Out with AFFF

Moving to Future of Firefighting Agents

Aviation Safety Blog
24-02

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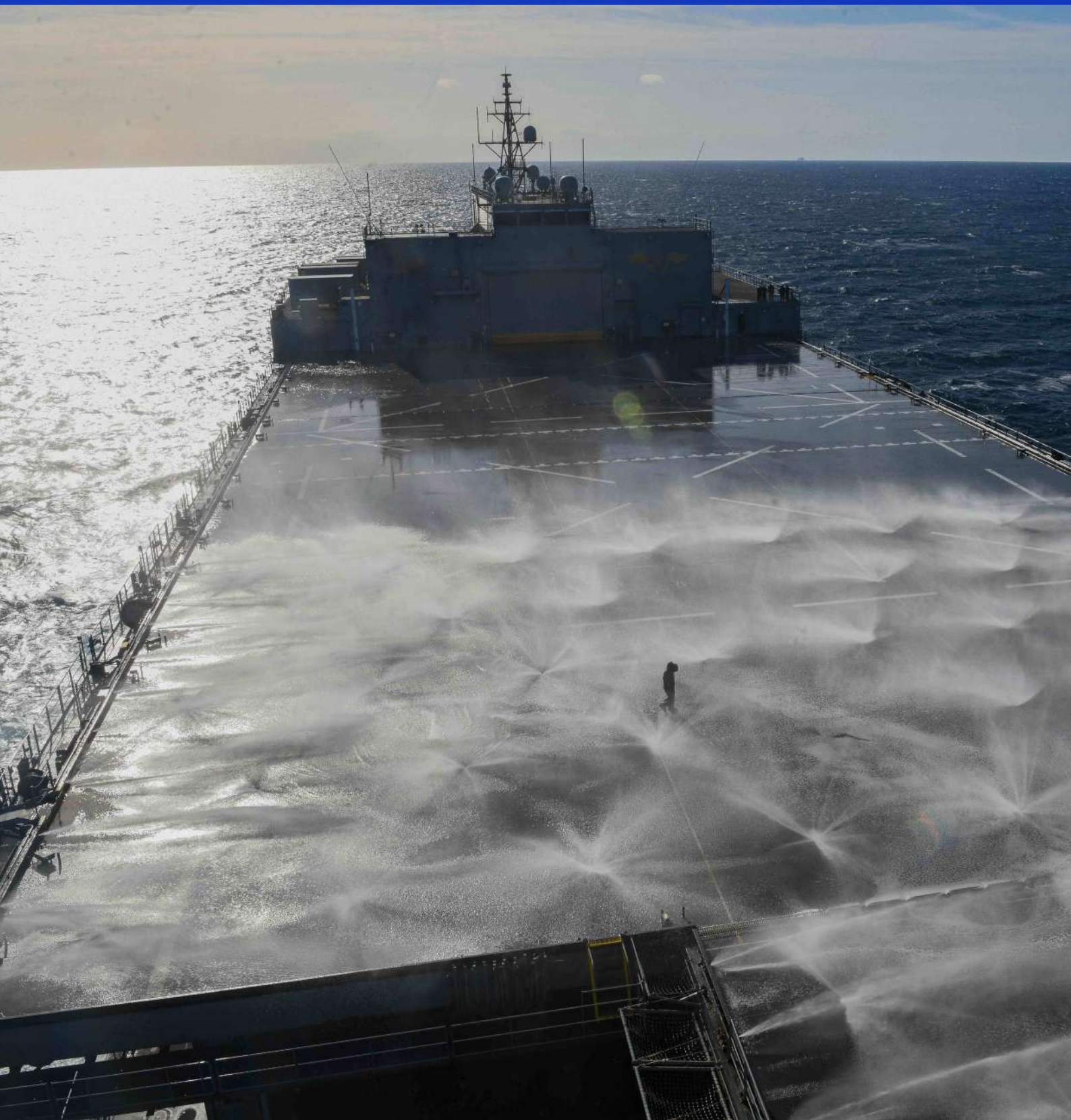

OUT WITH AFFF

Aqueous Film Forming Foam, also known as AFFF, is a highly effective firefighting foam that has been used to extinguish flammable liquid fires, particularly those involving jet fuel. However, the U.S. Navy and Marine Corps are taking steps to phase it out due to environmental issues, health risks and regulatory concerns associated with its use.

The chemicals called perfluoroalkyl and polyfluoroalkyl substances (PFAS) found in AFFF are known to persist in the environment and can contaminate water sources, posing a significant threat to our ecosystem. Moreover, “current scientific research suggests that exposure to certain PFAS may lead to adverse health outcomes. However, research is still ongoing to determine how different levels of exposure to different PFAS can lead to a variety of health effects.” [1]

As a result, provisions were included in the National Defense Authorization Act for Fiscal Year 2020. By Jan. 31, 2023, the Secretary of the Navy was mandated to release a military specification for a fire-fighting agent free of fluorine for all military installations. Following Oct. 1, 2023, the Department of Defense is restricted from spending or allocating funds to acquire fire-fighting foam containing more than 1 part per billion of perfluoroalkyl and polyfluoroalkyl substances. Moreover, the use of fluorinated aqueous film-forming foam at military sites will be prohibited no later than Oct. 1, 2024, or earlier if the Secretary finds earlier compliance feasible. The military is committed to finding safer firefighting alternatives that do not harm the environment or human health.

Currently, there are six non-foam alternatives proposed for AFFF:

1. Ignitable Liquid Drainage Floor

Sailors aboard USS Wasp (LHD 1) use a fire hose to clean AFFF from the deck in the ship's hangar bay after conducting AFFF testing, March 28, 2023. (U.S. Navy photo by Mass Communication Specialist 2nd Class Jonathan M. Wideman)

- Ignitable liquid drainage is a perforated aluminum floor placed on a hangar floor.
- Holes draw the fuel into drainage channels as soon as it spills, effectively containing and quenching a fire before it can grow.

2. High-Expansion Foam
   - High-expansion (Hi-Ex) Foam systems fill up a space with foam, effectively starving the fire of oxygen to extinguish it.
3. Trench Nozzles
   - A trench nozzle system is designed to contain a fuel fire within a grid of trenches cut into the floor and then suppress it with fire nozzles in the trenches.
4. Water-Only Sprinklers
   - Existing AFFF sprinkler systems can be converted to water-only by turning off the foam delivery parts of the system.
5. Optical Flame Detectors Only
   - Optical flame detectors are faster at detecting fire than smoke or heat detectors. They detect fire and transmit the information to an alarm system that alerts the closest properly equipped fire department.
6. Water Mist Sprinklers
   - Water mist sprinkler systems atomize water to deliver many tiny water droplets, improving the cooling effect of water.

These systems all have pros and cons, such as:

1. Some of these systems are very effective at containing fuel fires, but feature high installation costs and longer retrofit times.
2. Mechanism (smothering) is effective against many types of fire, but equipment is heavy and not able to be installed in some hangars.
3. Trench systems are very good at containing and suppressing fuel fires but has a high retrofit/installation cost.
4. Water is ineffective at suppressing fuel fires, but has no environmental or health concerns.
5. Technology is not currently compliant with DoD fire codes for hangars with fueled aircraft.

That said, AFFF is the past and soon we will rely on the options listed above or something similar. This doesn't mean to not take the necessary precautions now if hangars do not have a fire suppression system to effectively extinguish fuel fires. There are specific steps we can take to prevent catastrophic damage.

1. Have a Fire Bill that thoroughly details emergency procedures in case of a fire.
2. Post signs and placards around the hangar for all to see so everyone is aware of these procedures.
3. Have a Fire Watch posted.
4. Ensure aircraft are defueled before moving them into the hangar.

OUT WITH AFFF

The future of Naval and Marine Corps firefighting agents is changing for the better. We are looking for healthier, environmentally friendly and more effective products. We are always told to be flexible and that is what we need to be during this time of transition.

Endnote

1. "Our Current Understanding of the Human Health and Environmental Risks of PFAS," retrieved Oct. 3, 2023, https://www.epa.gov/pfas/our-current-understanding-human-health-and-environmental-risks-pfas

Cover: U.S. Navy Sailors and civilian mariners aboard USS Hershel "Woody" Williams (ESB 4), conduct aqueous film forming foam (AFFF) sprinkler tests on the flight deck while transiting the Red Sea, Feb. 6, 2023. (U.S. Navy photo by Mass Communication Specialist 2nd Class Conner D. Blake)