearers came to Berthing 3 and carried this Sailor to the Mess Decks to receive medical treatment.

The second Sailor was in a bottom rack in Berthing 3. His rack was lifted off the floor as a result of the collision, which likely prevented him from drowning in the rising water, and he was trapped at an angle between racks that had been pressed together. Light was visible through a hole in his rack and he could hear the water and smell the fuel beginning to fill Berthing 3. He attempted to push his way out of the rack, but every time he moved the space between the racks grew smaller and he was unable to escape. His foot was outside the rack and he could feel water. It was hot in the space and difficult to breathe, but he managed to shout for help and banged against the metal rack to get the attention of other Sailors in the berthing space. The Sailors who entered Berthing 3 to rescue others heard this and began assisting him, but he was pinned by more debris than the first Sailor freed.

It took approximately an hour from the time of the collision to free the second Sailor from his rack. Rescuers used an axe to cut through the debris, a crow bar to pull the lockers apart piece by piece, and rigged a pulley to move a heavy locker in order to reach the Sailor. Throughout the long process, his rescuers assured him by touching his foot, which was still visible. Once freed, the Sailor was the last person to escape Berthing 3. Everything aft of his rack was a mass of twisted metal. He had scrapes and bruises all over his body, suffered a broken arm, and had hit his head. He was unsure whether he remained conscious throughout the rescue.

At least one scuttle to Berthing 3 was shut during damage control efforts. The space was electrically isolated and, at 0608, the fire main valves were closed, reducing the amount of flooding. Dewatering efforts began and succeeded in removing the water from Berthing 3 prior to JOHN S MCCAIN's arrival at Changi Naval Base.

### **3.3 Impact on Berthings 4, 6, and 7**

Berthings 5 and 7 are next to each other on the port side of the ship, mirrored by Berthings 4 and 6, respectively, on the starboard side of the ship. Berthings 4 and 5 are connected across the ship through "cross flooding ducts," designed to distribute water from port to starboard side (or vice versa) to keep the ship level if it takes on water. Berthings 6 and 7 are similarly connected. A six foot long crack in the wall between Berthings 5 and 7, created by the collision, allowed water to move between the spaces.

All Sailors in Berthing 7 were able to evacuate, but water was at approximately knee level as they exited the space. At 0530 there was report of a ruptured pipe in Berthing 7, which added to the flooding caused by the cracked wall separating Berthings 5 and 7. By 0605, Berthing 7 was reported as lost, meaning that it was fully flooded and secured to prevent the flooding from spreading to the rest of the ship.

All Sailors in Berthing 4 were able to evacuate. At 0544, Sailors reported 4 inches of water on the deck in Berthing 4. Sailors in Berthing 4 were thrown about their racks by the force of the collision. By 0627, the berthing space was lost. See Figures 16 and 17.





**Figure 17—Scuttle and hatch into Berthing 4 showing the space completely flooded**



**Figure 18—Berthing 4 racks after dewatering**

All Sailors in Berthing 6 were able to evacuate. At 0546 flooding was reported in Berthing 6, which is across from Berthing 7 on the starboard side of the ship. Despite the crew's dewatering efforts, the space was declared lost at 0627.

At approximately 0630, as a result of crew's resiliency and successful damage control and engineering repair efforts, JOHN S MCCAIN was able to proceed under its own power toward Changi Naval Base, Singapore, at an average speed of 3 knots. JOHN S MCCAIN's navigation equipment was degraded as a result of the collision. While most electronic navigational aids on the bridge were operational, multiple warnings and alerts were illuminated, reducing the navigation team's confidence that the information was reliable. Because of the degraded information, the team relied on "seaman's eye" to stay on track while returning to port. Lack of ventilation across the ship raised concerns based on the amount of fuel that had spilled and the risks posed by rising temperatures inside the ship. The temperatures also drove many Sailors to the flight deck in order to escape the heat.

#### **4. MEDICAL EFFORTS AND INJURIES**

JOHN S MCCAIN medical teams established a triage center in Messing. This space, where the crew eats their meals, provided the largest open space on the ship and medical procedures can be performed on the cafeteria-style tables. The medical team treated lacerations and chemical burns from fuel exposure, splinted broken bones, and provided broad spectrum antibiotics to Sailors with open wounds. Triage care moved back to the Medical office at approximately 0630, as the initial rush of patients had been treated so the medical team would have full access to their equipment and supplies.

At approximately 0915, as the ship was transiting to Changi Naval Base, four seriously injured Sailors were medically evacuated to Singapore General Hospital by helicopter. Once pier-side at Changi Naval Base, another Sailor was transported to the hospital because of shock



symptoms and an injury to his shoulder. This Sailor was one of the Sailors who had been trapped in Berthing 3. Three of the five medically evacuated Sailors were transported from Singapore to Yokosuka, Japan on 27 August 2017. The remaining two were transported back to Yokosuka, Japan on 28 August 2017.

As JOHN S MCCAIN approached Changi Naval Base, AMERICA approached alongside and two members of AMERICA's medical team came aboard to provide additional support, including intravenous fluids to treat heat stroke. Once the ships were pier side, AMERICA hosted the JOHN S MCCAIN medical team, together treating Sailors with cuts and chemical burns from fuel exposure. Until alternative arrangements could be made, AMERICA also provided meals for all JOHN S MCCAIN Sailors and berthing for over 150 Sailors whose berthings were flooded. The Sailors and Marines aboard AMERICA also provided initial support for the JOHN S MCCAIN crew, including daily supplies, watchstanders, counseling, and communications network support.

In total, 48 Sailors suffered injuries that required medical treatment. Five Sailors who were treated at Singapore General Hospital suffered severe injuries and were unable to return to their duties for more than 24 hours. Of the 48 injured Sailors, 43 continued to assist with damage control and recovery efforts immediately following the collision.

## **5. SEARCH AND RESCUE EFFORTS - 21 TO 24 AUGUST 2017**

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Though the ship did not have a complete muster confirming ten Sailors were missing until 0715, JOHN S MCCAIN reported that Sailors were believed missing within moments of the collision. Coordination began immediately for search and rescue (SAR) efforts in the water space surrounding the collision site.

At approximately 0715 on 21 August 2017, SAR Operations commenced with Commander, Amphibious Squadron 3 (CPR 3) as SAR On-Scene Commander. At approximately 0700, AMERICA was en route and preparing to launch MV-22B Ospreys and MH- 60S Sea Hawks to support SAR efforts once in range. Republic of Singapore Navy (RSN) and Republic of Singapore Coast Guard (RSNCG) SAR units were on station by 0800. Eventually there would be six Singaporean and six Malaysian vessels searching near the collision site.

At approximately 0900, the Republic of Singapore (RSN) deployed three ships with damage control equipment to assist and transfer equipment to JOHN S MCCAIN on a rigid-hulled inflatable boat (RHIB).

At approximately 1000 and 1030, two helicopters from AMERICA landed on the deck of JOHN S MCCAIN with damage control equipment and in support of the SAR efforts. By approximately 1400, U.S. Navy aircraft were conducting SAR efforts within 25nm of the collision point. A RSN helicopter, two RSN patrol boats, and a RSNCG vessel were on scene to assist.

The Malaysian Navy and RSN both searched 10nm on either side of the path that JOHN S MCCAIN had traveled, attempting to locate any Sailors that may have fallen through the hole in the ship's hull made by the collision. Throughout the evening of 21 August 2017, and

continuously until 2000 on 24 August 2017, aircraft and surface vessels from the U.S. Navy, RSN, RSNCG, Singapore Air Force, Singapore Maritime Port Authority, Royal Malaysian Navy, Malaysian Maritime Enforcement Agency, Indonesian Navy and Royal Australian Air Force conducted multinational SAR operations. These efforts were coordinated from AMERICA, lasting for more than 80 hours and spanning more than 2,100-square miles.

On 22 August 2017, a body was found in the water by Malaysian units assisting the SAR efforts. The body was determined not to be one of the Sailors missing from JOHN S MCCAIN. SEVENTH Fleet suspended all SAR efforts outside the hull of JOHN S MCCAIN at sunset on 24 August 2017. Recovery efforts inside the hull of the ship continued.

## **6. DIVING AND RECOVERY OPERATIONS**

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A team of Navy Divers arrived on JOHN S MCCAIN as the ship entered the harbor in Singapore at approximately 1200 on 21 August 2017. They began inspecting the ship to determine how best to proceed with a dive inside the ship. The leader of the dive team inspected Berthing 3 and saw waves breaking into the ship. The divers discovered the hole in the port side of JOHN S MCCAIN that was approximately 28 feet wide. See Figure 18.



**Figure 19 – Port side of JOHN S MCCAIN post-collision**

By approximately 1435, JOHN S MCCAIN was moored and divers were in the water looking for places to enter the hull of the ship. The hole in the port side penetrated not only the hull, but an internal fuel tank as well. The fuel in the water created a number of hazards to divers and required them to proceed cautiously.

On a second dive at approximately 1500, divers were able to enter the hull of the ship to do initial safety assessments. Many of the conditions they found led to a cautious approach to assure the safety of the divers. The large amount of debris and structural damage required the divers to move slowly about the ship, even cutting holes through racks to access parts of the space. Visibility in Berthing 5 was very poor given the debris and lack of light. The divers had to move about the space almost exclusively by feel. The dive team conducted nearly continuous

dive operations over a period of seven days until all ten of the Sailors in Berthing 5 were recovered.

## **7. FINDINGS**

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Collisions at sea are rare and the relative performance and fault of the vessels involved is an open admiralty law issue. The Navy is not concerned about the mistakes made by ALNIC. Instead, the Navy is focused on the performance of its ships and what we could have done differently to avoid these mishaps.

In the Navy, the responsibility of the Commanding Officer for his or her ship is absolute. Many of the decisions made that led to this incident were the result of poor judgment and decision making of the Commanding Officer. That said, no single person bears full responsibility for this incident. The crew was unprepared for the situation in which they found themselves through a lack of preparation, ineffective command and control and deficiencies in training and preparations for navigation.

### **7.1 Training**

From the time when the CO ordered the Helm and Lee Helm split, to moments just before the collision, four different Sailors were involved in manipulating the controls at the SCC.

Because steering control was in backup manual at the helm station, the offer of control existed at all the other control stations (Lee Helm, Helm forward station, Bridge Command and Control station and Aft Steering Unit). System design is such that any of these stations could have taken control of steering via drop down menu selection and the Lee Helm's acceptance of the request. If this had occurred, steering control would have been transferred.

When taking control of steering, the Aft Steering Helmsman failed to first verify the rudder position on the After Steering Control Console prior to taking control. This error led to an exacerbated turn to port just prior to the collision, as the indicated rudder position was 33 degrees left, vice amidships. As a result, the rudder had a left 33 degrees order at the console at this time, exacerbating the turn to port.

Several Sailors on watch during the collision with control over steering were temporarily assigned from USS ANTIETAM (CG 54) with significant differences between the steering control systems of both ships and inadequate training to compensate for these differences.

Multiple bridge watchstanders lacked a basic level of knowledge on the steering control system, in particular the transfer of steering and thrust control between stations. Contributing, personnel assigned to ensure these watchstanders were trained had an insufficient level of knowledge to effectively maintain appropriate rigor in the qualification program. The senior most officer responsible for these training standards lacked a general understanding of the procedure for transferring steering control between consoles.

## 7.2 Seamanship and Navigation

Much of the track leading up to the Singapore Traffic Separation Scheme was significantly congested and dictated a higher state of readiness. Had this occurred, maximum plant reliability could have been set with a Master Helmsman and a qualified Engineering Lee Helm on watch.

If the CO had set Sea and Anchor Detail adequately in advance of entering the Singapore Strait Traffic Separation Scheme, then it is unlikely that a collision would have occurred. The plan for setting the Sea and Anchor Detail was a failure in risk management, as it required watch turnover of all key watch stations within a significantly congested TSS and only 30 minutes prior to the Pilot pickup.

If JOHN S MCCAIN had sounded at five short blasts or made Bridge-to-Bridge VHF hails or notifications in a timely manner, then it is possible that a collision might not have occurred.

If ALNIC had sounded at least five short blasts or made Bridge-to-Bridge VHF hails or notifications, then it is possible that a collision might not have occurred.

## 7.3 Leadership and Culture

The Commanding Officer decided not to station the Sea and Anchor detail when appropriate, despite recommendations from the Navigator, Operations Officer and Executive Officer.

Principal watchstanders including the Officer of the Deck, in charge of the safety of the ship, and the Conning Officer on watch at the time of the collision did not attend the Navigation Brief the afternoon prior. This brief is designed to provide maximum awareness of the risks involved in the evolution.

Leadership failed to provide the appropriate amount of supervision in constructing watch assignments for the evolution by failing to assign sufficient experienced officers to duties.

The Commanding Officer ordered an unplanned shift of thrust control from the Helm Station to the Lee Helm station, an abnormal operating condition, without clear notification.

No bridge watchstander in any supervisory position ordered steering control shifted from the Helm to the Lee Helm station as would have been appropriate to accomplish the Commanding Officer's order. As a result, no supervisors were aware that the transfer had occurred.

Senior officers failed to provide input and back up to the Commanding Officer when he ordered ship control transferred between two different stations in proximity to heavy maritime traffic.

Senior officers and bridge watchstanders did not question the Helm's report of a loss of steering nor pursue the issue for resolution.

This assessment of USS John S. McCain is not intended to imply that ALNIC mistakes and deficiencies were not also factors in the collision.

**ANNEX A - TIMELINE OF EVENTS**

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20 August 2017

- 1300 Navigation Brief to prepare the crew for the Singapore Strait transit and entering Sembawang, Singapore.
- Approx. 1326 Rudder swing checks were completed verifying satisfactory operation of the rudder.
- 1730 The Commanding Officer retired to his cabin to rest before reporting to the bridge at 0115 the next morning.
- 1904 JOHN S MCCAIN energized Navigation Lights.
- 2115 Modified Condition Zebra was verified. As explained in the report, this condition maximizes the ability of the ship to gain a watertight status in the event of collision.

21 August 2017

- 0000 JOHN S MCCAIN is en route Singapore.
- 0001 Log entries reported that one surface search radar was non-operable.
- Approx. 0100-0101 Navigation watchstanders began to verify the ship's position at more frequent intervals (15 minutes).
- 0115 The Commanding Officer arrived on the Bridge.
- Between approximately 0127 & 0204 Key supervisory watch stations changed personnel.
- 0216 Watchstanders shifted propulsion operations to what is termed split plant, a condition in which different gas turbines drive each of the two shafts separately.
- 0300 Currents were running at a speed of 2.7 knots requiring steering adjustment.
- 0315 Watchstanders report visual sighting of land.
- 0418 Additional watchstanders reported for duties as the Modified Navigation Detail.
- 0426 Navigation watchstanders began determining the ship's position at more frequent intervals (5 minutes).
- 0427 JOHN S MCCAIN turned to avoid surface contacts in the area.

- 0430 The Executive Offer arrived on the bridge.
- 0436 The Commanding Officer ordered steering modes shifted from automatic control to backup manual control.
- Approx. 0436 Personnel responsible for tracking contacts on radar secured the auto-tracking feature on the SPS-67 radar and began manually tracking surface contacts.
- Starting at 0437 The bridge ordered various rudder orders to avoid shipping. None of these maneuvers were logged.
- 0444 JOHN S MCCAIN turned to port and steadied on course 227T. On this course, the ship was aligned to enter the westbound Singapore Strait Traffic Separation Scheme.
- Approx. 0454 Radar contact was gained on the ALNIC nearly ahead of JOHN S MCCAIN on the port side, within 8 nautical miles. ALNIC was in the center of a group of three other contacts traveling in the same general direction as JOHN S MCCAIN. Watchstanders did not discuss maneuvering intentions with respect to these contacts.
- Approx. 0457 JOHN S MCCAIN increased speed to 17 knots.
- 0459 JOHN S MCCAIN reduced speed to 16 knots.
- 0500 Reveille was announced to wake the crew for entering port. The Navigator informed the OOD that previous course changes to the North to avoid surface traffic had put JOHN S MCCAIN behind on its intended track and timeline and recommended an increase in speed to make 18 knots.
- 0500 – 0524 JOHN S MCCAIN overtook several vessels just north of the eastern entrance to the Singapore Strait Traffic Separation Scheme. The closest point of approach during these passages was as close as 600 yards.
- 0509 JOHN S MCCAIN altered course to 226T.
- 0513 JOHN S MCCAIN increased speed to 18 knots and was steady on course 226T.
- 0514 JOHN S MCCAIN increased speed to 20 knots and was steady on course 226T.
- 0518 JOHN S MCCAIN turned starboard to course 230T, speed 20 knots. The Helmsman was compensating for the effects of currents with between 1 - 4 degrees of right rudder to stay on course 230T.
- Approx. 0519 The Commanding Officer noticed the Helmsman was struggling to maintain course while simultaneously adjusting throttles. The CO ordered steering



control separated from propulsion control, with duties divided between the Helm and Lee Helm watch stations. Splitting of the Helm and Lee Helm was not previously discussed at the Navigation Brief or at any time prior to the CO ordering it.

- Approx. 0520 Supervisory watch stations reported that the Automated Identification System (AIS) representation of contacts was cluttered and “useless.” Commercial traffic routinely reports positions via this system, enabling other vessels to use Global Positioning System (GPS) satellite information to accurately determine their positions.
- 05:20:03 JOHN S MCCAIN was overtaking motor vessel GUANG ZHOU WAN. JOHN S MCCAIN was making 18.6 knots over ground. JOHN S MCCAIN closed range from behind ALNIC on ALNIC’s starboard side.
- 0520:39 The Lee Helm station took control of steering in computer assisted mode. The shift in steering locations caused the rudder to move amidships.
- 0520:47 Lee Helm took control of the port shaft. Port and starboard shafts were both at 087 RPM/100.1% pitch.
- Just before 0521 The Helm reported to his immediate supervisor that he had lost steering control. The supervisor informed the Helm to inform the officer in charge of ship safety and navigation, the Officer of the Deck.
- 0521 The Helm reported loss of steering to the Officer of the Deck. The rudders were amidships. JSM was on course 228.7T, engines were all ahead full for 20 knots. JSM was making 18.6 knots over ground and turning to port at 0.26 degrees per second. ALNIC was on course 230T, speed 9.6 knots, and was bearing 164T at a range of approximately 582 yards from JSM.
- 0521 The Conning Officer, the person responsible for issuing steering orders, ordered the Helm to shift steering control to the offline steering units, 1A and 2A.
- 0521 A loss of steering casualty on the ship’s general announcing circuit was announced and After Steering was ordered manned. After Steering is an auxiliary station that has the ability to take control of steering in the event of a problem or casualty to the ship’s primary control stations.
- 0521:13 Steering units on the port rudder were shifted as ordered.
- 0521:15 Steering units on the starboard rudder were shifted as ordered.
- 0521:55 The first watchstander reported to After Steering. JOHN S MCCAIN did not have a complete delineated list of personnel to man After Steering in the event of a casualty or problem.

0522 JOHN S MCCAIN was on course 216.3T, speed 18.4 knots and was turning to port at a rate of approximately 0.2 degrees per second. Bridge watchstanders followed the Commanding Officer's order to change the lighting configuration to indicate a vessel not under command by the International Rules of the Nautical Road.

Approx. 0522:04 The Lee Helm took control of the starboard shaft. The port and starboard shafts remained at a speed of 087 RPM and 100.1% pitch. The Lee Helm did not match the port and starboard throttles that control the speed of the shafts. JOHN S MCCAIN was on course 216.1T and turning to port at a rate of approximately 0.25 degrees per second. Rudders were amidships.

Approx. 0522:05 The Commanding Officer ordered the ship slowed with a reduction in speed to 10 knots.

0522:07 The command to the port shaft lowered speed to 44 RPM and 100.1% pitch. The starboard shaft remained at a speed of 87 RPM and 100.1%. Rudders were amidships. No bridge watchstanders were aware of the mismatch in thrust and the effect on causing the ship's turn to port.

0522:40 JOHN S MCCAIN was on course 204.4T, speed 16.6 knots and was turning to the left at a rate of approximately 0.41 degrees per second.

0522:45 The Executive Officer noticed the ship was not slowing down as quickly as expected and alerted the Commanding Officer. In response, the Commanding Officer ordered 5 knots. This order was echoed by the Conning Officer. The CO did not announce that he had taken direct control of maneuvering orders as required by Navy procedures.

0523:00 The Conning Officer ordered right standard rudder. JOHN S MCCAIN was on course 194.5T at a speed of 15.8knots. ALNIC was on course 229.8T, 9.6 knots, and was bearing 097T from JOHN S MCCAIN at a range of approximately 368 yards.

0523:01 After Steering took control of steering in backup manual mode.

0523:06 The port shaft continued to slow. The starboard shaft was ahead at a speed of 87 RPM and 100.1% pitch. The port shaft order at this time was 32 RPM at 81.1% pitch. JSM was on course 192T, speed 15.6 knots and turning to the left at a rate of approximately 0.5 degrees per second.

0523:16 The Helm took control of steering at the helm station in Backup Manual mode.

0523:24 Throttles were finally matched at the Lee Helm station and both shafts were ahead to reach 5 knots. JOHN S MCCAIN was on course 182.8T, speed 13.8 knots, and turning to port at a rate of approximately 0.54 degrees per second.

- 0523:27 Aft Steering Helmsman took control of steering. This was the fifth transfer of steering and the second time the Aft Steering unit had gained control in the previous two minutes.
- 0523:44 JOHN S MCCAIN was on course 177T, speed 11.8 knots, and was slowly turning to the left port at a rate of approximately .04 degrees per second. The ordered and applied right 15 degree rudder checked JOHN S MCCAIN's swing to port and the ship was nearly on a steady course.
- 0523:58 ALNIC's bulbous bow struck JSM between frame 308 and 345 and below the waterline.
- 0524:12 After Steering still had control of steering at the ASU in CAM but the rudders moved amidships.
- 0524:24 JSM engines answered "all stop" and the shafts came to idle speed. The ship was on course 138.6T, speed 5.7 knots, and the ship was turning to port at a rate of approximately 1.4 degrees per second.
- 0526 JSM set General Quarters and the Damage Control Assistant assumed responsibility for all DC efforts from CCS.

**ANNEX B – PHOTOGRAPHS**

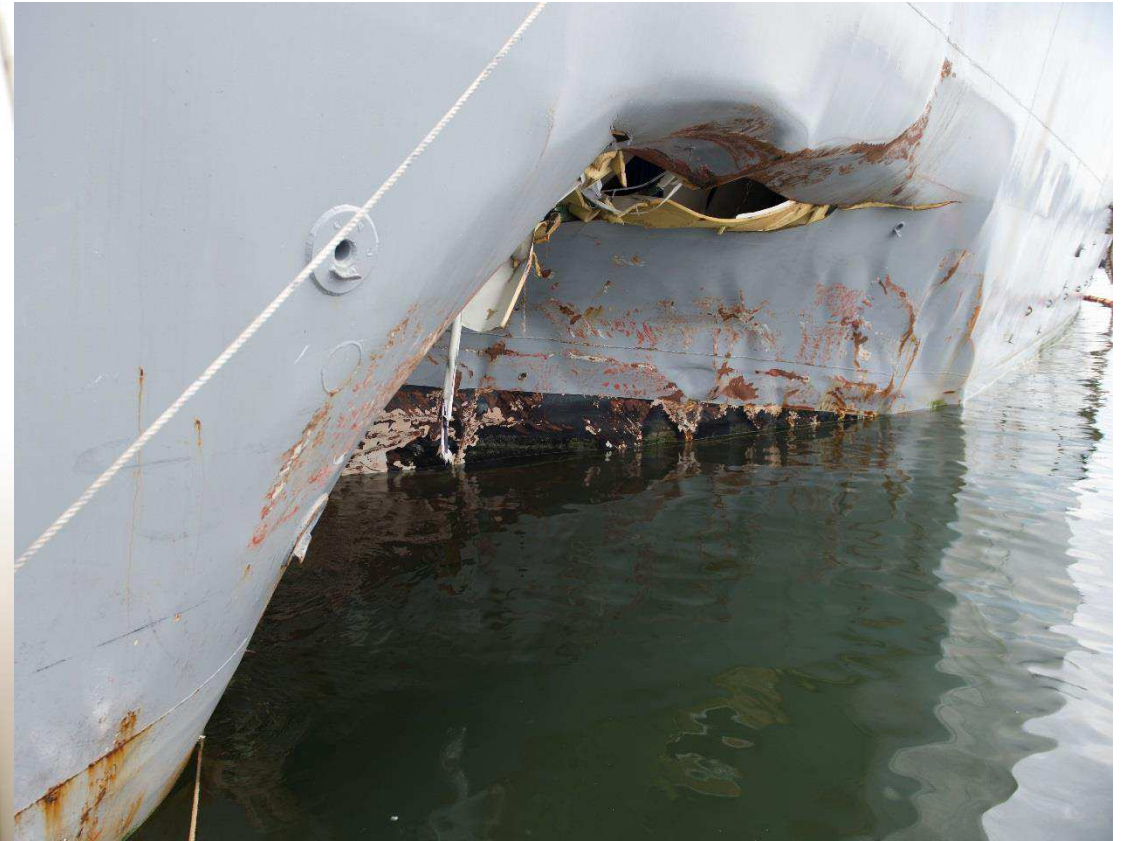
**B1: Port side view of JOHN S MCCAIN post-collision**



**B2: Internal and external views of the damage caused by the collision**



Internal view through Berthing 3 to point of impact; ocean visible



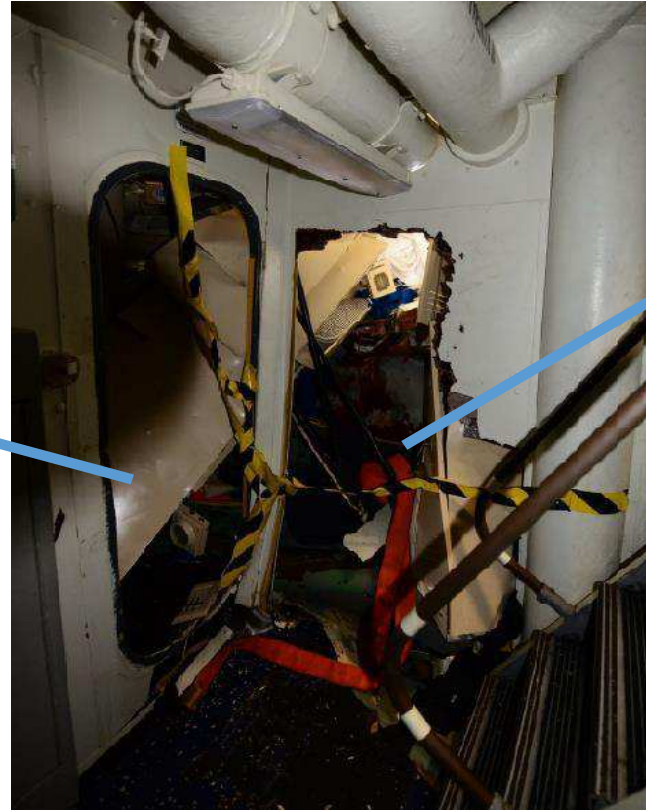
External view of point of impact; rupture in hull of the ship visible



**B3: Berthing 3 Primary egress (ladderwell) of JOHN S MCCAIN post-collision, with views into Berthing 3**

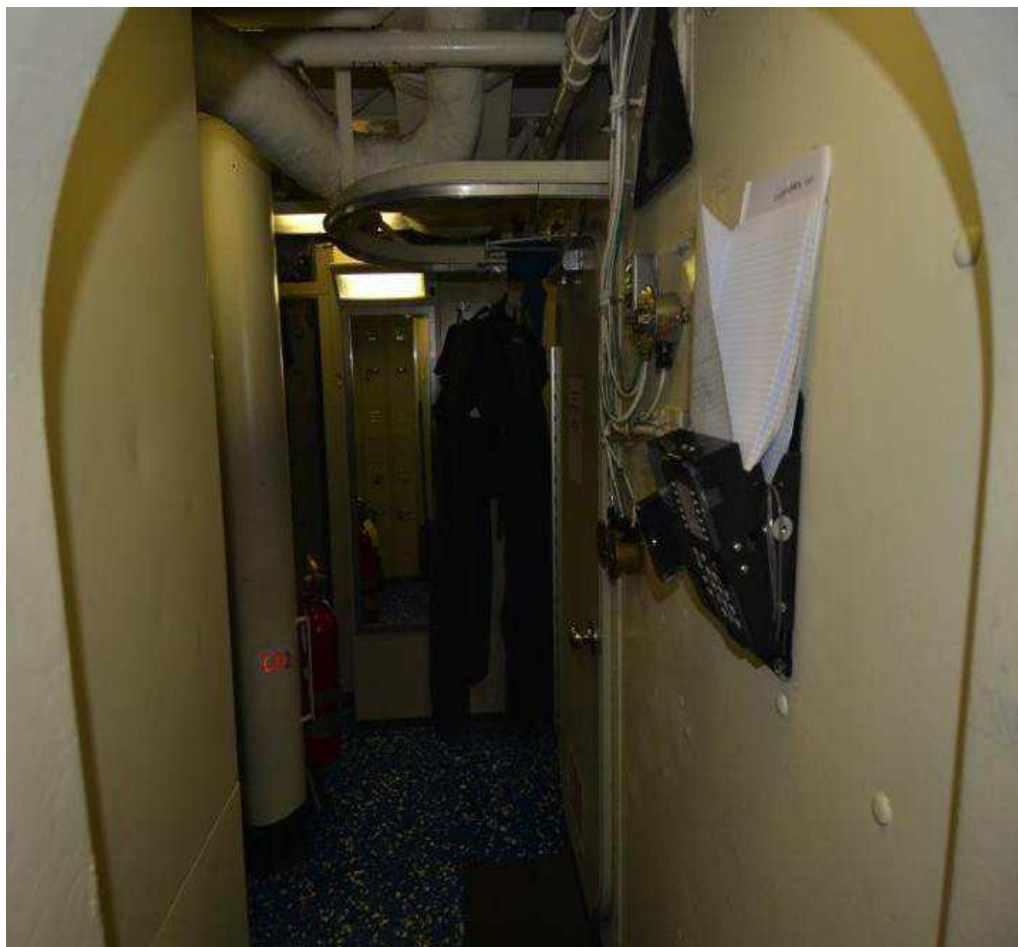


View through hatch into Berthing 3

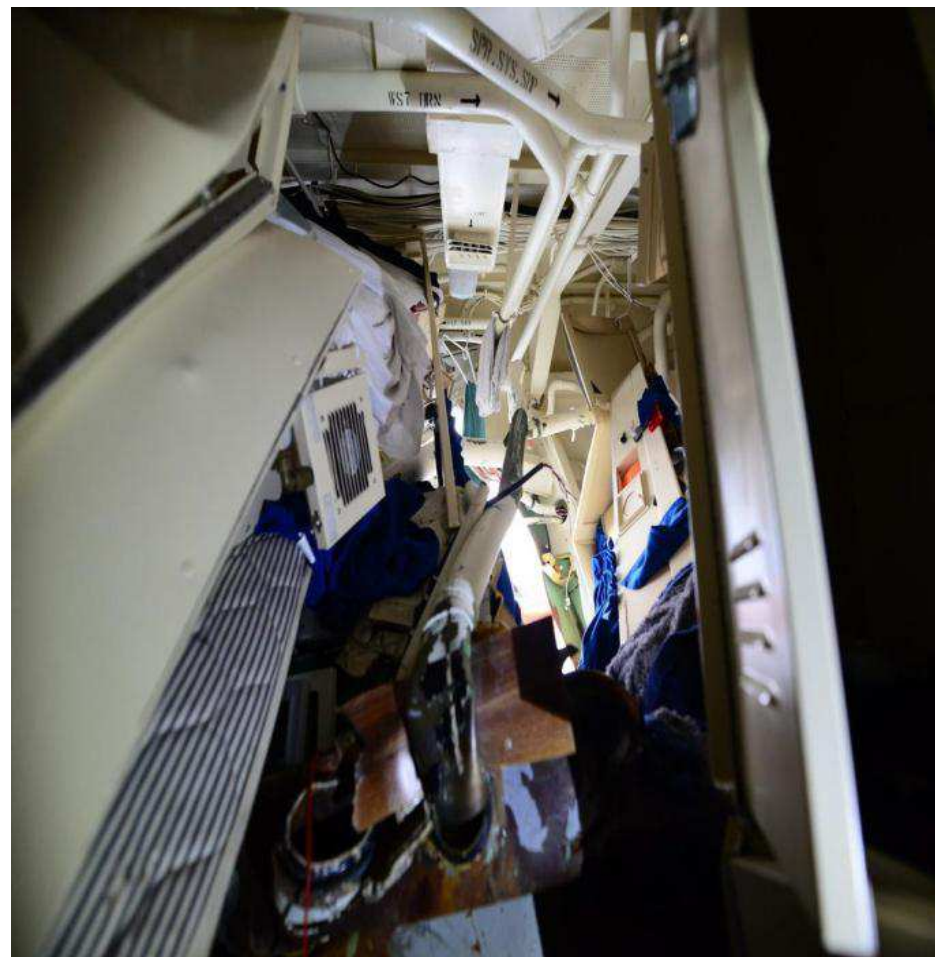


View through hole cut into bulkhead (wall)

**B4: View within Berthing 3, facing port (comparison)**



Undamaged Flight 1 Arleigh Burke Class Destroyer



JOHN S MCCAIN, post-collision



**ANNEX C – Catalog of Flooding in Spaces aboard USS JOHN S MCCAIN**

<b>COMPARTMENT</b>	<b>FRAME NO.</b>	<b>FLOODING</b>
Crew Living No. 3	2-300-01-1	2 Feet
Physical Fitness RM	2-300-2-L	2 feet
Access TK	2-305-2-T	2 Feet
Crew WR, WC, & SH	2-321-2-L	2 Feet
Access TK	2-326-1-T	2 Feet
Crew WR, WC, & SH	2-326-0-L	2 Feet
Crew Library	2-338-2-L	Little
Power CONV Room	3-319-0-Q	Partial
MER	4-254-0-E	Minor
IC & Gyro	3-300-0-C	SOLID
Crew Living No. 4	3-300-1-L	SOLID
Crew WR, WC, & SH	3-300-2-L	SOLID
Crew Living No. 5	3-310-2-L	SOLID
Crew WR, WC, & SH	3-325-1-L	SOLID
Crew Living No. 6	3-338-1-L	SOLID
Crew Living No. 7	3-338-2-L	SOLID
CG Locker	3-338-3-A	SOLID
Crew WR, WC, & SH	3-338-5-L	SOLID
CG Locker	3-338-4-A	SOLID
Crew WR, WC, & SH	3-338-6-L	SOLID
VCHT RM No. 2	3-300-0-E	SOLID
A/C Mach & PMP Rm	5-300-01-E	SOLID
Fuel Service Tank	5-300-4-F	Compromised
Cross Flooding Ducts	FR 335 & 367	SOLID
Fuel RCVG TK	5-338-2-F	Suspected Flooded