

TerranearPMC Safety Share

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Week of September 10, 2018 – USS Forrestal

A few weeks ago, the nation was celebrating the memory of Senator John McCain. Many stories were told about his life of service; however, one in particular, grabbed my attention. It was the tragic event that occurred when John McCain was on the USS *Forrestal*: an aircraft carrier that suffered a perilous fire during the Vietnam era. As a S&H professional, such stories always intrigue me as I examine the who's, what's, where's, when's and how's of such events so I can understand how such tragedies could have been prevented. As a side note to this story, the name of this ship, USS *Forrestal*, caught my attention as well, as the building in Washington D.C. for which the Department of Energy resides, bares the same name. Both building and ship are named after James Vincent Forrestal; the Secretary of the Navy and Secretary of the Defense under Presidents Franklin Roosevelt and Harry Truman.

On July 29, 1967, a fire broke out on board the aircraft carrier USS *Forrestal*. The incident was initiated via an electrical anomaly that caused a Zuni rocket (on a McDonnell Douglas F-4B Phantom) to fire, which then caused the rocket to strike an external fuel tank of a A-4 Skyhawk. The flammable jet fuel spilled across the flight deck, which ignited, and triggered a chain-reaction of explosions. The result was 134 fatalities with an additional 161 injured. At the time, the USS *Forrestal* was engaged in combat operations in the Gulf of Tonkin, during the Vietnam War. The ship survived, but with damage exceeding \$72 million (and that's 1967 dollars! By today's economy, that number would be closer a \$1 billion), which does not include the damage to aircraft.

The day before the accident, the *Forrestal* was resupplied with ordnance from the ammunition ship USS *Diamond Head*. The load included sixteen 1000-lb AN/M65A1 "fat boy" bombs (so nicknamed because of their short, rotund shape), which the *Diamond Head* had picked up from the Naval Base, Subic Bay and were intended for the next day's second bombing sortie. Some of this batch were more than a decade old, having been exposed to the heat and humidity of Okinawa and Guam for years, where they were erroneously stored in open-air Quonset huts at an abandoned ammunition dump on the periphery of Subic Bay Naval Base. The AN/M65A1 bombs were thin-skinned and filled with Composition B, an older explosive with considerable shock and heat sensitivity.

Composition B also had the tendency to become more powerful (up to 50% by weight) and more sensitive if it was old or improperly stored. *Forrestal's* ordnance handlers had never even seen an AN/M65A1 before, and to their disbelief, the bombs delivered from *Diamond Head* were in substandard condition; coated with rust and grime due to years of exposure to heat and humidity. In addition, they were still in their original packing crates which were noted to be moldy and rotten. Some were stamped with production dates as early as 1953. Most dangerous of all, several bombs were seen to be leaking liquid paraffin phlegmatizing agent from their seams; an unmistakable sign that the bomb's explosive filler had degenerated due to excessive age, heat exposure and moisture.

According to investigation records, *Forrestal's* ordnance handlers were afraid to even handle the bombs while *Forrestal's* ordnance officers reported the situation up the chain of command to the ship's commanding officer, informing him that the bombs were, in their assessment, an imminent danger to the ship and should be immediately jettisoned overboard.

However, 1000-lb bombs were needed (regardless of the type of ordinance) for the next day's mission and even though the captain demanded the *Diamond Head* take the AN-M65A1s back in exchange for new Mark 83s, the *Diamond Head* had none to provide.



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According to investigation reports, personnel at Subic Bay Naval Base who had prepared the AN-M65A1 bombs for transfer assumed *Diamond Head* had been ordered to dump them at sea. When notified that the bombs were destined for active service in the carrier fleet, the commanding officer of the naval ordnance detachment at Subic Bay was so surprised that he initially refused the transfer, believing a paperwork mistake had been made. At the risk of delaying *Diamond Head's* departure, he refused to sign the transfer forms until receiving written orders from his superiors via teleprinter that explicitly absolved his detachment of responsibility for the bombs' condition.

With orders to conduct strike missions over North Vietnam the next day, and with no replacement bombs available, the captain of the Forrestal reluctantly concluded that he had no choice but to accept the AN-M65A1 bombs in their condition. In a concession to the demands of the ordnance handlers, the captain agreed to store all 16 bombs alone on deck in the "bomb farm" area between the starboard rail and the carrier's island until they were loaded for the next day's missions. Standard procedure was to store them in the ship's magazine with the rest of the air wing's ordnance; had they been stored this way an accidental detonation could easily have destroyed the entire ship.

While preparing for the second sortie of the day, the aft portion of the flight deck was packed wing-to-wing with a total of 27 fully loaded aircraft. At the same time several tons of bombs were stored on wooden pallets on deck in the bomb farm. Concurrently, a McDonnell Douglas F-4B Phantom was positioned on the aft starboard corner of the deck, pointing about 45 degrees across the ship – and it was armed with LAU-10 underwing rocket pods, each containing four of the Zuni rockets. The Zuni rockets were designed to be protected from accidental launch by a safety pin that was to be removed prior to launch from the Forrestal catapult.

It was then that an electrical power surge in the Phantom occurred as it was switching from external to internal power. The electrical surge caused one of the four Zuni rockets in a pod to fire. The rocket was later determined to be missing the rocket safety pin, which then (mistakenly) allowed the rocket to launch. The rocket flew about 100 feet across the flight deck, contacting an external wing-mounted fuel tank containing 400 US gallons on a Skyhawk to rupture while the aircraft was awaiting launch.

Despite intensive efforts to cool the bomb that had fallen to the deck, the casing suddenly split open and the explosive began to burn brightly. Recognizing that a lethal cook-off was imminent, orders were shouted for firefighters to withdraw. It was at that moment that the bomb detonated: one minute and 36 seconds after the start of the fire. It was recognized that the unstable Composition B material enhanced the power of the explosions.

This tragic event, as so many other disasters in history, could have been prevented. In fact, there were multiple contributing factors, and quite possibly, if only one of these were properly controlled or prevented from occurring, the disaster on the USS Forrestal could have been avoided. Such factors as using old, deteriorated ordinances, unsubstantiated assumptions that the bombs were going to be dumped (discarded), a missing safety pin, and a management system that allowed substandard materials to be used by overriding an officer's concern, all contributed to this unfortunate event. It is through such accidents and their subsequent investigations that we, today have the privilege and good fortune to exercise our right to "STOP WORK" should we see something that does not look right. The S&H profession subscribes to "Zero Accident Philosophy" meaning we can work in an environment where employees' safety and health does not need to be compromised. It is just up to us to exercise our abilities to recognize hazards and then to make the effort to correct any situation that needs to be corrected.

Dear optimist, pessimist, and realist, while you guys were arguing about the glass of water, I drank it. Sincerely, the opportunist.

