In November 2018 the 2nd Battalion, 44th Air Defense Artillery Regiment returned from our eighth deployment since 9/11 in support of Operations Inherent Resolve (OIR) and Freedom’s Sentinel (OFS). While deployed, we conducted counter-rocket artillery and mortar (C-RAM) operations and implemented kinetic and non-kinetic, and offensive and defensive counter-unmanned aerial system (CUAS) capabilities. In reflection of the hundreds of rocket attacks we received during our nine-month deployment, it was well observed that there are opportunities to better train Engagement Operations Cell (EOC) crews to defeat the complex rocket attacks we saw in OFS. The tempo of the CALFEX was based on demonstrated crew performance rather than a rigid master scenario events list (MSEL) historically used. The 2-44th ADA executed high-level training and progressively difficult scenarios to test crews’ system knowledge and adherence to unit tactics, techniques and procedures (TTPs). C-RAM deployment training methodologies should adopt a conditions-based progression approach infused with increasingly complex scenarios and CUAS engagement sequence training to evolve our proficiency and best keep pace with current and future threats.

In the National Military Strategy (NMS), the Chairman of the Joint Chiefs of Staff (JCS) prioritizes efforts across the department against Russia, China, Iran, North Korea and violent extremist organizations (VEOs). With the C-RAM mission historically focused only on VEO IDF attacks, we have to expand our focus to include near-peer threats in a multi-domain battle. In Afghanistan, 2-44th ADA faced hundreds of IDF attacks with short track times and complex maintenance issues in congested airspace, as well as the challenges of initiating kinetic CUAS engagement processes. C-RAM mission rehearsal exercises (MREs) should replicate the complexities seen in theater and the range of possibilities described in the NMS. While it is impossible to predict and replicate every possible scenario, the training should evolve as various threats evolve. In combat, there are routinely maintenance faults, equipment faults and equipment limitations where a more extensive battle drill is involved. At the 2019 CALFEX, we implemented these lessons learned from our deployment to create a more fluid C-RAM approach to inculcate these themes into our EOC and LPWS crews. C-RAM MREs need
to evolve to properly train battalions on the threats they will face downrange and in future conflicts.

Another challenge we faced during our deployment to OFS was the implementation of both non-kinetic and kinetic CUAS capabilities in theater. The battalion created and implemented a comprehensive CUAS Academy throughout Afghanistan in 2018 to infuse knowledge and awareness of the UAS threat. It was designed to educate and train Soldiers across Afghanistan on the various aspects of a CUAS mission, to include visual aircraft recognition, capabilities and limitations, the current UAS threats, current TTPs for reporting CUAS, and the inclusion of CUAS electronic warfare systems. This training was extremely successful as the CUAS team instructed over 1,000 coalition Soldiers across Afghanistan.

During the 2018 deployment, 2-44th ADA received a directive to perform a live-fire test of the Howler weapon system in a combat environment. The Howler is a platform that fires a Coyote Block IC (a UAS with a payload) to intercept and destroy UAS threats. The S-3 operations team developed a joint engagement sequence (JES) with adjacent and higher echelons to enable a safe intercept with the Howler weapon system. The JES cannot be conducted with the C-RAM unit alone, the Air Traffic Control (ATC) and base defense operations center (BDOC) play a crucial role in engaging an aircraft. The biggest challenge we faced with the JES was the amount of time it took to coordinate with the ATC and BDOC. The only way to shorten the process is to properly train the BDOC and ATC crews and create a shared understanding of their responsibilities. While performing the JES in theater, it was observed how critical it is to implement JES training into MREs for deploying C-RAM battalions, as well as units deploying as a BDOC or ATC element.

As part of the potential to improve the training pipeline, pre-deployment training for deploying battalions must include JES training. With protection of friendly aircraft being the top priority for all air defenders, the procedures to engage an air track are much more complex than during an IDF engagement. While the EOC has full autonomy to engage rockets and mortars nearly instantly, the Target Engagement Authority (TEA) to engage a threat UAS is the BDOC commander. Although it is often a lengthy process, the JES mitigates risk of fratricide by incorporating redundant safety checks. Only the BDOC has the ability and resources to validate these safety checks.

When performing CUAS operations in theater, C-RAM units are currently required to train incoming BDOC and ATC crews, some with a three-month turnaround, on the JES to facilitate a smooth and timely engagement sequence. It is important for BDOC and ATC units to participate in the five-module CUAS Academy and learn the JES prior to deploying. This training helps instill the importance of quickly sanitizing airspace and having positive control of friendly UAS flying around the forward operating base.

As the operational environment and enemy TTPs continue to evolve, C-RAM units will intercept threat UAS with the C-RAM weapon system. Prior to engaging an air track, the TEA, EOC and air element must follow critical steps to ensure the protection of manned aircrafts and friendly UAS: positive identification, airspace sanitation and confirmation that the threat is hostile. When the C-RAM battalion is training the BDOC, it is paramount that all TEAs are present, understand their responsibilities and understand the risks involved when engaging an aircraft. At a minimum, the EOC, ATC and BDOC should conduct rehearsals with a simulated UAS engagement, and if possible, conduct a live fire to refine the agreed-upon JES.

The 2-44th ADA capitalized on these lessons learned during the CALFEX by replicating scenarios seen in theater to provide the most realistic training possible. Our S3 operations team created six levels of increasingly difficult IDF scenarios that closely replicate those seen in combat for both EOC and LPWS crews. This type of training motivated crews to develop a mastery of the systems and challenged their ability to work together and solve complex equipment problems under pressure. The levels of difficulty ranged from level one, a single RAM event with no injects best described as an easy “granny shot,” to level six, involving extremely difficult IDF scenarios with multiple rockets and/or mortars, maintenance faults and equipment failures during the engagement.

Rather than keeping one crew in each EOC for a six-to-eight-hour window, EOC crews were constantly either conducting a live certification, training against challenging simulation scenarios or learning about the current UAS
threat in the five-module tactical CUAS Academy taught by the mobile training team. This constant rotation enhanced training by eliminating downtime when the LPWS was conducting maintenance or performing a reload. When a crew was performing exceptionally well during the live certification, the lead trainers would present increasingly challenging scenarios. Rather than following a rigid MSEL and giving each crew the exact same scenarios, the lead trainers were able to easily interchange EOC crews in and out of the live and simulation EOCs to provide crews the training that was most beneficial for them. If a crew was struggling to perform against low-to-intermediate scenarios, they were immediately given an after-action review and then placed in a simulation EOC to re-train with two experienced observer coach trainers. Once that crew demonstrated improvement on battle drills and adherence to unit TTPs, they were given another opportunity to enter the EOC to engage live rockets and mortars.

Leading up to the CALFEX, the 2-44th ADA designed and refined the procedures to engage a UAS, developed unit TTPs and taught 17 EOC crews the battle drills in a matter of weeks. Further, we increased the difficulty level in UAS engagements at the 2019 CALFEX by flying both hostile and friendly UAS, and incorporating realistic injects into the JES. The S-3 operations team used the same six level difficulty model to challenge crews on CUAS engagements and create a more complex training environment. The 101st DIVARTY and the 1/101st Air Defense Airspace Management/Brigade Aviation Element cell were instrumental in making this event successful. Prior to the CALFEX, these entities participated in a two-day JES training event where we taught them the BDOC and ATC roles. They provided feedback throughout the training to improve the JES and make it a more fluid and user-friendly sequence. They made the training much more realistic for the EOC crews by incorporating injects similar to those that will be seen in combat.

In Joint Publication 3-0, the JCS states that the integration and synchronization of joint Fires and joint fire support are essential to the success of joint operations. When defeating unmanned fixed-wing and rotary-wing aerial systems, detailed coordination and training are critical for a safe and effective execution. During the live fire, we exercised the JES with DIVARTY and the ADAM cell performing the role as the BDOC TEA and the ATC. With their participation and knowledge on air-space management operations, the 2-44th ADA validated the JES and made improvements to unit TTPs for future training. The lessons learned will serve to improve and better integrate UAS intercept operations into future MREs.

In order to train a battalion that is prepared to fight the complex IDF attacks and future threats, MREs should not follow a structured MSEL, but rather challenge crews based on how they perform and progress. Future C-RAM live-fire ranges should move away from easy RAM shots and start infusing difficult scenarios that test discipline and adherence to unit TTPs. The training should also incorporate kinetic CUAS operations to teach units how to execute the JES with BDOC and ATC elements. C-RAM deployment training needs to more closely mimic the 2019 CALFEX to provide high-level training for EOC and LPWS crews and prepare for the evolving threat in combat.

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