



Naval Safety Command

SAFETY AWARENESS DISPATCH



SA 22-19

2020 ASSAULT AMPHIBIOUS VEHICLE SINKING

In the summer of 2020, a Marine Expeditionary Unit (MEU) was conducting one of several training periods to prepare for their upcoming deployment. On the day of the mishap, Bravo Company of the Battalion Landing Team (BLT), and their attached Assault Amphibious Vehicle (AAV) platoon conducted a mechanized raid on San Clemente Island. After complications with one of the AAVs during the attack, the unit separated into two elements; one would remain on the island to repair the vehicle, and the other would return to the ship. During the transit back to the ship, an AAV began to



take on water and eventually lost operation of all bilge pumps. Over 45 minutes, the vehicle continued to take on water until the crew ordered the other Marines on board to evacuate. As another AAV came to aid in evacuating the Marines, a wave broke over the vehicle's top, flooding into the top hatches that had opened. The AAV sank to the ocean floor resulting in the death of eight Marines and one Navy Hospital Corpsman.

The information in this safety awareness product was assembled from publicly-available, open-source documents including the official command investigations (CIs). It does not contain information from any safety investigation.

Training Before the Mishap

The AAV platoon was identified to support a MEU in mid-January 2020. In addition to this assignment, the platoon was also selected to support an exercise in the United Arab Emirates (UAE). This decision was made under the assumption that the infantry battalion to which the AAV platoon would be attached during the MEU would be able to participate in the preparatory training for the exercise. However, the infantry battalion did not join the overseas exercise. The AAV platoon conducted various gunnery exercises and live-fire ranges from January to March until deploying half the platoon for the three-week exercise, but none of the personnel were the Marines of Bravo Company. Once this exercise element returned from the UAE, they were required to execute their two-week Restriction of Movement (ROM) due to COVID-19 precautions. As a result of this timing, the first time the AAV platoon and their assigned rifle company trained together was when they executed the Expeditionary Operations Training Group (EOTG) raid package in May. While the units completed this training successfully, waterborne operations were not part of the evolution, so there was no chance to validate the AAV platoon's or the rifle company's familiarity with the procedures for transporting troops over water.

In seven months from when the AAV platoon was identified to support the MEU until the mishap, they conducted only four days of waterborne operations, but Bravo Company did not participate. Various concerning issues occurred during training that could have identified proficiency gaps, but the problems were not effectively assessed for action. During a platoon night training exercise, two AAVs struck each other in the surf zone, causing minor damage. While this incident was reported to the MEU and BLT leadership, no investigation or remedial action was conducted. Two of the unit's

gunnery exercises were canceled halfway through execution due to maintenance or range issues, resulting in several crews not gaining the required gunnery qualifications. In addition to not being able to complete these specific gunnery qualifications, the AAV platoon was not evaluated by a Marine Corps Combat Readiness Evaluation (MCCRE), which was required by the Marine Expeditionary Force's (MEF) and division's orders before a unit executed a Change of Operational Control (CHOP) to a MEU. The AAV battalion commander skipped the evaluation under the impression that MCCRE standards were generally applied at the company through regiment level, not the platoon level. He thus used platoon-level Training and Readiness (T&R) standards to validate the AAV platoon's combat readiness.

In addition to having limited training time with the AAV platoon, Bravo Company had a significant gap in Underwater Egress Training (UET). Before conducting waterborne operations in AAVs, all personnel must complete this training, which involves completing the Shallow Water Egress Trainer (SWET) and then either the Modular Amphibious Egress Trainer (MAET) or the Submerged Vehicle Egress Trainer (SVET). MEF requirements state the egress training should have been completed before the MEU composite date, but due to ambiguity in the order and misinterpretation of the intent behind the order, the majority of Bravo Company had only completed the SWET. When the company had trouble getting all their Marines through the SVET due to maintenance, COVID delays, and other factors, they interpreted a line from the MEF order (stating that if a Marine failed the MAET, they could remediate with the SWET) to mean the SWET alone could be used to pass personnel as fully UET qualified. This interpretation resulted in only two of the 13 Bravo Company Marines on the mishap AAV having executed the SVET, the rest had only conducted the SWET.

Considerations: *Decisions made at senior leadership levels severely hindered the BLT's and AAV platoon's ability to train for deployment effectively. Being assigned to a MEU is arguably the most critical assignment a unit can receive. As such, training oriented toward preparing for the MEU must be prioritized. The decision to assign the AAV platoon to an overseas exercise eliminated vital time to focus on waterborne operations and joint training with their sponsor unit. If the Marines of Bravo Company had been afforded more time to familiarize themselves with AAVs, they would have increased their understanding of egress procedures and waterborne operations. Bravo Company and the BLT also applied poor logic in their training prioritization. Waterborne operations are clearly one of the most hazardous evolutions conducted in an AAV. The failure to fully complete the UET training shows a lack of hazard awareness.*

The organizational oversight and enforcement of training requirements also warrants scrutiny. The Vague policies regarding the MCCRE for the AAV platoon, as well as the UET training, confused the purpose behind these requirements. At the organizational level, we must ensure intent is understood, and at supervisory lower levels must make every effort to complete that intent.

Maintenance Before the Mishap

Maintenance on the AAV platoon's vehicles began just before the platoon was supposed to Change Operational Control (CHOP) to the MEU. They were initially told they would be assigned the 14 AAVs that had just returned from a previous MEU deployment, and that the vehicles were well maintained and operational. However, due to a battalion reorganization, those vehicles were sent to a different company, so the mishap platoon's AAVs had to be sourced from elsewhere in late March. According to witness statements in the original command investigation, the vehicles identified for the platoon came from what they referred to as an administrative deadline lot, and many had not been operational for extended periods. Although a follow-on command investigation could not find maintenance system data to confirm this statement, there were apparent problems with the vehicles' serviceability, as identified by the pre-CHOP Joint Limited Technical Inspections (JLTI).

The Pre-CHOP JTLI validated the concerns about the 14 AAVs' serviceability, finding that five vehicles were non-operational and seven were missing excessive stock list-level 3 (SL-3) items. Due to the maintenance problems, on 20 April, the AAV platoon personnel executed CHOP without their assigned AAVs and equipment because MEF policy mandated all vehicles and equipment be in condition code A (i.e., fully operational) before CHOP to a deploying unit. This schedule left only two weeks for the platoon to conduct vehicle repairs before the EOTG Mechanized Raid course beginning on 3 May.

The BLT, Assault Amphibian Battalion (AABn), and MEU leadership were briefed on the maintenance deficiencies, and plans were established to return the vehicles to operational use. The vehicles were repaired sufficiently for "land-use only" by the start of the EOTG Raid course on 3 May. From 8-26 May, platoon maintenance personnel repaired all vehicles for land and waterborne use. However, the vehicles were not officially CHOPed to the BLT until 11 August, 16 weeks after the original CHOP date and 12 days after the mishap. This delay caused their Force Activity Designator (FAD) not to upgrade, which kept them at a low logistical support priority to obtain ordered parts. From the original CHOP date of 20 April to the 30 July mishap date, 11 of the 14 AAVs belonging to the MEU AAV platoon were in a non-operational status at various points.



Considerations: *Just as training to prepare for the MEU should be given priority, so should appropriate vehicle and maintenance assignments. The lack of logistical prioritization the AAV platoon received as they were about to CHOP demonstrated a lack of appreciation at senior levels for the level of training demanded during a MEU workup and the level of hazard associated with this training. Appropriate resources must be dedicated to facilitating more complex operations. With this in mind, we as an organization must be willing to accept – and assert – when mission accomplishment is not feasible. Given the number of maintenance difficulties this platoon faced, whether the repairs were sufficient when executing the training is questionable. Units and their commanders must make realistic assessments of the unit's ability to meet task demands. If they can't, it is better to own that fact than to risk the lives of Sailors and Marines.*

Planning and Execution of the Event

Amphibious Squadron (PHIBRON) MEU Integration Training (PMINT) started for the AAV platoon when they transited from the Del Mar Boat Basin to the Amphibious Ship (AMPHIB). During the transit, two vehicles experienced mechanical problems requiring them to complete the movement in "water track mode," using the tracks instead of water jets for propulsion. Over the next two days, the two AAVs were repaired, and personnel conducted Preventative Maintenance Checks and Services (PMCS) on the rest of the vehicles. During the PMCS, another AAV was identified to have a problem with the digital display monitor not showing engine water temperature, and they decided not to use this vehicle in the mechanized raid.

The day before the mishap, the operations order for the mechanized raid on San Clemente Island was given, planning conducted, and the confirmation brief held. During the brief, participants discussed a variety of risk management factors and it was stated the AMPHIB would provide a safety

boat for the evolution while the AAV platoon provided an empty AAV to serve as the second required safety vessel. After the plan was approved, the AAV platoon and Bravo Company conducted a well-deck rehearsal, rehearsal of concepts (ROC) drill, and prepared further. These rehearsals lasted until approximately 2300. Reveille for the AAV platoon was at 0300 the following day to begin preparations for the designated 0700 launch, allowing the crews 4 hours of sleep. The platoon started splash checks at 0530, which are supposed to include a safety brief for embarked personnel explaining the safety and egress/evacuation procedures. The CI, however, found this brief was either not conducted or not conducted to the necessary standards.



Two safety vessels were required for waterborne evolutions involving six or more AAVs during ship operations. During preparation that morning, the designated safety boat could not launch from the ship because the engine failed to start. The AAV platoon commander was informed of the inoperable boat. He had already designated AAV 12 as a safety boat (despite it containing embarked personnel), but no other AAV was designated as a second safety boat, meaning they launched without the mandated safety structure.

At 0745, 13 AAVs were launched to conduct the mechanized raid. They reached the island about an hour later and completed the evolution by 0945. Shortly after, one of the AAVs reported they had blown a hub, meaning the bearing inside the road wheel hub had failed and the vehicle couldn't move. After requesting the parts needed to fix the vehicle and determining there would be a delay in getting the parts to the island, the decision was made to leave the immobilized AAV and three others (including AAV 12) on the island and send the other nine back to the ship.

During this same time period, the driver of the mishap AAV noted the low transmission oil level. The rear crewman inspected the engine and found a leak due to loose mounting bolts. He tightened the bolts, then he and the driver added 6 gallons of transmission oil to the transmission and notified the driver. This amount was barely one-fourth of the 23 gallons the AAV transmission requires to operate correctly.

Considerations: *The lack of adequate safety boats during transit to and from the island was an oversight. Waterborne operations are one of the most hazardous training evolutions conducted in the Marine Corps. The time-critical risk management to ensure there are mitigations to counter these hazards falls on the platoon and company leadership. It is imperative for the officers and senior NCOs at these levels to provide adequate focus on these factors. The leadership here fell short in this regard.*

The leadership of the mishap AAV also failed to respond to the transmission oil leak adequately. The severity of the leak was not appreciated. The vehicle commander should have pushed this information up to platoon leadership, and they should not have put this AAV in the water with such little transmission oil. The lack of oil resulted in the transmission seizing during transit.

Attempted Transit to Ship and Sinking

The unit conducted a surf observation report before departing and determined the surf to be at a surf index of 2.1 and conditions beyond the surf zone to be a sea state of 1. Once the AAV column departed the protective cove of the island, though, the sea state increased in intensity.

At 1645, the nine AAVs began to "splash" for their transit back to the AMPHIB. There was no safety

boat in the water when they launched, despite one being available on the AMPHIB at this time. The AAV Platoon Commander stated he assumed the ship would have safety boats because nobody told him they would not be provided, but he never confirmed the presence of safety boats or specifically requested them. In addition to this oversight, as they left AAV 12 on the island, the platoon commander had no AAVs designated as safety vessel.

After approximately 30 minutes of transit, AAV #3 reported a malfunction and that they could not maneuver in the water. The section leader in AAV #1 maneuvered to the disabled AAV, rigged it for a tow and began towing it back to San Clemente Island. They did this with the troops still embarked in the disabled AAV, which violates AASBn Order 3000.1 Common SOP for AAV Operations.

At approximately 1730, the lead vehicle of the AAV column was between 1500 and 2000 meters from the ship. With the existing water conditions – somewhere between sea state two and three – this distance would have taken approximately 10 minutes to traverse.

The rear crewmember of the mishap AAV notified the vehicle commander that water inside was above the deck plates at the ramp. “Deck plate level” water met the criteria to begin prepping embarked troops for evacuation. The vehicle commander acknowledged the water, but did not give a command to prep the embarked troops for transfer yet. At this point, the rear crewmember moved to the A-Gunner position at the front of the AAV because he lost internal radio communication and had to relay information verbally.

At the same time, the AAV driver noticed the voltage reading fall from 27 volts to 19 volts. This low voltage degraded the radio output as well as the electric bilge pumps’ discharge rates.

By approximately 1739, the water in the AAV rose to ankle level, and the rear crewmember informed the vehicle commander. Per AASBn Order 3000.1 Common SOP for AAV Operations, water at the boot ankle level should have been the trigger to execute all emergency distress signals and evacuate all embarked troops. The vehicle commander climbed out of the turret to stand and began giving emergency distress signals by waving the “November” flag, but he did not provide the command to evacuate troops, nor did he launch the vehicle’s red or white star cluster pyrotechnics, despite no response to his other attempts to signal their distress.

At approximately 1755, the other members of the AAV Platoon became aware that the mishap AAV was in distress. AAVs 13 and 14 (400+ meters away) began maneuvering to assist. As AAV 13 worked closer, the mishap AAV vehicle commander signaled to position the AAV behind his as they moved within 50-100 meters and called for a troop transfer.

As AAVs 13 and 14 were maneuvering into position, the rear crewmember relayed to the vehicle commander that water had reached calf-level, and they needed to evacuate the troops. At the same time, he heard water impact the generator belt and noted a loud screeching noise. The driver checked the voltage regulator and saw it was not charging. He also observed water spraying out the sides of the engine panel, indicating it was full of water.

At approximately 1807, the vehicle commander returned to the turret and the rear crewmember informed him the water was at the bench-seat level. At this point, the vehicle commander gave the order to open the starboard cargo hatch and have the troops “drop their stuff.” This guidance was either not communicated effectively or not understood, because all troops who drowned were found with their plate carriers still on.

The rear crewmember opened the starboard cargo hatch forward handle in preparation to evacuate the troops. The embarked troops attempted to open the rear handle, but they struggled to do so because they had never rehearsed this procedure. Additionally, they were forced to use personal cell phones as lighting to find the handle because the Emergency Egress Lighting System (EELS) was not

functioning, and the AAV crew had not attached the two chemical lights required to mark the cargo hatch handles.



As they worked to open the hatch, AAV 14 had moved into position for troop transfer. AAV 14's driver noted the mishap AAV was sitting only about six inches out of the water. As AAV 14 maneuvered closer, a wave pushed it into mishap AAV, striking its forward starboard side.

Once the cargo hatch was open, the rear crewmember positioned himself on top of the AAV behind the turret to assist the embarked troops exiting the vehicle. At this point, the Marines in the troop compartment were still trying to determine if they should drop their gear. The mishap AAV had been pushed into a direction broadside to sea swell, and was riding low in the water, making it more vulnerable to the swells and waves. While the rear crewmember was helping Marines out of the vehicle, a wave swept over the top and rapidly filled the AAV through the open cargo hatch, filling it past its reserve buoyancy.

The AAV sank with Private First Class Bryan J. Baltierra, Lance Corporal Marco A. Barranco, Private First Class Evan A. Bath, Hospital Corpsman 3rd Class Christopher Gnem, Private First Class Jack-Ryan Ostrovsky, Lance Corporal Guillermo S. Perez, Corporal Wesley A. Rodd, Lance Corporal Chase D. Sweetwood, and Corporal Cesar A. Villanueva onboard.

Considerations: *The vehicle commander faced a dilemma when, in his decision-making process, he had no pre-designated safety vessel to use in evacuating troops when water initially began filling the vehicle. He was faced with the decision of telling the Marines he was transporting to evacuate into the open ocean or to try to make it to the ship. Regardless, there are reasons behind mandatory evacuation criteria. Twenty-eight minutes passed from when the water level reached evacuation criteria before the decision was made to begin egress. Had the troops been evacuated when the water reached ankle level, as was required by mandated emergency procedures, lives could have been saved.*

Inadequate rehearsals and limited experience in waterborne operations put the embarked troops at a significant disadvantage. At their most vulnerable moment, when they were actively attempting to exit the vehicle, the group was ill-prepared to open the cargo hatch and execute the required actions. Training matters. Preparation matters.

Conclusions

After the AAV and the individuals that went down with it were recovered, a post-mishap analysis was conducted by subject matter experts to determine the technical causes of why the vehicle sank. They listed eight specific factors, which can be found in the command investigation, that caused that AAV to fill with water and ultimately lose effective buoyancy. They cited not one discrepancy but a sequence of mechanical failures. First, the transmission failed due to leaking oil, which caused reduced momentum. This reduction caused the forward hydraulic pump to become ineffective because of low engine speed. The reduced hydraulic bilge pump capacity allowed water level to increase, ultimately submerging the generator, and causing it to fail. The generator failure forced the AAV to run solely on battery power, further degrading the electric bilge pumps. With this significant reduction in bilge pump capacity, the amount of water entering the AAV was far greater than the pumps could expel, resulting in adverse conditions leading to the mishap.

These mechanical factors were the result of a much larger picture, though. As previously stated, there were factors at every level of our organization that led to this sequence of events and the

eventual mishap

At the individual and team level, mistakes were made on the day of the mishap. The vehicle commander not recognizing the severity of the need to add so much transmission fluid before the movement back to the ship denied the platoon leadership opportunity to identify the problem that led to the transmission failure and loss of bilge pump capacity. Had this been noted, the AAV may not have even been put in the water.

The failure to adhere to safety procedures of marking the cargo hatch handles with chemical lights and not evacuating the vehicle at specific waterline criteria denied those in the AAV the ability to egress from the vehicle effectively. Had these procedures been adhered to, the loss of life would likely have been avoided.

At the supervisory level, the AAV platoon did not adequately adhere to crew rest standards. By only affording their personnel 4 hours of sleep, the unit leadership imposed fatigue, which can degrade decision-making abilities. Additionally, supervisors failed to ensure adequate safety briefs were conducted, which limited the rifle company personnel's understanding of evacuation procedures.

There were factors at various organizational levels. The AAV battalion not allocating its best vehicles to a deploying unit and electing to send the MEU platoon to the overseas exercise created a dilemma where the platoon had to conduct a significant amount of maintenance with limited time to do it. It also limited the amount of training time the AAV platoon had with the rifle company to which it was to be attached.

The battalion landing team's decision to conduct their UET training primarily with the SWET limited their personnel's egress abilities. Depending on one's interpretation of the MEF order, this may have met requirements, but it clearly did not set the Marines up to be proficient in egressing from the vehicle.

All of these factors together created a situation where a fatigued crew was placed in an AAV that was subject to an insufficient maintenance cycle and insufficient waterborne training opportunities with the BLT it was attached to. Therefore it faced numerous difficulties leading to it taking on excessive water, and when faced with a crisis, the crew made erroneous decisions that resulted in the vehicle sinking. When it sank, the transport personnel did not have adequate evacuation training or preparation, and eight Marines and one sailor were lost.



Key Takeaways

Over the months leading up to the exercise and on the day of the mishap, numerous oversights, misjudgments, and critical mistakes made at various phases led to this vehicle sinking and the loss of nine service members. Training, maintenance and safety procedures could have limited the risk, and procedures that, if followed, would have saved lives. It would be foolish, however, to think the errors made by this unit could not happen somewhere else. The following considerations are offered so others may avoid making similar mistakes.

1. Don't accept risk that isn't yours to accept. When orders or instructions list a safety requirement, it's because others before you have performed the risk management for you already. Don't dismiss their work for the sake of expediency. Doing so violates a tenet of risk management to "make risk decisions at the right level." As we saw in this incident in which leaders dismissed the need for a safety vessel, doing so will eventually cost lives. The same can be said by those who interpreted the water egress training requirement without seeking higher-level clarification. If it isn't your risk to accept, don't. Pass it up the chain of command for a decision.

2. Follow the Emergency Procedures. Whether you are in command of an AAV or one of the follow-on Amphibious Combat Vehicles (ACV), there will be mandatory emergency steps to take if specific criteria are met. In this case, actions were required when the water reached certain levels. Commanders have to make hard decisions, sometimes in the face of uncertainty. Learn from this lesson that the mandatory steps are there to help you make the right decision. Follow the emergency procedures. This action applies to any platform, including aircraft.

3. Leaders: Set your units – and your people – up for success. Commands above the AAV platoon failed the unit by forming the platoon late and providing them with equipment that was not deployment ready. They placed the burden on the team to ready themselves, even while a low priority for parts handicapped them. The responsibility is on the higher-level commanders to ensure they are providing their subordinate units with all they need to succeed. And the burden is on the unit-level commanders to speak up when they cannot safely meet the mission. Both of those burdens take courage to carry.

4. Training matters. From individual drills to large-scale exercises, training prepares us to meet the challenges inherent in military operations. For both the AAV crew and the embarked personnel, their training was clearly inadequate to meet the dangers they faced from a waterborne emergency. Practicing until you get it right is not enough. Repeated and frequent practicing of critical actions until you can't get them wrong is essential to prepare for these challenges.

5. Placement of leadership matters. The AAV platoon commander, AAV platoon sergeant, and infantry company commander stayed on the island as the AAVs returned to the ship. Regardless of the friction expected for the section staying behind, and irrespective of their confidence in the subordinate leaders overseeing the waterborne movement, commanders and senior enlisted leaders need to distribute themselves to best command and control their units, especially during operations that inherently carry higher risk. The top three individuals most entrusted with leading those Marines and Sailors all removed themselves from a position where they could effectively exert control over events in the water. As the mishap vehicle's troubles slowly unfolded, they were powerless to affect the outcome. While perhaps not all three needed to be in the water that day, all three should not have been back on the island while most of the unit was transiting to ship.

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And remember, "Let's be careful out there."