



PROJECT FACT SHEET



PROJECT – DEVELOPMENT OF FLUORINE-FREE FOAM

Objective

Aqueous Film Forming Foam (AFFF) based on perfluorooctyl-substituted surfactants was for decades the water-based firefighting agent of choice in military and civilian applications until it was determined that two highly persistent, bioaccumulative compounds formed from decomposition of AFFF—perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS)—pose a health risk and display unacceptable toxicity to aquatic index organisms. The shorter-chain homologue now used for firefighting is considered a temporary patch, in anticipation of an environmentally compatible next-generation agent and of adverse findings of toxicity in the C-6 AFFF materials and their by-products. The DoD is working aggressively to address the national PFAS issue in a cohesive, consistent manner while coordinating and communicating with external stakeholders. We are making substantial progress toward understanding the Department's use of AFFF and researching fluorine-free alternatives to AFFF; monitoring and communicating information on the health effects of human exposure to PFAS; establishing policies and collecting data to track PFAS cleanup progress and costs; and supporting research and development efforts for all of these activities. This project on development of fluorine-free foam works to further those goals in research and development. The objective is to develop a drop-in replacement for AFFF that meets the performance standards of MIL-F-24385 (MIL-SPEC) as well as the compatibility requirements with equipment that is more environmentally responsible than AFFF.

Technology Description

AFFFs have been used for decades by public, commercial and military firefighting organizations to fight hydrocarbon fires. AFFFs containing fluorinated surfactants have superior firefighting capabilities, but many are classified as persistent, bio-accumulative, and toxic. As a result, new, reliable, environmentally friendly, fluorine-free firefighting foam concentrates for use on class B liquid pool fires are needed. In addition to being environmentally friendly and non-toxic, the new agent must provide the same level of fire protection as fluorinated AFFFs. In response to this need, TDA Research, Inc. has developed a firefighting foam concentrate (3%) that does not contain fluorosurfactants or any fluorinated compounds (i.e., is fluorine-free), is compatible with current fire-fighting hardware and fire-fighting protocols, and meets the fire performance requirements of AFFF when measured with a Type III Fire Test for Class B fires as described in Section 10 of the Standard UL 162 (Underwriters Laboratories, Inc. Northbrook, IL, Eighth Edition, February 23, 2018). At this time, it is unknown if it will or can meet MIL-SPEC, but it shows promise for future development. In this project, TDA will optimize and scale-up production of the formulation to support large scale fire testing. In 2020 TDA was awarded a Phase II SBIR to further develop the technology.

Benefits

Currently available fluorine-free foams do not meet MIL-SPEC standards for performance, nor do they meet compatibility requirements with equipment. This research could lead to a minimally toxic, fluorine-free firefighting agent functionally equivalent to fluorinated AFFFs, to replace them in firefighting applications. This would be of enormous benefit to the entire DoD, as well as commercial airports.