



At U.S. Military Facilities Around the World

Biobased Transformer Coolant Fluid Is Quickly Adopted

Whether it's on land or sea, managers of more than 155 U.S. military facilities are quickly switching to, or installing new equipment that comes with a biobased transformer coolant fluid—Envirotemp® FR3®. The world's largest naval station is one that has switched to the product made from soybean oil because it is better for the environment.

“The direct and indirect costs associated with failed transformers can be staggering, especially when those transformers are located at the world's largest naval station,” says Deperming Engineer Jack Fay, who works at Lamberts Point Deperming Station at Naval Station Norfolk.

The huge rusting radiators of the 16 transformers at the Lamberts Point Deperming Station were replaced with new stainless steel ones. A total of 6,000 gallons of mineral oil was removed and replaced with biobased Envirotemp® FR3® transformer coolant fluid.



photo credit: Naval Station Norfolk

Bordered by the Chesapeake Bay and Elizabeth River in Hampton Roads, Virginia, Naval Station Norfolk occupies a 4,300-acre peninsula known as Sewells Point. It is home to 70 ships including aircraft carriers, cruisers, destroyers and submarines.

The U.S. Navy recognized the inherent environmental and fire safety risks associated with the continued use of mineral oil as a dielectric coolant. It was particularly concerned with two large transformers installed in the Elizabeth River near the base and used to convert AC to DC power at the Deperming Station there. Deperming is the process that removes magnetic fields that form on a ship's hull during construction. Without deperming, ships would be more vulnerable to magnetic mines and torpedoes and could experience interference with communications and navigation equipment.

“We were concerned because the huge transformers were getting old and their radiators were getting rusty and could potentially leak mineral oil into the river,” says Fay. “A major part of refurbishing the equipment was ‘retrofilling’ or removing the dielectric mineral oil and replacing it with the biobased fluid. Our transformers are located on a waterway, so we required a solution that would not pose a threat to marine life,” says Fay.

Because FR3 fluid is soy-based and does not contain petroleum hydrocarbons, silicones or halogens, it typically biodegrades quickly in case of leak or spill. Tests show that FR3 fluid is 99% degraded in 21 days when tested per an Environmental Protection Agency method. In comparison, mineral oil is only 25% degraded in 21 days. In addition, the biobased fluid is considered non-toxic when evaluated by multiple standard test methods.

How big was this project? A total of 6,000 gallons of mineral oil was removed and replaced with FR3 fluid. In addition, the transformers were checked for leaks, gaskets replaced and copper tubing, fittings and supply lines repaired. And, what about the rusting radiators—they were replaced with 16 new, stainless steel ones.

photo credit: Naval Station Norfolk



Deperming Engineer Jack Fay, who works at Lamberts Point Deperming Station at Naval Station Norfolk, is concerned about the environmental impact if a transformer should leak. As a result, he sought a solution that would not harm marine life.



photo credit: Naval Station Norfolk

Even huge ships like this aircraft carrier require deperming after they've been in dry dock for repair. The world's largest naval station where deperming is done as well as Departments of Energy, the Interior and State facilities have all switched to a biobased transformer coolant fluid made from soybean oil that is better for the environment, less flammable and can extend the life of equipment.

"Biodegradability is a key factor," says Dick Chappell, who sells Cooper System Products to the military throughout Virginia. "But the fact that it has excellent dielectric qualities and is less flammable has made FR3 fluid the leading transformer insulating coolant at numerous other Virginia military installations."

The revolutionary product, he explains, had been available for about ten years. Until a transformer manufacturer, Cooper Power Systems, began making products that came with the biobased fluid, no one knew how much more environmentally friendly this is. "Once people have experienced it, they look at the less-biodegradable mineral oil the way they once did PCB-based (Polychlorinated Biphenyls) fluids."

Cargill Industrial Oils and Lubricants manufactures the fluid for Cooper. While its environmental qualities may be the prime motivator for adoption of biobased transformer coolant fluid, the product performs better than mineral oil. The biobased product can extend the life of a transformer and initial installation can be less expensive since special fire safeguards may not be required.

But it's not just the military itself that finds biobased transformer fluid so useful, Northrup Grumman Shipbuilding in Newport News has also purchased Transformers with FR3 fluid. Other Virginia industries that have converted to FR3 fluid include Hampton Roads Sanitation, Jefferson Laboratory, and A.P. Moller-Maerski Corp container facility. Other Federal agencies that are using FR3 fluid include: National Aeronautics and Space Administration, Departments of State and Energy, Department of the Interior Bureau of Reclamation, Tennessee Valley Authority and others.

ABOUT NAVAL STATION NORFOLK

Naval Station Norfolk is a base of the U.S. Navy supporting naval forces operating in the Atlantic Ocean, Mediterranean Sea, and Indian Ocean. When the 70 ships and 134 aircraft homeported here are not at sea, they are along side one of the 13 piers or inside one of the 11 aircraft hangars for repair, refit, training and to provide the ship's or squadron's crew an opportunity to be with their families.

Port Services controls more than 3,100 ships' movements annually as they arrive and depart their berths. Port facilities extend more than four miles along the waterfront and include some seven miles of pier and wharf space. Air Operations conducts over 100,000 flight operations each year, an average of 275 flights per day.

FACT FILE

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America's farms are just beginning to tap their potential as a source for natural, renewable biobased products that offer benefits to worker health, the environment, America's economy and energy security. To learn more about the many biobased products made from soybeans, such as those used at Department of Defense facilities, go to www.soybiobased.org.

Because of the potential for biobased products to create new markets for soybeans, U.S. soybean farmers have invested millions of dollars to research, test and promote biobased products. Much of this work was done through the United Soybean Board (USB), which is composed of 64 U.S. soybean farmers appointed by the U.S. Secretary of Agriculture to invest soybean checkoff funds. As stipulated in the Soybean Promotion, Research and Consumer Information Act, USDA's Agricultural Marketing Service has oversight responsibilities for the soybean checkoff.

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