Logistics Support in the Arctic

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"Logistics plans and executes the movement and support of forces to include those aspects of military operations that deal with: design and development, acquisition, storage, movement, distribution, maintenance, and disposition of materiel."[1] This remains constant across the U.S. Army, but it takes a much more detailed approach in the Arctic. From extreme cold weather (ECW) to terrain, the environmental effects on personnel, equipment, and supplies force the integration and application of operational art and science in order to extend operational reach, enable freedom of action, and prolong endurance for the commander. Cold weather injuries (CWIs), resupply operations, equipment capability shortfalls and maintenance, and supply sustainability all must be taken into account when planning logistics operations. In the Arctic, the environment is your greatest enemy and an ally that you must respect and master.

With temperatures that can reach -65 degrees Fahrenheit, the extreme cold is a primary factor in planning logistics support to U.S. forces.[2] Of utmost importance is the prevention of CWIs. All personnel must understand how to effectively operate in Arctic ECW conditions and trust in the proper use of their personal protective equipment. Injuries such as frostbite and hypothermia debilitate Soldiers and have an extreme impact on a unit's readiness. The issuance of appropriate cold weather gear and the enforcement of proper use are paramount in the prevention of CWIs. Along with proper wear of gear, Soldiers cannot overexert themselves during operations due to perspiration which can directly result in those injuries.

Refueling and water resupply pose significant risks to Soldiers due to the extreme cold. Fuel does not freeze until extremely negative temperatures which can cause immediate frostbite when it comes in contact with Soldiers' skin. This requires insulated and fuel-proof clothing for our petroleum supply specialists. For water resupply operations, Soldiers require insulated and waterproof clothing to mitigate their layers from becoming saturated and thus causing CWIs. To prevent injuries to Soldiers, leaders must conduct regular and thorough CWI checks in addition to ensuring proper wear and use of individual personal protective equipment (PPE). Units must also incorporate and enforce work-rest schedules to minimize prolonged exposure to the elements.

In terms of U.S. Army equipment's ability to operate in the Arctic, many of our ground and aviation platforms struggle to effectively operate in Arctic ECW conditions. Through numerous field training exercises and rounds of experimentation, Soldiers identified numerous capabilities to support operational requirements. However, those unique or commercial off-the-shelf solutions lack the requisite supply or maintenance support to ensure

A fuel truck from the 725th Brigade Support Battalion (Airborne) and snow machines stage along the Donnelly Drop Zone in Alaska on 8 February 2021 as part of Arctic Warrior 21. (Photos by John Pennell)

sustained operation. These maneuverability shortfalls in Arctic conditions impose limitations on logistics in terms of responsiveness and survivability. The extreme cold temperatures reduce aviation assets' ability to consistently support aerial delivery and sling-load operations while ground resupply experiences a considerable reduction in speed. Commanders and logisticians must take these factors into consideration when developing movement and maneuver plans so they do not outpace the distance and speed at which they receive their required resupplies.

Ice and snow create difficult problem sets when attempting to traverse ground lines of communication. Most U.S. military tires are not rated or suitable for these conditions, which compounds the difficulty of traveling along non-permissive routes and only further decreases the speed of logistics support. Logisticians should also take weight distribution of their loads into account during convoy preparation as light loads can lead to an uncontrollable vehicle in icy conditions. When developing convoy and aerial resupply operations, planners must take into account the increased time for equipment preparation and travel. Driver's training is a critical component of preparing for Arctic convoys. Soldiers must understand how their equipment will handle in the extreme conditions and be comfortable in how to operate under those conditions. Another mitigation is the utilization of tire chains, but Soldiers must train on the proper installation as incorrect application can lead to damaged equipment and ineffectiveness during operations.

Terrain features in the Arctic present their own unique problem sets based upon the time of year and temperature. Key terrain analysis is crucial to successful execution of operations. Something as simple as a steep grade or a sharp turn can have negative impacts on convoy operations. The mountainous terrain and densely wooded areas associated with the Arctic present numerous obstacles when conducting resupply operations. From steep terrain to frozen rivers and lakes, Soldiers face conditions that impede logistics support. Focused driver's training and experienced crews with well-maintained equipment are the best mitigations to these challenges.

Over-the-snow mobility can assist with engaging these challenges, but equipment such as snow machines and small unit support vehicles (SUSVs) are not readily available or lack the requisite sustainment support. Logistics organizations play a large role in maintaining ground lines of communication through implementation of military vehicle-mounted snowplows. The plows are crucial pieces of equipment when it comes to clearing sustainment areas as well as maintaining roads for continued travel.

The Arctic ECW conditions also pose a risk and present additional problem sets for classes of supply. Preservation of classes of supply becomes a much more difficult task due to freezing. Civilian-contracted refrigeration trailers and trucks are the primary means of maintaining rations due to the fact that the multi-temperature refrigerated container system (MTRCS) ineffectively prevents these items from freezing in extreme negative temperatures. Due to the need of preserving and mitigating food items such as fresh fruit and vegetables from freezing, food service specialists will experiment with innovative items such as insulating covers for the MTRCS. Arctic water resupply using water trailers such as the water buffalo, Camel, and Load Handling System Compatible Water Tank Rack (Hippo) have installed heating elements to mitigate freezing, but operators must expertly maintain these systems to reduce the risk of frozen water and burst pipes. The proper functioning of these heating elements is vital to sustaining Soldiers across the battlefield.

As previously discussed, fuel freezes at extremely negative temperatures and poses a CWI risk to our Soldiers. Soldiers must also apply detailed care during refueling operations to mitigate soil contamination. The ground is frozen during the winter months, which prevents effective contamination remediation. Fuel and hydraulic lines can freeze and crack, causing petroleum spills along with non-mission capable equipment. Another consideration is the increased utilization of bulk fuel due to more consistent use of equipment. Soldiers consistently operate vehicles for warmth and to mitigate freezing of the equipment. Generators and heaters are in constant use for life support and should be treated with the same importance as a pacing item.

Equipment maintenance due to unscheduled services increases significantly during Arctic ECW conditions. Bench stock and shop stock, along with thorough preventive maintenance checks and services, will help curb the effects from this, but supplying the necessary parts to the point of need can be cumbersome due to the weather conditions. Battery life is another problem in the extreme cold for vehicles, lights, optics, and numerous other pieces of equipment. Maintenance shelters are a premium item in keeping our combat power in the fight. Although the lightweight maintenance enclosure does not possess the requisite insulation or heating capability to conduct

A Soldier with the 539th Composite Truck Company extends a fuel hose to refuel waiting vehicles during Joint Pacific Multinational Readiness Center 22-02.

maintenance operations in Arctic ECW conditions, we are testing insulated structures to determine the best fit for enabling field maintenance.

Equipment requires a thawing period before mechanics can perform diagnostics or repairs. That, combined with the need to protect Soldiers from the elements, makes maintenance in the Arctic a very difficult task. In an interview with *Army Sustainment*, MG Brian Eifler, commanding general of U.S. Army Alaska and the 11th Airborne Division, said: "In the Arctic, changing a windshield wiper in -50 F temperatures is absolutely a significant event."[3] Due to vehicle accidents and equipment becoming mired in the snow, recovery operations increase during the winter months as well. While it is common practice to include recovery vehicles in most military convoys, that practice is pertinent during Arctic convoys.

In support of warfighter maneuverability, troop transport operations are vital. Medium tactical vehicles (MTVs) with cargo area covers and installed troop heaters serve as primary means of Soldier transport across the area of operations. These assets ensure Soldier warmth along with expedited travel. The systems are also great tools for mitigating equipment and supply freezing. Leaders cannot place enough emphasis on the maintenance and utilization of troop transport assets.

Through tough, realistic training, units within Alaska continue developing expertise in Arctic ECW operations and how to effectively support warfighters in these conditions. The best method of understanding what it means to provide robust logistics to our Soldiers in the Arctic is to train in the conditions we expect to fight in. As MG Eifler stated, "We have to be ready no matter what, and that starts with training that stresses us in all the right ways to achieve that expected dominance."[4] Logisticians must also thoroughly understand the concept of maneuver in order to fully implement the principles of sustainment and provide options to the combatant commander. While we must always consider the adversary, Arctic operations will always require leaders to plan for the environment to be one of the greatest threats to our forces and our mission.

Notes

[1] Army Doctrine Publication 4-0, *Sustainment*, July 2019, 1-1.
[2] 2LT Nathan Bedel, "Water Mitigations in the Arctic," *Army Sustainment* 54/4 (2022): 17, accessed 12 December 2022 from https://www.alu.army.mil/alog/currentissue.pdf.
[3] MG Brian S. Eifler, interview by Mike Crozier, "Meeting the Arctic Challenge," *Army Sustainment* 54/4 (2022): 16, accessed 12 December 2022 from https://www.alu.army.mil/alog/currentissue.pdf.
[4] Ibid.

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