

Soldiers assigned to the 41st Field Artillery Brigade unload an ammunition container from an M270 Multiple Launch Rocket System at a rearm, refuel, and resupply point during Dynamic Front 25 in Rovajärvi, Finland, 7 November 2024. Dynamic Front 25 took place in Finland, Estonia, Germany, Poland, and Romania, and demonstrated NATO's ability to share fire mission target information and operational graphics from the Arctic to the Black Sea. The annual exercise increases the lethality of the alliance through long-distance fires, builds unit readiness in a complex joint, multinational environment, and leverages host-nation capabilities to increase U.S. Army Europe and Africa's operational reach. (Photo by Sgt. Gianna Elle Sulger, U.S. Army)

# Black on Ammunition, Green on Forecasting Ammunition Lessons Learned from a DIVARTY in a Division Warfighter Exercise

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In the Army, most people naturally think black on ammo is a bad thing. However, what if black on ammo actually means you are doing exactly what you need to do to accomplish the mission? There is an ongoing debate among the sustainment, fires, and movement and maneuver warfighting functions as to what a black status means with respect to ammunition. For the purpose of this article, I define "black on ammo" as it is relates to the division artillery (DIVARTY) force's field artillery headquarters (FFA HQ) mission as the inability to support field artillery tasks against the division commander's high-payoff target list without resupply.<sup>1</sup>

Army Regulation 700-138, Army Logistics Readiness and Sustainability, delineates a "green" status as unit quantity that is 90 percent or greater (combat capable), "amber" as 70–89 percent strength (combat capable with minor deficiencies), "red" as 60–69 percent (combat ineffective, unit has major losses of deficiencies), and "black" means a unit quantity is less than 50 percent (at grave risk, not supportable).<sup>2</sup> In the sustainment community, most sustainers naturally want to keep a stockpile of all supply commodities on hand for replenishment purposes before units go black and, if at all possible, keep commodities above levels of amber, preferably in the green at all times.

As the lead sustainer in the 2nd Infantry DIVARTY in the role of an FFA HQ, I had the unique opportunity to enhance my understanding of the fires' side of logistics and multiple echelon levels of sustainment. I quickly understood that ammunition may not always be green. In fact, sometimes on-hand quantities might be in the red or black, which is okay if you understand mission requirements, can appropriately forecast ammunition, and can make ammunition adjustments depending on the range to the enemy's location. In the division's 2022 Warfighter exercise (WFX 22-02), my sustainment team and I used class V (CLV) ammunition projected volume of fire (VOF) for each phase of the operation to accurately forecast ammunition expenditure (up to ninety-six hours out and tied to the targeting cycle) and help drive the course of action in CLV ammunition expenditure success.

Most sustainers view the replenishment of ammunition and the calculation of the required supply rate (RSR) as a straight-line process. They straightforwardly define the concept of RSR as the quantity of CLV ammunition needed for a specific operation. Units evaluate their ammunition needs to maintain tactical operations throughout chosen periods and accordingly establish an RSR. Although managing ammunition through a straight-line approach may work well under certain conditions, it becomes especially critical for artillery units engaged in large-scale combat operations (LSCO) to dynamically forecast their needs. They must consider the various combat phases and the expected VOF.

To elaborate on this, the process begins when sustainers and units analyze the operational goals and the nature of the conflict they are entering. This initial assessment is crucial for determining the basic framework of their ammunition requirements. In traditional scenarios, a linear model of supply might suffice, where the consumption rate is relatively predictable, and resupply can be planned on a regular basis. This model relies on historical data and standard operating procedures to ensure units have enough ammunition for their missions.

However, in more complex environments such as LSCO, the situation on the ground can change rapidly. Artillery units in particular face unique challenges due to the scale of engagements and the strategic importance of their firepower. The dynamic forecasting they are encouraged to perform involves a detailed analysis of the operation's phases—from initial engagement, through maneuvering, to the final assaults.<sup>3</sup> Each phase might require different types and quantities of ammunition, influenced by the enemy's actions, our strategic decisions, and other factors like weather or terrain.

Forecasting thus becomes a multifaceted task. It's not just about predicting how many rounds of ammunition will be needed, but understanding when they will be needed, and how best to distribute them across the units involved. This requires a deep collaboration with intelligence units to monitor enemy movements and anticipate changes in the battlefield. Logisticians and

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(Figure by author)

### Figure 1. Straight-Line Required Supply Rate (RSR) Forecast versus Real-World Expenditure

planners use this information to adjust their forecasts and supply plans accordingly.

Moreover, the expected VOF plays a critical role in these calculations. VOF is essentially a measure of the intensity of firing expected during an operation. It's impacted by the operation's objectives (e.g., suppressing enemy defenses, supporting an assault, or defending against an attack), the duration of engagement, and the effectiveness of the enemy's countermeasures. Artillery units must ensure they have not just enough ammunition but the right kind of ammunition to achieve their objectives without running into shortages at critical moments.

While the fundamental principles of ammunition resupply might seem straightforward, the reality on modern battlefields demands a far more nuanced approach. Effective ammunition management in LSCO environments is about anticipation, adaptability, and the precise coordination of logistics and combat operations to meet the challenges of dynamic and often unpredictable combat scenarios.

It's important to expand on this and understand that in the dynamic and often unpredictable environment of LSCO, the demand for ammunition can fluctuate significantly. Artillery units, facing varying intensities of combat, must adjust their supply strategies to ensure they have sufficient ammunition to maintain operational effectiveness. This necessitates a departure from the more linear, predictable models of supply chain management, toward a more flexible and anticipatory approach.

As these units progress through different phases of combat, the nature of their engagements can change, requiring different types and quantities of ammunition. For instance, during an initial offensive phase, the demand for the high volume of fire might be greater to suppress enemy positions. Following this, in a more static defensive phase, the rate of ammunition



(Figure by author)

#### Figure 2. Per Phase Required Supply Rate (RSR) Forecast versus Real-World Expenditure

consumption might decrease but require precision munitions for targeted strikes.

Anticipating the VOF—that is, the intensity and quantity of ammunition required for effective engagement with the enemy—becomes critical. This requires a deep understanding of the operational tempo, enemy capabilities, and the tactical objectives for each phase of the operation. By effectively forecasting these needs, artillery units can tailor their RSR, ensuring that they neither run short of critical munitions nor overburden their supply lines with excessive stockpiles that may not be immediately necessary.

While a straight-line process for calculating and managing ammunition supply might suffice for smaller or more predictable operations, the complex and fluid nature of LSCO demands a more nuanced approach. Sustainers and artillery units must work closely, employing both quantitative models and qualitative judgments, to anticipate and meet the evolving ammunition needs. This proactive strategy is essential for maintaining the momentum and effectiveness of artillery operations within the broader context of LSCO, ensuring that forces remain prepared and adaptable in the face of changing battlefield dynamics.

## Understanding Ammunition by VOF and by Phase of the Operation

Expending rounds against the enemy based on the phase of the operation is an approach that will better describe requirements to ensure mission accomplishment. Figure 1 is visual representation of how many logistics planners view RSR. RSR translates for the duration of an operation, a forecast of ammunition inventory based on a straight line RSR. Figure 2 portrays the recommended approach to view RSR, which is by forecasting inventory over time by phase of the operation. The DIVARTY benefited significantly from this approach during WFX 22-02.



(Figure by author)

#### Figure 3. Planned versus Actual MLRS Ammunition Expenditure by Type

Projecting RSR by phase of the operation helped us forecast our requirements two days earlier than if we used a straight-line RSR. The difference of two days in LSCO can be the difference between winning and losing. In our case, it meant when we would need a resupply sooner than expected. Our forecasting helped determine the need for resupply in Phase II of the operation versus Phase III. As shown in figure 2, our forecasting also helped us to shorten our mission requirement gap, illustrating our projected ammunition aligned with our projected ammunition requirements. As a DIVARTY, we could forecast how much ammunition we had at all times, and we knew when we would run low and by how much.

Over time, the pattern of ammunition expenditure and VOF more closely represents a bell curve than a straight-line pattern. A straight-line pattern is deceiving across phases of an operation because it gives the impression that ammunition requirements will remain steady throughout. In our WFX, that was clearly not the case. Based on projected VOF, the DIVARTY could tell the critical ammunition like the M30 rockets the and the older M26A2 rockets for the multiple launch rocket system would fluctuate throughout the entire operation. We anticipated we would expend more M30 up front, then transition to M26A2 in following phases as shown in figure 3. Army Techniques Publication 3-09.30, *Observed Fires*, specifies that unlike the traditional free-flight M26 series rockets, whose accuracy degrades as the range to the target increases, the guided multiple launch rocket system provides consistent improved accuracy from a fifteen kilometer minimum range to a maximum range of more than seventy kilometers.<sup>4</sup> Thus, the preferred ammunition to shoot is M30 if within range for accuracy and reduction of collateral damage.

What we did not anticipate in the WFX was a controlled supply rate (CSR) imposed on critical ammunition at the sustainment stock level, the source of our ammunition replenishment. This imposed CSR was at an insufficient level to meet our daily requirements. This CSR meant we would go red and black on critical ammunition requirements we needed to support long-range artillery missions. Based on guidance from the commander on how we planned to fight, we had a reliable estimate for when we would run out of ammunition for each critical ammunition. Further, we had a branch plan to allow us to fight using long-range munitions if required. The CSR would increase the risk at a critical portion of the battle that was unacceptable to multiple commanders. The staff's ability to communicate these concerns allowed the risk to remain at an acceptable level.

An FFA HQ requires efficient communication to get the appropriate information needed between different organizational networks. The DIVARTY gathered information at multiple levels to obtain a holistic view and communicate a shared understanding of the process. As a DIVARTY in the role of an FFA HQ, we are in a unique position. We can view sustainment stock and on-hand quantities across multiple units, including any attached or reinforcing field artillery brigade. The field artillery brigade primarily focuses on what it has on-hand at the gunline and at its sustainment battalion. The sustainment brigade primarily focuses on higher echelon sustainment stock. The DIVARTY occupies the space between. Therefore, we are able to synthesize the two perspectives to get a more holistic assessment.

As an FFA HQ, we actively utilize VOF along with the operational phase to precisely determine forecasted ammunition requirements. The DIVARTY's targeting mission offers a level of predictability that directly informs us of the necessary amount of ammunition required to sustain the battle. We enhance this process by proactively integrating ammunition requirements into our comprehensive planning efforts and branch plans. This integration allows us to adapt to changing conditions and to tailor our approach according to the specific type of operation we are engaged in.

Based on the targeting requirements identified for each phase of the operation, we make informed decisions regarding the types of long-range artillery resources that will be needed. This decision-making process is crucial for ensuring that our operations are not only effective but also efficient, minimizing waste while maximizing impact on the battlefield.<sup>5</sup>

#### **Forecasting Ammunition**

For the firing units to successfully meet the maneuver commanders' targeting guidance, the FFA HQ must forecast accurately. This accurate forecasting is not just a perfunctory task; it's a critical component that shapes the description of ammunition requirements. These requirements are detailed not only by the quantity of ammunition requested and used by the unit but also by the *s*pecific needs that arise during operations.

The process of forecasting ammunition involves several key factors, primarily the Department of Defense Identification Code, or DoDIC. The DoDIC specifies the exact type of ammunition needed, while inventory tracking systems help assess the quantity needed. This precision ensures that units have the right ammunition, in the right place at the right time, thereby enhancing the effectiveness of military operations.

As a DIVARTY, our role extends beyond mere requests. We consistently communicate our requirements, which are tightly linked to the targeting cycle. This continual communication is crucial because it allows for a seamless integration of our needs with the overall operational plan. By doing so, we substantially reduce the occurrence of unforecasted requirements. Unforecasted requirements can pose additional and unnecessary risks for sustainment units, who may find themselves in challenging positions trying to fulfill last-minute demands. Hence, our proactive approach in forecasting and communication helps in mitigating these risks, ensuring that our sustainment units are better prepared and not overburdened with unforeseen tasks.

In essence, the precision in forecasting and the continuous communication of ammunition needs are fundamental to the efficient operation of artillery units. These practices ensure that the firing units have the necessary resources to meet their objectives, thereby supporting the broader mission of ensuring security and effectiveness in military operations.

For the initial first two phases of WFX, we planned to rely heavily on M30 ammunition. We knew our forecasted replenishment for M30 for Phases I and II would be high. The high consumption of M30 would allow us to remove the high-payoff targets that posed the highest risk in these phases. With this risk reduced for Phases III and IV, we could transition our expenditures to another type of ammunition. We based consumption rates on defense, offense, and stability operations. Informed by our anticipated targeting success, we forecasted high for offense and relatively lower expenditures for defense.

Our S-2/S-3 high-value target analysis drove out forecast analysis based on the required VOF needed to achieve mission success. We also used counterfire analysis and anticipation to determine how much we would need to defend our division and ourselves. We even further involved ourselves as a S-4 section through our attendance in the DIVARTY targeting meeting, which allowed us to anticipate requirements out to ninety-six hours. Based on forecasted VOF, close coordination with the fire control officer, ammunition expenditure, and the imposed CSR for sustainment stock, we forecasted that we would be in a red or black status on both M30 and M26A2 ammunition by end of Phase III/ beginning of Phase IV.

We knew we did not have many options so we quickly made the operational determination that we would not conserve ammunition; rather, we would



A soldier from 3rd Battalion, 19th Airborne Field Artillery Regiment, 3rd Brigade Combat Team, 82nd Airborne Division participates in a live-fire event with an M119 howitzer during the Division Artillery's Best of the Best competition on Fort Bragg, North Carolina, 7 December 2022. Competing soldiers are categorized based on their military occupational specialty and weapon to showcase their talents through precision, speed, and lethality. The team's competition category was the "Best M119 Howitzer." (Photo by Sgt. Emely Opio-Wright, U.S. Army)

use what we had of the M30 first for longer-range artillery then move closer to the enemy for shorter range M26A2 ammunition to achieve similar effects. Tactically, this meant we had to plan to move closer to the forward line of troops to change ammunition type. We also had another course of action to shift to high explosive M31 instead of M30 in the interim when we ran out of both M30 and M26A2, which required a more accurate target location to achieve the same effect. This meant that instead of a six-to-eight-digit grid coordinate, we would need a ten-digit grid coordinate for effective targeting, requiring a lot more accuracy from the division's target detection efforts.

However, perception from a sustainment metrics perspective stated that we were black on ammunition (less than 50 percent). In the eyes of FFA HQ, we ultimately would not be black on ammunition until we absolutely had no ammunition left. This meant sustainment black was our 100 percent, amber was 75 percent of that, and red was less than 50 percent of that. Black for us was no ammo at all. Using this simple metric helped us accurately estimate when the division had positioning and risk decisions to make. The FFA HQ communicated these opportunities through multiple working groups and decision boards at the division and field army levels. These decisions would be made based off the targeting success and the ammunition that remained by phases of the operation. The division needed to win the battle based on ammunition type we had left.

An additional challenge we quickly resolved in the initial phase of calculating ammunition requirements was the way in which we received ammunition reporting requirements. The standardized logistics status document in which units sent up CLV ammunition requirements had ammunition consolidated into one full rollup versus breaking down how much ammunition consumption each unit expended day by day. As

#### **AMMUNITION LESSONS LEARNED**

an FFA HQ, our ammunition expenditure strategy calculated ammunition expenditure day by day for an end-of-day individual rocket count. The day-by-day ammunition expenditure count allowed us to communicate accurately how much ammunition the division expended. Additionally, it allowed us to see how much we could anticipate expending. Finally, it allowed us to know how much ammunition remained based on what artillery type we wanted to use. Planning and accurate forecasting was the essential foundation for our ability to use ammunition effectively.

#### Summary

During our WFX, the success we experienced with ammunition management was directly attributable to clear guidance from leadership and the seamless synchronization of our staff. Unlike many organizations, which often struggle to integrate sustainment and logistics into their combat planning effectively, DIVARTY took a proactive stance. We didn't just include sustainment as a side note in our mission planning; we positioned it at the core of our strategy to ensure the mission's success.

One key to our achievement in this area was our precise forecasting of ammunition needs, extending up to ninety-six hours ahead and intricately linked to our targeting cycle. This foresight allowed us to meticulously align the projected volume of fire for CLV ammunition with each phase of the operation. This planning was pivotal in determining our course of action and ultimately in the successful expenditure of CLV ammunition.

Traditional sustainment doctrine might label our approach and category of ammunition metrics as "black" on ammunition, indicating a critical shortage or potential shortfall in supply. However, as an FFA HQ, DIVARTY broke the mold. We employed unconventional forecasting techniques and conducted in-depth ammunition analysis, which played a crucial role in navigating potential shortfalls and achieving our mission objectives.

Our innovative approach to ammunition management and the clear articulation of our requirements have set a precedent we believe can benefit other units across the Army, especially in LSCO. The methodologies we developed and employed represent a shift in how sustainment and logistics can be integrated into combat planning, offering a template for success in future operations.

In summary, DIVARTY's success during the WFX was not a happy accident but the result of deliberate planning, innovative thinking, and a holistic approach to sustainment. Our experience demonstrates that embracing sustainment as a fundamental component of mission planning, coupled with innovative forecasting and analysis, can significantly enhance operational effectiveness, a lesson we hope will resonate Army wide.

#### Notes

1. Joint Publication 3-09, *Joint Fire Support* (Washington, DC: U.S. Government Publishing Office [GPO], 2019), 34, <u>https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp3\_09.pdf</u>.

2. Army Regulation 700-138, Army Logistics Readiness and Sustainability (Washington, DC: U.S. GPO, 2018), 30, <u>https://armypubs.army.mil/epubs/DR\_pubs/DR\_a/pdf/web/ARN7663\_AR700-138\_Web\_FINAL.pdf.</u>

3. Army Techniques Publication (ATP) 4-35, *Munitions Operations* (Washington, DC: U.S. GPO, 2023), chap. 2, <u>https://armypubs.army.mil/epubs/DR\_pubs/DR\_a/ARN37303-ATP\_4-35-000-WEB-1.pdf</u>. 4. ATP 3-09.30, *Observed Fires* (Washington, DC: U.S. GPO, 2017), 6-4, <u>https://armypubs.army.mil/epubs/DR\_pubs/DR\_a/pdf/</u>web/ARN5011\_ATP%203-09x30%20FINAL%20WEB.pdf.

5. ATP 3-60, Targeting (Washington, DC: U.S. GPO, 2023), 3-3-3-5, https://armypubs.army.mil/epubs/DR\_pubs/DR\_a/ ARN39048-FM\_3-60-000-WEB-1.pdf.