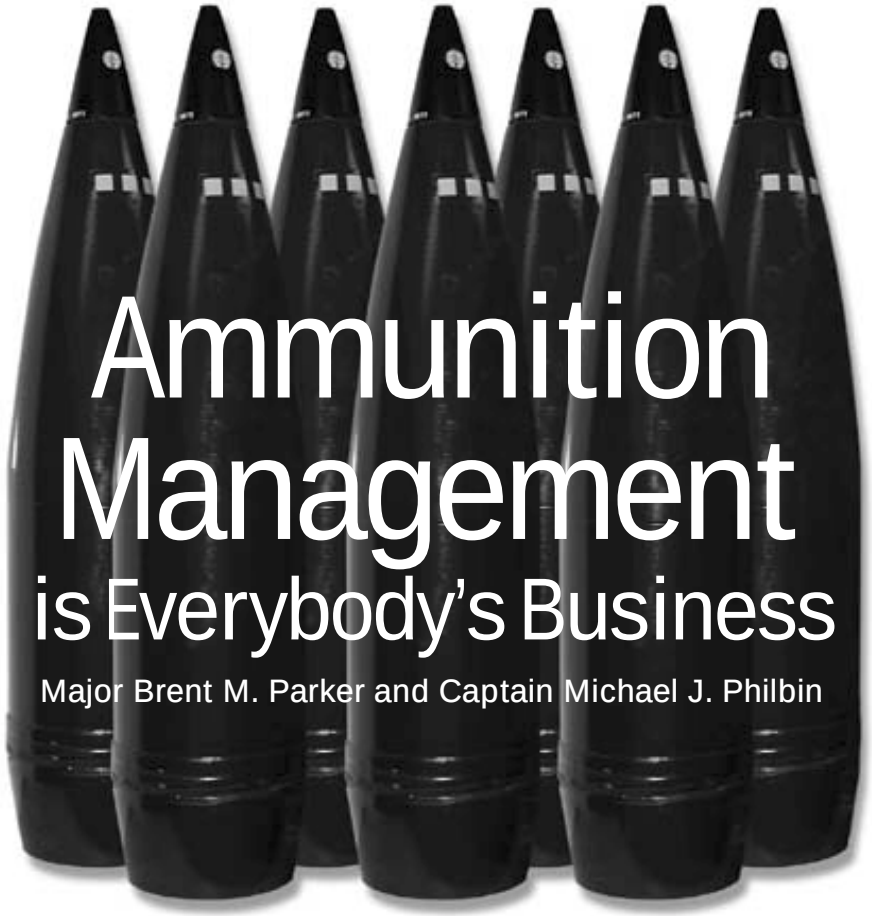


Ammunition Management is Everybody's Business

Major Brent M. Parker and Captain Michael J. Philbin

The *Strikers* battalion was going into its second battle during its rotation at the National Training Center (NTC), Fort Irwin, California. The unit had had time to plan and prepare for its initial encounter with the "Krasnovians." It had considerably less time to plan for this next fight and would no longer have its unit basic load (UBL) as a baseline for ammunition planning.

During the previous six months, the battalion supply officer (S4) had helped prepare the *Strikers* for the rotation. In addition to the logistics planning and preparation for deployment, the S4 wisely focused on ammunition management during the train-up. Many units had difficulty managing ammunition at the NTC because of a lack of home-station training with such large quantities of ammunition.

In conjunction with the S3 and the battalion executive officer (XO), the S4 developed measures and a training plan to solve the battalion's ammunition management shortfalls. Five months before the rotation, the XO, S3, S4 and the battalion fire direction officer (FDO) began revising the ammunition portion of the battalion tactical standing operating procedures (TACSOP); developing a UBL, ammunition haul plans and standard combat configured loads (CCLs); planning for ammunition during the military decision-making process (MDMP); and developing a service support paragraph in the battalion operations order (OPORD) that included an ammunition distribution plan.

UBL, Haul Plans and CCLs. According to *FM 6-20-1 Tactics, Techniques and Procedures (TTP) for the Field Artillery Battalion*, the "UBL is that quantity of ammunition authorized and required to be on-hand in a unit to meet combat needs until resupply can be accomplished."

The group started with the battalion's haul capacity to determine the total amount of ammunition the battalion could carry. Using historical data from previous NTC rotations and Janus exercises, the group calculated how much ammunition the battalion would need to execute an attack or defense. Then the group built the UBL to be able to conduct either mission within the haul capacity.

Before modifying the battalion TACSOP, the S4 reviewed the doctrine on ammunition management in *FM 6-20-1* and *FM 6-70 TTP for M109A6 Howitzer (Paladin) Operations* and the battalion's and other units' NTC take-home packets. He then developed a list of the responsibilities of the key players in ammunition management: XO, S3, battalion FDO, S4, battalion ammunition officer (BAO), ammunition platoon sergeant, headquarters/service battery commander, firing battery commander, battery XO/platoon leader, battery/platoon FDO, section chief, ammunition section team chief and palletized loading system (PLS)/5-ton chief. (For a list of their responsibilities, see the web site at www.irwin.army.mil/wolf/wolveshome/Default.htm. The job descriptions listed are taken from FM 6-20-1 and FM 6-70 plus some recommended additions.) What surprised the S4 was the large number of battalion personnel necessary for successful ammunition management—managing ammunition was *everybody's* business.

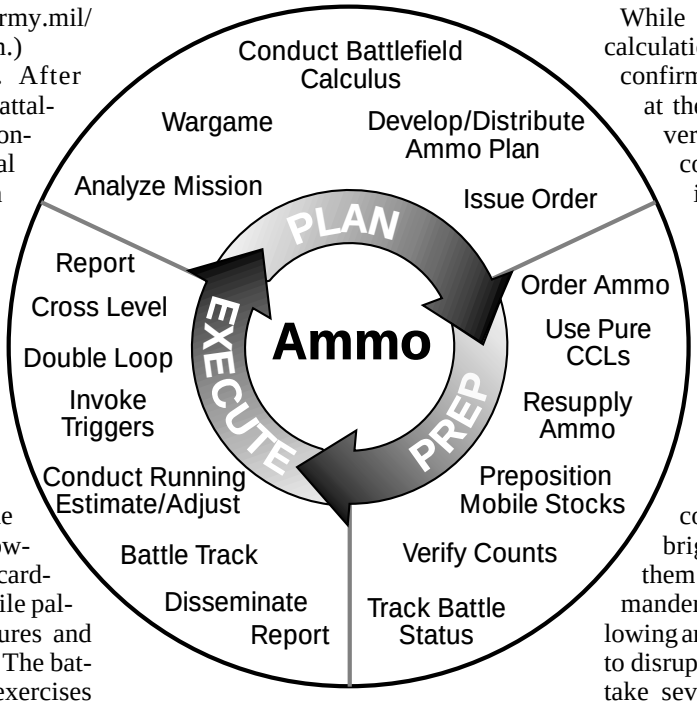
Next, the S4 discussed with the S3 and battery commanders a standard ammunition report every 30 minutes and PLS habitually being associated with the same firing batteries. The administration and logistics operations center (ALOC) was the central location for ammunition management. It was easy for the ALOC to track the total battalion ammunition count by consolidating battery reports and incorporating ammunition counts at the combat and field trains. With this information, the S4 could recommend to the S3 movement and cross leveling of ammunition and adjustments to resupply triggers.

The S4 added the standard ammunition report formats and times to the TACSOP. Additionally, the TACSOP had the standardized ammunition tracking charts used at the tactical operations center (TOC), ALOC and battalion support operations center (BSOC).

The S4, S3, battalion FDO and BAO developed standard CCLs for the TACSOP. The CCLs were based on mission requirements, haul capacity and flexibility. For example, the family of scatterable mines (FASCAM) CCL included 108 remote anti-armor mine systems (RAAMS) and 24 area denial artillery munitions (ADAMs), enough to build a 400x400-meter medium-density minefield. The FASCAM CCL contained an additional 56 dual-purpose improved conventional munitions (DPICM) to maximize haul capacity. To maintain flexibility, this CCL had six different possible combinations of propellants, ranging from M3A1 (Green Bag) to M119A2 (Red Bag) to a mix of powders in between. (For an example of this CCL, see

the web site at www.irwin.army.mil/wolf/wolveshome/Default.htm.)

Home-Station Training. After modifying the TACSOP, the battalion began training. The S3 conducted an officer professional development (OPD) session and NCO development program (NCODP) to discuss the revisions to the TACSOP. Next, the S3 divided the field training exercises (FTXs) into live-fire and dry-fire portions. During the dry-fire portions, the battalion trained with notional ammunition tracked on paper and primers to replicate live ammunition. The PLS trucks used expended powder canisters, wood pallets and cardboard boxes the size of projectile pallets to train tie-down procedures and simulate hauling ammunition. The battalion XO used these dry-fire exercises to focus the battalion on ammunition reporting and tracking procedures.



The XO started each Janus exercise with the historical ammunition counts from the battalion's last Janus exercise to conduct ammunition battlefield calculus and maintain a running estimate of the ammo supply. This technique worked the staff's ability to analyze on-hand ammunition against required ammunition by using an action-reaction-counteraction approach to determining ammunition shortfalls. Additionally, the staff had to maintain a running estimate of ammunition expended during battles and ammunition resupply and to account for ammunition losses due to counterfire and air attack. The XO was a demanding leader who kept his staff members on their toes.

Second NTC Battle. The S4 hoped all the training of the past months would pay off in the next NTC battle. The S3 entered the TOC at the NTC with a copy of the brigade's operations order for the second battle—it was a deliberate attack. Now was time to conduct battlefield calculus.

Battlefield Calculus. During mission analysis, the unit tailors its ammunition for the mission and then refines the ammunition type and count in the wargaming portion of the MDMP. The XO said some units had tried to resupply up to their original UBL instead of conducting ammunition analysis for each mission. These units would not have had enough special munitions at the decisive point of the battle. The UBL is generic enough to execute either an attack or defense, but it might not be able to meet all the requirements for a specific mission.

The S4 and the battalion FDO quickly scanned Annex D, the fire support annex, and found six essential fire support tasks (EFSTs) associated with this mission from which the essential FA tasks (EFATs) for each battery are derived. The six EFSTs were disrupt enemy engineer preparation, destroy an infantry strongpoint, suppress two motorized rifle platoons (MRPs) at the zone of penetration, obscure the breach point, neutralize the combined arms reserves (CAR) and neutralize the regimental artillery group (RAG). As part of mission analysis, the S3 determined the *Strikers* battalion was responsible for the first four EFSTs. The reinforcing battalion was responsible for neutralizing the RAG; close air support (CAS) would neutralize the CAR.

The battalion FDO consulted his munitions effects tables and determined it would take a battalion six-rounds of DPICM to destroy the infantry strongpoint. It would take a battery three-rounds of DPICM per target to disrupt the engineer prep and to suppress each MRP. The battery firing smoke would need 50 M825 rounds to provide a 1,000-meter smoke screen for 30 minutes. After a brief discussion with the S3, the battalion FDO calculated the engineer targets and infantry strongpoint would require M119A2 propellants and the remaining targets would require M4A2.

While the battalion FDO made his calculations, the S4 called the ALOC to confirm the current ammunition count at the combat and field trains. He verified the battery ammunition counts against what the battalion fire direction center (FDC) was tracking. When the FDO completed his analysis, the S4 subtracted the battalion ammunition on-hand from the ammunition the FDO said was required. According to his math, the battalion had plenty of the right type of ammunition for the next fight.

When the staff members had completed their analyses of the brigade order, the S3 gathered them to brief the battalion commander. The commander gave the following ammunition guidance: "The task to disrupt the engineer preparation will take several missions—I would estimate 15 to 20—so you need to take that into account in your planning. Plan to re-attack the infantry strongpoint three or four times to achieve the desired effects. The suppression against the MRPs will be continuous suppression for at least 30 minutes; you might even plan for an hour. The breach will take far more than 30 minutes, so plan to provide screening smoke for at least 90 minutes. Although our [direct support] battalion is not responsible for neutralizing the CAR or the RAG, we must be prepared to shoot SEAD [suppression of enemy air defenses] and a marking round for CAS. S4, based on these changes, do we still have enough ammunition on-hand to execute our EFATs?"

The S4 and FDO recalculated the ammunition requirements and found the battalion was short 14 battalion-ones of Red Bag and approximately 50 smoke rounds. The S4 then checked his controlled supply rate (CSR) and concluded there was more than enough ammunition available in the CSR to make up for the current shortfalls to execute the EFATs, and the ammunition could be on-hand in 12 to 24 hours.

The S4 reported the information to the battalion commander and immediately contacted the BAO to get an update on ammunition haul available. The BAO reported that after supplying the batteries and consolidating flat racks, the battalion would have four empty PLS available. The S4 ordered three Killer/Red Bag CCLs and one Smoke/White Bag CCL, asking that a Killer/Red Bag CCL

be issued to each firing battery as soon as possible. The BAO knew how to use the standard CCLs in the battalion TACSOP. Although the S4 knew that "pure" CCLs might not work for every mission, he tried to use them as much as possible. Standard CCLs make ammunition management a little easier.

Resupply Methods and Triggers. Once the S4 started the ammunition resupply moving, he rejoined the staff for the course of action (COA) development phase of the MDMP. The staff developed two different COAs for the next battle. The S4 analyzed each COA to determine the best resupply method. He looked at the amount of ammunition to be resupplied, battery locations compared to the combat ammunition trains location, experience of the ammunition platoon and the environmental factors that may affect resupply, such as terrain, weather and light. After careful consideration, he chose to use flat rack exchange points as the optimum method of resupply and plotted potential exchange points for each COA.

With the S3 and battalion FDO, the S4 calculated resupply triggers. They had to answer several questions to develop resupply triggers. How much ammunition is available in each battery, including pre-positioned ammunition and ammunition on trucks? The less ammo in the positions, the lower the number of volleys required to trigger resupply.

How far from the resupply point is each battery, and how long will resupply take? The longer the time for resupply, the lower the number of rounds that triggers resupply.

What is the method of resupply? A unit using flat rack exchanges will want to empty or almost empty a flat track before conducting the exchange.

When does the battalion plan to fire a high volume over a short time? The S4 recalled the battalion almost ran out of propellants in the last fight. He learned to focus more on propellant resupply triggers than projectile resupply triggers.

Ammunition Distribution Plan. When the staff finalized its COA, the S4 reviewed the EFAT responsibilities for each battery. Each battery was responsible for a different block of time or phase to engage enemy engineer assets. All batteries would fire a preparation against the infantry strongpoint. A and C Batteries, primarily, would be responsible for providing suppression. Finally, B Battery would provide the smoke screen.

With this information, the S4 continued to develop his ammunition distribution plan. He looked at the on-hand ammunition counts of each battery to see if he needed to cross-level ammunition. Also, he sent word to the BAO to send the smoke flat rack to B Battery. He verified that alternate batteries had enough ammunition on-hand to accomplish at least part of the EFAT, just in case B Battery could not maintain a firing capability during this critical EFAT. For example, C Battery had the alternate responsibility to fire the smoke screen. Although C Battery did not have 90 minutes of smoke on-hand, it did have enough to provide a 60-minute screen or a smaller screen for 90 minutes.

During the action reaction-counteraction sequence of wargaming, the S4 validated his ammunition distribution plan. Along with the FDO, the S4 tracked each mission fired during the wargame. Missions fired accounted for accomplishing the EFATs, re-attacking targets and firing targets of opportunity. He decremented the ammunition from the planned starting point for each battery, using battlefield calculus (see Figure 1).

The S4 also developed decision points to resupply batteries as the batteries expended their ammunition and recorded them for inclusion in the OPORD's service support paragraph. At the end of the wargame, the S3, S4 and FDO had a clear understanding of the minimum ammunition requirements to support the EFATs to be published in the operations order.

The commander also specified the battery commanders inform him if a

Type	On Hand	Phase 1	Phase 2	Phase 3	Total	Delta
A Battery						
HE	93			6	6	87
DPICM	643	108	72	108	288	355
BBDP	90	36			36	54
ADAM	12		24		24	-12
RAAMS	48		96		96	-48
CPH	28	2			2	26
SMK	29		58		58	-29
RAP	76	36			36	40
GB	180				0	180
WB	670	110	130	114	354	316
RB	160	62	120		182	-22
B Battery						
HE	30			36	36	-6
DPICM	378	108	108	108	324	54
BBDP	126	36			36	90
ADAM	0				0	0
RAAMS	0				0	0
CPH	24				0	24
SMK	72			58	58	14
RAP	43	36			36	7
GB	162					162
WB	322	110	108	144	362	-40
RB	27	62			62	-35

Legend:

ADAM = Area Denial Artillery Munition
BBDP = Extended-Range DPICM
DPICM = Dual-Purpose Improved Conventional Munition
CPH = Copperhead
GB = Green Bag
HE = High Explosive
RAAMS = Remote Anti-Armor Mines System
RAP = Rocket-Assisted Projectile
RB = Red Bag
SMK = Smoke M825
WB = White Bag

Figure 1: Example of Battlefield Calculus for Ammunition Purposes

During the action-reaction-counteraction sequence of wargaming, the S4 validated his ammunition distribution plan. Along with the FDO, the S4 tracked each mission fired during the wargame.

battery fell below its minimum determined EFAT ammunition requirement before executing its EFAT. The S3 added this requirement under the commander's critical information requirements (CCIRs) that are part of the FA support plan (FASP).

After the wargame, the staff began FASP production. The S4 included the ammunition distribution plan in the service support paragraph. The plan included when, in what quantities and where the ammunition platoon would deliver each battery's ammunition; ammunition resupply triggers; resupply methods; locations of resupply points; and the ammunition CCIRs. This gave the BAO all the guidance he needed to deliver the ammunition to the batteries. By publishing a complete ammunition distribution plan, everyone understood the scheme and resupply method.

Ammunition Resupply. Immediately following the first fight, the BAO had gone to the S3 and S4 for guidance on what ammunition to push to the firing batteries during reconsolidation. Generally, the battalion resupplied the batteries with Killer CCLs of DPICM and White Bag because the batteries always have opportunities to fire them. He exchanged half-empty flat racks at the batteries with full CCL racks of Killer munitions.

The BAO's platoon sergeant supervised the cross leveling and consolidation of ammunition in the combat trains. The platoon sergeant preferred having the same six PLS crews with him at the combat trains. That way, they knew what to expect from him and he knew what to expect from them.

By the time some of the racks had been emptied and all the ammunition consolidated, the S4 contacted the BAO with the ammunition order for the next fight. The BAO then relayed the order to his ammunition platoon representative in the field trains. He also sent instructions to bring the three full flat racks in the field trains forward to the combat trains to exchange for the empty racks and then pick up ammunition requested from the CSR.

When the ammo platoon rep arrived at the combat trains with three full PLS, the BAO found out the time and location for the ammunition draw: 0600 hours at the brigade's ammunition transfer point (ATP). The BAO or his platoon sergeant always was present at ammunition draws in case there were complications.

The instructions were to get the Killer/Red Bag ammunition to the batteries as soon as possible, so the ammo platoon sergeant took the loaded flat racks immediately to an exchange point. En route, he contacted the ALOC and reported the total ammunition drawn using the format for tracking the battalion's ammunition (see Figure 2); he also instructed the ALOC to tell each firing battery to send a PLS to the exchange point. As it was, A Battery, the "hot battery," was down to battery-three volleys of Red Bag firing against the enemy engineer preparation targets when its PLS returned with the Killer/Red bag CCL.

When the BAO returned to the combat trains with his copy of the FASP, he immediately gave instructions to the platoon sergeant to have the smoke CCL sent to B Battery. When the ammunition distribution was complete, the BAO and his platoon sergeant rehearsed their soldiers on the routes and actions on contact for the next day's mission. The BAO monitored the firing batteries' ammunition consumption during the battle and prepared for any resupply.

Battery Ammo Management. Meanwhile, the A Battery commander reported to the S4 that he received the ammunition and sent a battery consolidated ammunition report. He instructed his battery XO to continue to track ammunition and report the count every 30 minutes while he developed the battery OPORD.

After digesting the information provided in the service support paragraph, the A Battery commander had a clear understanding of his EFATs and began developing his battery order. He established his battery turret loads by adjusting the standard turret load for the offense in the TACSOP, based on the EFATs his battery was responsible for at that phase of the battle.

He had to decide which battery internal resupply method to use and develop triggers for the ammunition carrier-to-PLS resupply (e.g., methods are separate or mated, and resupply is every 16 volleys of DPICM, eight volleys of Red Bag or 16 volleys of White Bag). He knew initially his counterfire and ground attack threats would be low, so the battery would use mated operations and resupply combat ammunition trains to the PLS every 16 rounds during Phase I of the operation. He then adjusted his resupply methods and triggers to equally support the different phases of the operation.

The A Battery commander noticed in the service support paragraph that the battalion ammunition resupply trigger for the battery was 27 volleys. He quickly did the math (six guns x 27 volleys = 162 rounds); he or the XO had to notify the battalion S4 to trigger resupply when the battery fired that many rounds. The battalion then would direct a PLS to move from the combat trains to a designated ATP point to exchange flat racks. Once the flat racks in the battery were empty, the PLS would move to the exchange point for a full CCL from a combat trains PLS.

Understanding that the key issue was propellant, the A Battery commander thought a good overall CCL would be a pure CCL of DPICM/Red Bag triggered to replace what he had fired. However, the PLS currently in his position had a mix of White Bag and Red Bag. He

informed the S3 that his resupply trigger must be modified and that firing 10 volleys of Red Bag, based on his on-hand count, should be a trigger, ensuring his battery had Red Bag until it received a pure CCL with Red Bag.

The A Battery commander knew he had to manage the ammunition on the flat racks in complete rounds. He could not allow ammunition carrier crews to take only propellants, which could rapidly cause ammunition accountability problems. Additionally, he developed resupply triggers divisible by eight to minimize random numbers of leftover rounds and ensure efficient transfers of ammunition from the flat racks to the ammunition carriers. The PLS crew would then be able to keep ammunition banded and ready for rapid movement.

The battery commander directed his ammunition carrier crews replace one propellant type for another if they removed only propellants from a PLS. The S3 concurred with the battery commander's recommendations and directed the S4 to adjust the resupply trigger for Red Bag based on current CCL configurations.

The A Battery commander also was to be notified immediately about the loss of one of his howitzers, ammunition carriers or PLS, including the amount of ammunition destroyed on that vehicle. He ensured this info was included in the CCIR portion of his order. It was

155-mm Ammo	DPICM	BBDP	HE	RAP	ADAM	RAAMS	CPH	Illum	SMK M835	SMK HC	WP	GB M3A1	WB M4A2	RB M119 Chg 7	RB M203 Chg 8	Total Rds	Total Propellant
DODAC	D563	D864	D544	D579	D502	D509	D510	D505	D528	D506	D550	D540	D541	D533	D532		
CSR	89	12	33	12			1	3	6		6	46	61	34	26	162	167
Total	1602	216	594	216	24	108	18	54	108	0	108	828	1098	612	468	3048	3006
A Btry	360	162	60	78			30	12	60		12	80	258	258	178	774	774
B Btry	360	162	60	78			30	12	60		12	80	258	258	178	774	774
C Btry	360	162	60	78			30	12	60		12	80	258	258	178	774	774
FR # 1	50	12			18	96							118	58		176	176
FR # 2	50	12			18	96							118	58		176	176
FR # 3	120	56											118	58		176	176
FR # 4	120	56											118	58		176	176
FR # 5	120	56											118	58		176	176
FR # 6	120	56											118	58		176	176
FR # 7	120	56												150	26	176	176
FR # 8	120	56												150	26	176	176
FR # 9	120	56												150	26	176	176
FR # 10	120	56												150	26	176	176
FR # 11	120	56											176			176	176
FR # 12	120	56											176			176	176
FR # 13	120	56											118	58		176	176
FR # 14	120	56											118	58		176	176
FR # 15	120	56												100	76	176	176
FR # 16		176													176	176	176
FR # 17	98	14	64										48	32	96	176	176
FR # 18		14	142	20									48	32	96	176	176
FR # 19			176												176	176	176
FR # 20			100	76									48	42	86	176	176
FR # 21	6			94	12	24			40						176	176	176
Total	2844	1442	662	424	48	216	90	36	220	0	36	240	2214	2044	1520	6018	6018

Legend:
Chg = Charge
CSR = Controlled Supply Rate
DODAC = Department of Defense Ammunition Code
FR = Flat Rack (of Ammo)
Illum = Illumination
SMK HC = Smoke HexaClorathan
WP = White Phosphorous

Figure 2: Example of a Battalion Ammunition Tracking Sheet

155-mm Ammo	DPICM	BBDP	HE	RAP	ADAM	RAAMS	CPH	Illum	SMK M835	SMK HC	WP	GB M3A1	WB M4A2	RB M119 Chg 7	RB M203 Chg 8	Total Rds	Total Propellant
DODAC	D563	D864	D544	D579	D502	D509	D510	D505	D528	D506	D550	D540	D541	D533	D532		
CSR	89	12	33	12			1	3	6		6	46	61	34	26	162	167
Total	1602	216	594	216	24	108	18	54	108	0	108	828	1098	612	468	3048	3006
Gun 1	15	4	6				2	2	8		2		25	14		39	39
FAASV 1	48	10		10	4	18	3					10	40	25	18	93	93
Gun 2	15	4	6				2	2	8		2		25	14		39	39
FAASV 2	48	10		10	4	18	3					10	40	25	18	93	93
Gun 3	15	4	6				2	2	8		2		25	14		39	39
FAASV 3	48	10		10	4	18	3					10	40	25	18	93	93
Gun 4	15	4	6				2	2	8		2		25	14		39	39
FAASV 4	48	10		10	4	18	3					10	40	25	18	93	93
Gun 5	15	4	6				2	2	8		2		25	14		39	39
FAASV 5	48	10		10	4	18	3					10	40	25	18	93	93
Gun 6	15	4	6				2	2	8		2		25	14		39	39
FAASV 6	48	10		10	4	18	3					10	40	25	18	93	93
FR #13	176												176			176	176
FR #14	176													176		176	176
FR #15		76							100					100	76	176	176
Total	730	160	36	60	24	108	30	12	148	0	12	60	566	510	184	1320	1320

Figure 3: Battery Ammunition Tracking by Guns, FA Ammunition Supply Vehicles (FAASV's)

critical to maintain total ammunition accountability at all times to determine if the battery had enough ammunition to service its EFATs. In his OPORD, he directed the battery XO report the consolidated ammunition count every 30 minutes by shell/propellant/fuze and lot for all ammunition carrying vehicles in the position in accordance with battalion formats (see Figure 2).

The A Battery commander learned from his last battle that not having a battery consolidated ammunition count caused poor decisions to be made, resupply triggers to be missed and the loss of accountability when equipment was destroyed. The battery FDC only had been able to give him a current count of ammunition on the gun line, not the entire position. The battery commander directed his XO to develop a document to account for all battery ammunition by element (see Figure 3).

He then developed a set of battery triggers based on past missions and added this to his battery TACSOP: reporting triggers of 10 volleys of DPICM/White Bag or five volleys of special munitions/Red Bag. He also directed the platoons to report every 25 minutes on the battery net and the XO to forward the consolidated report to the ALOC.

The battalion had enforced the habitual association of specific PLS with a battery, making reporting battery ammo counts easier. That way the PLS drivers became integrated into battery operations and knew key leaders and when to report statuses. They also were familiar with the battery's TACSOP.

The battery XO's habitual relationship with his PLS crews helped him maintain his ammunition count. They knew he wanted an update every 25 minutes, starting at 15 minutes past the hour, so he did not have to constantly ask them for it. The FDC crew also sent their ammunition counts to him in a timely manner. This reporting process helped the XO be proactive in sending his reports to the S4 in the ALOC. As a result, A Battery never went to a red status for ammunition on-hand. At the end of the battle, the battery XO reported to the ALOC that A Battery still had enough ammunition to continue the attack.

The S4's hard work on ammunition planning, preparation and execution in this battle had paid off. He began to collect the information he needed for mission analysis for the next fight to start the ammunition planning and management cycle over.

Everyone from the battalion to battery knew and understood his role and responsibilities in ammunition management. The S4 had developed an ammunition plan early and passed this information on to the executors quickly. He also had refined the plan as the battalion developed the order.

Everyone in the battalion understood the plan and provided feedback on its execution. Everyone reported ammunition levels accurately and often.

The battalion fired more than 300 rounds in the first hour of the battle. The S4 now understood why so many units had difficulties managing ammunition at the NTC. At home station, they typically fired 200 to 300 rounds in a five-day live-fire FTX.

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