



THIS DAY IN NAVAL SAFETY HISTORY

APRIL 22, 2014

USS MCCAMPBELL (DDG 85)

NO. 1 MRG EXPLOSION

EVENT: :Roughly eight hours after completing routine at-sea operations, the USS McCampbell (DDG 85) was pierside with its Main Engine Room No. 1 (MER1) in shutdown condition when an explosion occurred in the No. 1 Main Reduction Gear (MRG), just after 9 p.m., on April 22, 2014. The explosion caused significant damage to the MRG casing and dehumidifier. Smoke, soot and ashes were found outside the MRG casing indicating flames and heat escaped from blown MRG covers. There were no fatalities.

During the post-mishap safety investigation, the Safety Investigation Board (SIB) looked not only at the events leading up to and during the McCampbell mishap, but also reviewed the findings from two previous MRG explosion mishaps on board USS Halsey (DDG 97) in 2006 and 2007. The investigators ultimately identified two primary causal drivers of the mishap: 1) equipment design flaws, and 2) inadequate procedural guidance.

The first causal factor referred to equipment design flaws in the Lube Oil Purifier Heater (LOPH) which could lead to conditions that overheat lube oil, causing it to break down and release volatile byproduct gases.

The second causal factor involved a failure to ensure lessons learned stay learned.

While the LOPH design flaw was the primary physical cause of the mishap, the conditions allowing the McCampbell mishap to occur in the first place can be traced back to a failure to instill and incorporate the lessons learned from the previous Halsey mishaps - leading to the second causal factor, inadequate procedural guidance or publications.





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Following the Halsey MRG mishaps, new and revised procedures to mitigate the likelihood of an LOPH explosion condition were identified and pushed out via message by Naval Sea Systems Command and associated type commanders, but were never incorporated in operational and maintenance references. New crew members were trained with core reference materials for operating and maintaining the MRG lube oil system, and were unaware of the procedural changes and updates distributed via message following the earlier mishaps.

Additionally, previously implemented corrective actions from the 2006 and 2007 incidents were not effective in correcting design flaws and the operating procedures that could lead to a buildup of explosive gases in the MRG casing. Additionally, the enhanced procedures recommended from prior incidents to mitigate the issue were not incorporated into the manual and procedures, and were unknown to the crew.

LESSONS LEARNED and CORRECTIVE ACTIONS: To ensure the conditions preceding this mishap weren't repeated in the future, specific and detailed actions were identified for implementation along with a timeline for completion.

- Evaluation of maintenance procedures to include preventive maintenance updates and changes to Maintenance Requirement Card to expand oil testing and clarify procedures, and to the Maintenance Index Pages to improve identification of issues and deficiencies that could contribute to an explosive event.
- Additional Preventive Maintenance System checks to perform routine inspections of certain MRG components.
- Promulgation of warning notification to the fleet on testing procedures and flashpoint procedures and indicators.