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DEPARTMENT OF SUPPLY CHAIN AND INFORMATION SYSTEMS

READY TO FIGHT TONIGHT: IS THE ARMY SUPPLY CHAIN READY TO SUPPORT A
GLOBAL NEAR PEER ENGAGEMENT?

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ABSTRACT

The purpose of this thesis is to explore the current Army supply chain infrastructure and practices in place related to their efficiency as part of a potential force projection against a near-peer in a high-end conventional war. The threat of near-peer competitors has come to be a common phrase used in defense circles as the United States military planners and policymakers look to the future of armed conflict.

This thesis is primarily focused on Army capabilities, but due to the joint nature of warfighting and the structure of the Department of Defense, it is necessary to examine some of the military logistics infrastructures beyond that which belongs solely to the Army. Additionally, it is necessary to recognize that this work does address the capabilities of nations like Russia and China that make them near-peer competitors but does not evaluate the efficacy of current U.S. foreign policy towards them as that goes beyond the scope of this work.

Due to the nature of this information this body of work is based solely on open-source information like the National Security Strategy, National Defense Strategy, congressional testimony, think tank reports, and unclassified documents.

Based on the findings of this research, it is clear that the three largest challenges for Army supply chain readiness are the munitions supply chain, the need to balance readiness and modernization efforts, and the lack of reliable and secured 5G mobile technology. All three of these issues stem from years of budgetary uncertainty and lack of investment in emerging technologies and their application for use by the military.

Keywords: Closed-loop supply chain, power projection, Army, great power competition, prepositioned stocks, Organic Industrial Base

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Introduction

“You will not find it difficult to prove that battles, campaigns, and even wars have been won or lost primarily because of logistics.” – GEN Dwight D. Eisenhower

Logistics touches every aspect of Army strength: for every tank round fired; for every helicopter that takes off; for every GPS tracking system used, the Army supply chain is responsible for it from its manufacture to the very end of its lifecycle. As military planners look to the future it is clear that the next conflict the U.S. is involved in will be larger than anything the military has faced in the past two decades. This leads to the important question: “Is the Army ready to fight tonight?” If the answer is no, then how does the Army get to a higher level of readiness? Often the answer is focused on the training of units and the maintenance status of equipment, but it necessary to dive deeper and examine the systems that sustain units and provide the logistics support that keeps units ready. “Logistics is the foundation for the success of military operations from entry-level training to the most complex operations across the spectrum of conflict,” (Wissler, 2018). In order to fight and win the nation’s wars, the U.S. Army must be backed by an agile, resilient, and ready supply chain.

This thesis analyzes a variety of open-source information available on Army readiness and the Army logistics enterprise. Starting with the Trump Administration’s National Security Strategy (2017), the main threats to U.S. security were identified. Then in the National Defense Strategy (2018) the Department of Defense takes the information from the National Security Strategy and translates it into broad military guidance for military planning and strategy and force posture. Congressional testimony of senior Army leaders and Department of Defense officials provides information on the status of the Army supply chain and the greater DoD

logistics enterprise. Additionally, published interviews with Army leaders provide more detailed information about specific readiness topics and think tank reports create the context for looking at the major issues facing the U.S. military and specifically the Army supply chain.

The remainder of this thesis will address the major components of the Army supply chain and how these organizations work together to support and sustain the entire Army. The Army Prepositioned Stocks and the Army Organic Industrial Base are significant force multipliers in the Army supply chain and their impact on Army supply chain readiness and capability is examined. Then the new operating environment that the Army will find itself in future wars is addressed along with its impacts on Army Logistics. Finally, the major weaknesses of the Army supply chain are identified as is their root cause.

Chapter 1

The Army Supply Chain

The Army supply chain is a multimillion-dollar business that makes up just a portion of the multibillion-dollar Department of Defense (DoD) supply chain. The Army's logistics enterprise operates at such a large scale with a high degree of complexity that distinguishes itself from even the largest commercial supply chains ("Managing Supply Chains: What the Military Can Teach Business (and Vice Versa)," 2003). While the basic set-up and purpose of traditional industry supply chains and military supply chains are similar they face different challenges that impact their performance.

Traditional commercial supply chains are driven by the need for efficiency, with a particular emphasis on operating at the lowest possible cost with the highest possible productivity by focusing on minimizing inventory, and capacity management. In particular, supply chains that use just-in-time (JIT) manufacturing smooth the flow of material from suppliers to the manufacturing line. Management of efficient supply chains may include activities that manage demand, such as Wal-Mart's "everyday low prices" to reduce the likelihood of demand spikes or refining forecasting techniques to improve the quality of supply chain planning (Wang, 2007).

Military supply chains need to be highly responsive and able to handle large surges in demand. The Army is expected to be able to deploy quickly anywhere in the world, and that means that the Army must have a supply chain that can adapt and respond to unpredictable demands and a rapidly changing environment ("Managing Supply Chains: What the Military Can Teach Business (and Vice Versa)," 2003). Support for Operation Iraqi Freedom (OIF) moved the

equivalent of “over 150 Wal-Mart superstores” to Kuwait to support 250,000 Soldiers, sailors, airmen, and marines (Wang, 2007).

In addition to operating some of the largest forward supply chains in the world, the Army has the added challenge of operating a retrograde pipeline for all Class VII supply items (See Appendix A). Class VII items are designed to be repaired and maintained by the tactical unit that owns the item, but in cases where maintenance and repairs go beyond the capabilities of the unit, the item is sent back to its depot. For every piece of equipment, from engines, rotors, to electronics, that gets deployed there must be a way to move it back to a depot or maintenance location (“Managing Supply Chains: What the Military Can Teach Business (and Vice Versa),” 2003). Depots are a key piece of the Army Organic Industrial Base covered in Chapter 3.

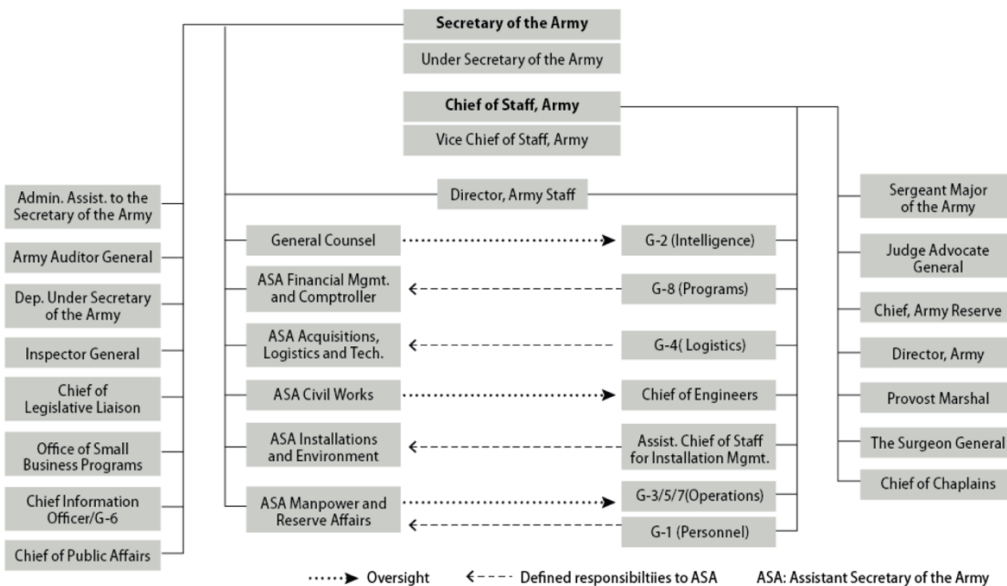
In addition to the sheer scale of the Army supply chain, there are multiple Army and DoD entities that are responsible for empowering, enabling, and operating the logistics enterprise. The Headquarters Department of the Army G-4, the Army Materiel Command, the Logistics Corps, and the Defense Logistics Agency are the most important stakeholders to consider when evaluating supply chain readiness and performance (Feickert, 2020).

Headquarters Department of the Army G-4

The Headquarters Department of the Army G-4 (HQDA) is the deputy chief of staff of the Army for logistics. The HQDA G-4 is part of the Army staff and works with the Assistant Secretary of the Army for Acquisitions, Logistics, and Technology ASA(ALT) to advise the Chief of Staff of the Army and the Secretary of the Army on logistics matters (See Figure 1).

Also, the HQDA G-4 is responsible for developing the plans and policies used by all Army Logisticians across the globe and then oversee the implementation of said policies.

Figure 1. Department of the Army Organization



Source: Association of the United States Army (AUSA), Institute of Land Warfare, Profile of the United States Army, September 2018.

Army Materiel Command

The U.S. Army Materiel Command (AMC) is one of the Army's four major commands and its mission is to "develop and deliver materiel readiness solutions to ensure globally dominant land force capabilities," (AMC Resource Guide 2017-2018, 2017). AMC does this by developing technology, providing acquisition support, and logistics support for the Army. AMC is responsible for ten major subordinate commands (See Appendix B) each with its' own specific mission; these organizations provide materiel life-cycle management for AMC and the Army (AMC Resource Guide 2017-2018, 2017). The selected AMC subordinate commands are highlighted for their importance in the Army supply chain for the movement of troops, weapons

systems and vehicles, and ammunition, all things that are needed in order project force anywhere in the world (Frier et al., 2011).

Army Sustainment Command

The Army Sustainment Command (ASC) is tasked with integrating and synchronizing the delivery of AMC capabilities and enablers at specific points of need to support Army readiness (Gamble, 2018). ASC connects the national sustainment base to Soldiers in the field, bringing together the capabilities of AMC's subordinate units to ensure Soldiers have what they need when they need it. Within the scope of ASC is the materiel management of major end items such as tanks and mine-resistant ambush-protected vehicles, and sustains, maintains, and modernizes them for combat brigades. The command is involved in the retrograde of excess equipment from combat areas to support Army requirements. The Army Prepositioned Stock (APS) Sets also fall under the purview of ASC (Gamble, 2018) and will be discussed more in Chapter 2.

Joint Munitions Command

The Joint Munitions Command (JMC) provides the Army and Joint Forces with ready, reliable, and lethal munitions at the right place and time to sustain global operations. JMC is unique from the other subordinate commands as they provide logistics support for the other Armed Services, not just the Army. They oversee the whole lifecycle of conventional munitions including production, distribution, storage, and demilitarization of munitions for all U.S. military services and, if necessary, U.S. allies as well. JMC supports a global presence of technical

munitions to frontline units. As part of the Army Organic Industrial Base, JMC manages ammunition plants that produce more than 850 million rounds of ammunition annually and storage depots that receive, store and issue training and combat munitions (AMC Resource Guide 2017-2018, 2017).

Army Medical Logistics Command

The Army Medical Logistics Command (AMLC) is the Army's primary medical logistics and sustainment command, responsible for managing the global supply chain and medical materiel readiness across the whole of the Army (Hanson, 2019). The AMLC has only been part of AMC for a short period, but the integration of medical logistics into the greater logistics enterprise of AMC is a step to ensure readiness across the whole Army.

Tank-Automotive & Armaments Command

TACOM, the Tank-Automotive & Armaments Command, manages the Army's ground equipment supply chain, which constitutes about sixty percent of the Army's total equipment. TACOM is responsible for six components of the Army Organic Industrial Base, including the Joint Systems Manufacturing Center-Lima, Watervliet Arsenal, Anniston Army Depot, Red River Army Depot, Sierra Army Depot, and the Rock Island Joint Manufacturing and Technology Center (AMC Resource Guide 2017-2018, 2017).

Military Surface Deployment and Distribution Command

The Military Surface Deployment and Distribution Command (SDDC), is the Army's provider of global deployment and distribution capabilities. SDDC operates the two Military Ocean Terminals (MOTs) on either coast that conduct port operations for the military with the added responsibility of being the primary strategic ammunition ports for all overseas areas of operation (AMC Resource Guide 2017-2018, 2017). The SDDC working with U.S. Army Transportation Command is responsible for moving deployed Soldiers and their equipment from their stateside duty station to wherever they are forward-deployed, so the SDDC is an incredibly important readiness enabler for the Army (Army Materiel Command, 2019).

Logistics Corps

The Army Logistics Corps is the heart of Army sustainment.ⁱ There was a movement in the 2000s to consolidate the Quartermaster, Ordnance, and Transportation Corps under one organization to better plan, integrate, and execute sustainment activities (Schröter, 2000). Traditionally the purpose of the Quartermaster Corps was to provide supplies and services; the Transportation Corps was responsible for the movement of troops, supplies, and equipment; the Ordnance Corps' was tasked with maintenance and munitions. However, due to the demand for Logisticians, at every level, to understand and be able to execute the tasks of each branch, the Army moved all three branches to Fort Lee, VA which is now the Army's Sustainment Center of Excellence. The officers of the Logistics Corps oversee the key touchpoints of the Army supply chain from leading a distribution platoon to running a supply support activity to commanding a Field Support Brigade (See Chapter 3). Logisticians represent the supply chain workforce and

lower-level management at the tactical and operational levels while the HQDA G-4 and AMC are the upper-level managers and senior leaders at the strategic level.

Defense Logistics Agency

The Defense Logistics Agency (DLA) is the U.S.'s joint combat logistics agency. Its primary purpose is to meet the logistics requirements of the armed forces for food, clothing, fuel, repair parts, and other items. DLA also supplies eighty-six percent of the military's spare partsⁱⁱ and nearly one hundred percent of fuel and troop support consumables (DLA at a Glance, 2020), manages the reutilization of military equipment, provides catalogs and other logistics information products, and offers document automation and production services to a host of military and federal agencies.

The primary mission of DLA is to efficiently support the armed services' requirements. To fulfill this mission, it must maintain inventories of items for which demand is highly variable even when relatively stable, could increase or decrease dramatically on short notice, or may never even materialize (Peltz et al, 2015). DLA achieves a high level of customer service by maintaining a high level of stock, while a commercial firm may not do this due to the costs of carrying inventory that may never get used. However, DLA needs to do this to ensure that they can meet the needs of the Warfighter promptly. DLA combines its logistics capabilities with the manufacturing and industrial capabilities of the Army Organic Industrial Base by operating DLA warehouses on the site of Army depots and arsenals to create a more cohesive supply chain enterprise (*Defense Logistics Agency Locations*).

Chapter 2

Army Pre-Positioned Stocks

The Army prepositioned stocks (APS) program constitutes one of the three legs of the strategic mobility triad: airlift, sealift, and prepositioning (See Figure 2). “APS exists to reduce deployment response time and the initial amount of strategic lift required to support continental U.S. (CONUS)-based power projection and to sustain the Warfighter until sea lines of communications with CONUS are established and industrial base surge capacity is achieved,” (Tactical Defense Media, 2018). There are multiple types of APS: prepositioned unit sets, operational project stocks, Army war reserve sustainment stocks, and war reserve stocks for allies (Piggee, 2018). All four categories contribute to the idea of “readiness”, but only the first three categories are part of the Army supply chain intended for use by the U.S. Army.

Figure 2. Strategic Mobility Triad



Source: Army Field Manual 100-17-2 Army Pre-positioned Land

Prepositioned unit sets are built to reduce deployment response time and support the Army’s force projection strategy (See Appendix C for 10 U.S. Code § 2229 for the law on the

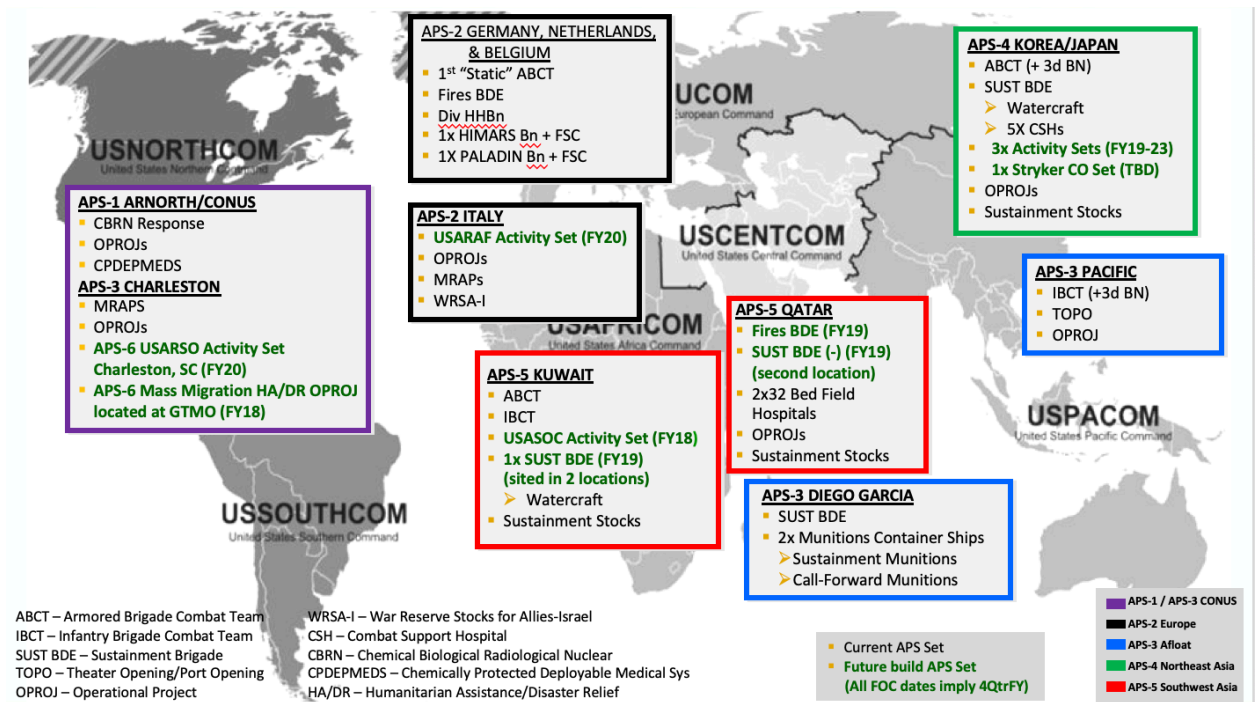
DoD requirements for prepositioning). Unit sets include combat equipment (major end items, Appendix A) and enablers like communications and communications security equipment.

Operational project stocks are equipment not found in Army unit authorizations. These are tailored to provide key strategic capabilities required by combatant commanders in support of contingencies, humanitarian assistance, and disaster relief. Army war reserve sustainment stocks are assets intended to sustain the fight by replacing combat losses and supplies consumed in battle. War reserve stocks for allies are owned and paid for by the U.S. but are intended to be transferred to support allied forces under the Foreign Assistance Act (Piggee, 2018).

APS is an important component of total Army readiness and global force projection. Due to the nature of future conflicts, the Army needs to be increasingly expeditionary, with confidence in their ability to rapidly deploy from home stations to the battlefield with access to ready, modern, combat-configured equipment.

APS assets are located worldwide in North America, Europe, South Korea, Japan, Kuwait, and Qatar, with stock located ashore and afloat (See Figure 3). The equipment stored at each location is based on the operational needs of the combatant commander in the associated theater of operations. Critical equipment stored at the various locations includes major end items such as tanks and combat vehicles, medical equipment, engineering equipment, and artillery systems that make up armored and infantry brigade combat teams, sustainment brigades, and other critical unit sets.

Figure 3. Current APS Footprint



Source: LTG Aundre F. Piggee. 2018. "Army Prepositioned Stocks Deep Dive for the House Armed Services Committee." Washington, D.C., April 13.

Transitioning from Combat Capable to Configured for Combat

Originally when the APS sets were deployed around the globe they were combat capable, which meant that when a unit was dropped on the APS set they would have to configure or put together, the equipment themselves, which is the equivalent of buying a product with some assembly required. This meant that the deployed unit would have to bring all the necessary tools and equipment to properly configure the equipment they were falling in on.

Former AMC commander, GEN Gustavo Perna, directed the change in the configuration of APS from combat-capable to combat-configured to increase the combat readiness of APS sets, enable faster employment of the APS sets, and reduce the amount of equipment the deployed unit would need to bring with them from their home-station (Tactical Defense Media, 2018).

The Configured for Combat (CFC) implementation plan is in progress and runs through the fiscal year 2024 (Tactical Defense Media, 2018). The ultimate goal is to store and issue equipment in a ready-to-fight configuration with command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) enablers. By eliminating the number of steps, and therefore time, between the deploying units leaving their CONUS station and being ready to move in theater provides a higher degree of readiness for the Army. Combat-configured APS is intended to function as a strategic deterrent and, when called upon, CFC APS provides the combat equipment required to respond rapidly and win in a conventional warfare situation.

Army Field Support Brigades

Army Field Support Brigades (AFSBs) are a subordinate unit of the Army Sustainment Command and have a variety of responsibilities. However, for the purpose of this research, the focus is on their maintenance and care of APS sets when they are not employed by a deployed unit and their retrograde operations. They provide the link between the strategic operations of AMC and the operational and tactical operations of the units that are actually deployed and fighting the fight (Gamble, 2018).

The role of AFSBs is increasingly important with the transition from combat-capable to combat-configured as the equipment requires more frequent maintenance when it is in its combat-configured state. Additionally, AFSBs are responsible for issuing the APS equipment to the deployed unit, so the more efficient the AFSB Soldiers are the faster the deployed unit can be operating in the field. In the event that any equipment sustains damage that renders it inoperable, the AFSBs also must conduct retrograde operations and move the equipment back up the

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logistics supply chain to an Army depot. At the depot, skilled workers will repair the broken equipment or salvage as much of it as possible so that the parts can be used in other repairs.

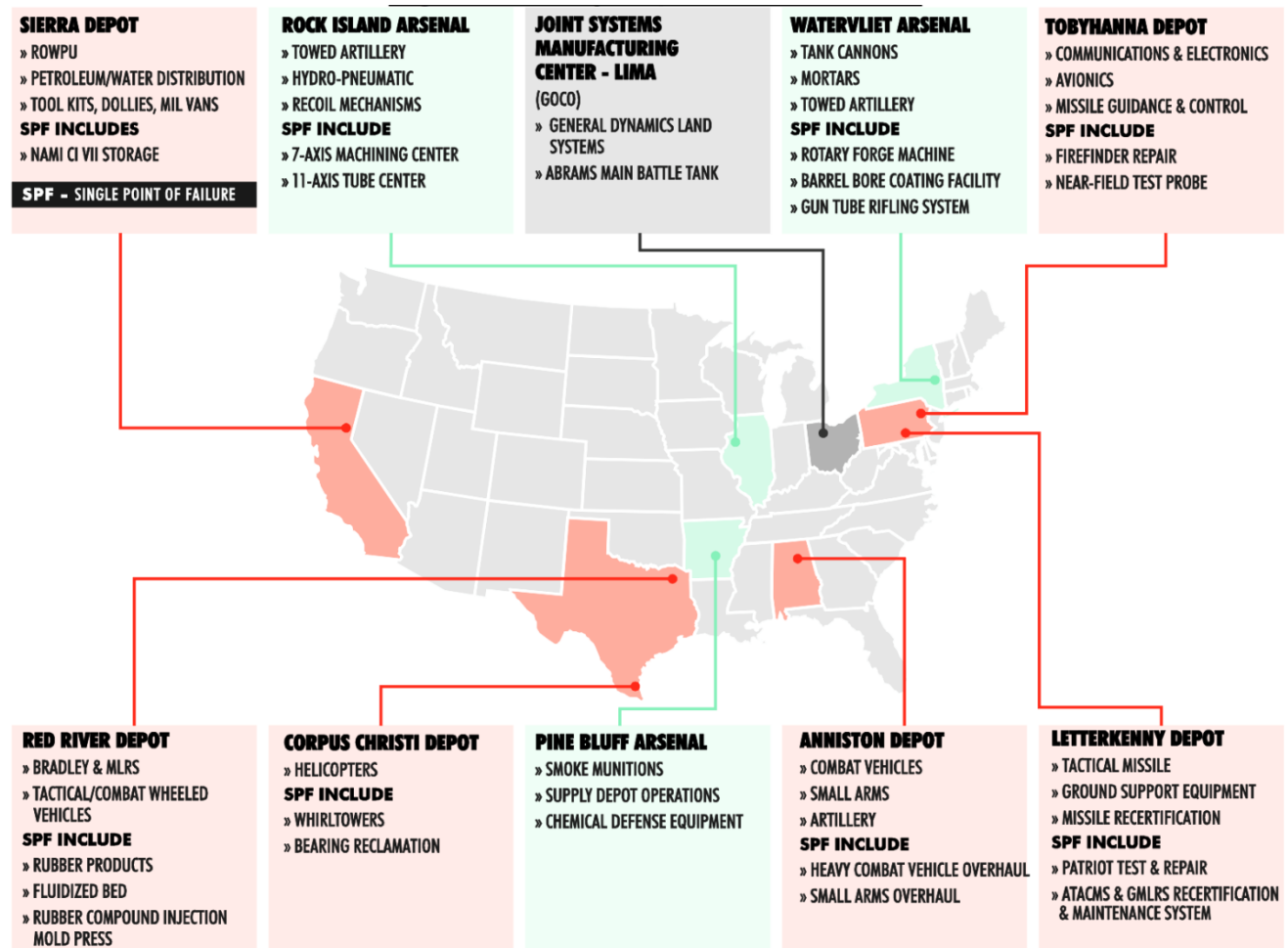
Chapter 3

The Army Organic Industrial Base

The existence of an Army-owned manufacturing base is as old as the Army itself. After the creation of the Continental Army, there was a need for artillery and ammunition that was not met by any commercial industry, so the Army created its own sources. In the decades following American independence, the organic industrial base grew and in 1813 the oldest operating piece of the organic industrial base, the Watervliet Arsenal, was founded (Bonsell et al., 2005). The Army's Organic Industrial Base (AOIB), consisting of twenty-six depots, arsenals, and ammunition plants (*Statement on the Posture of the United States Army*, 2020), is a subset of the larger DoD Industrial Base (See Appendix D for the law mandating depot-level maintenance as a core defense capability) and is tasked with the manufacture and reset of Army equipment. Effective and successful manufacture and reset of equipment generates readiness and operational capability throughout the entire Army.

Each AOIB facility, which has a specialized core competency (See Figure 4) is charged with the manufacture, repair and reset of the military's equipment, which includes explosives, small arms, tanks and cannon tubes. The AOIB not only manufactures new weapons systems but also updates technology to modernize existing equipment and enhance reliability (Department of the Army, n.d).

Figure 4. Army Depot and Arsenal Locations



Source: "Army Organic Industrial Base Strategic Plan 2012-2022." Department of the Army.

U.S. Army Arsenals and Depots are capable of providing products and services not readily available anywhere. "They are the Nation's insurance policy – a ready, controlled source of technical competence in case of unforeseen contingencies," (Department of the Army, n.d). By maintaining control over the manufacturing process for key items like ammunition and repair parts the Army should be able to ensure that Soldiers never stock out of those items. Since the Army is not dependent on the manufacturing availability or capability of another entity they can

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ensure that their needs are being met. Also, by conducting repairs and resets of equipment within the AOIB the Army has developed a highly skilled workforce at each depot.

Chapter 4

The Changing Nature of Warfare

The United States Army has been at war for almost twenty years, engaged in an asymmetric war against terrorist and insurgent groups in mainly the Middle East with some American Soldiers deployed to parts of Africa. Simply put, asymmetric war is an armed conflict between two groups with a large difference in relative military power. Relative military power can be related to how well equipped, trained, or supported the groups are. Also, the two combatant groups are normally a standing, formal military force and an insurgency or resistance militia. However, as military planners look to the future of armed conflict they see the next major engagement for the United States military as a return to conventional warfare. The high-end conventional warfare of the twenty-first century will bear similarities to the unforgiving force on force conflicts of World War II while utilizing technology to make the battlespace a multi-domain conflict, from land and sea to space and cyber.

Counterinsurgency

While counterinsurgency or counterterrorism operations are no longer the number one priority for the U.S. military. As of the 2018 National Defense Strategy (NDS), the threat of insurgent and terrorist groups still exists and based on the manner in which the Army trains to fight it is important to not forget the lessons learned through two decades of counterinsurgency. The high degree of resiliency and motivation is what enables insurgent groups to operate and, in some instances, succeed against a superior military force. While fighting and winning a counterinsurgency is by no means easy due to the complexity of the situation and the ambiguity

associated with it, the Army was able to become very proficient at sustaining and supplying troops with all the things necessary to fight the enemy.

In the Middle East, the U.S. fought the insurgency from bases that they and their allies established in the region, from Forward Operating Bases to larger Air Bases to smaller Command Outposts. By having established bases in secured locations, the Army was able to drop a large number of necessary supplies from ammunition to repair parts and hold them in the theater until they would need to be used. Then there were additional bases further from the front lines, but still, in theater, that also could be counted on to supply the more tactical positions in the theater.

High-End Conventional Warfare

High-end conventional warfare, also referred to as high-intensity warfare and Major Theater War (MTW), exists on part of the military operational spectrum that the U.S. Army has not touched in decades, which means significant conventional forces are engaged in intense warfare--such as large, force-on-force conventional confrontations. As seen in the latest editions of the National Security Strategy (2017) and National Defense Strategy (2018), military planners see a rising China and resurgent Russia as the biggest threats to National Security and due to the current world situation if the U.S. does come into military conflict with either nation it will be in the form of high-end conventional warfare. Conventional warfare differs greatly from counterinsurgency as the belligerents are organized, professional militaries that are equipped and supported by their governments. However, in addition to large force on force events, the high-

end conventional war also includes the use of multi-domain operations that turn the battlespace into a “Non-Linear Battlefield”.

The Nonlinear Battlefield

The Nonlinear Battlefield refers to the multi-domain nature of high-end warfare. The conflict not only takes place on specific land battlefields but also includes air, sea, cyber, and even space as potential battlespaces where conflict can occur. Since the research is focused on the Army supply chain the most important domain to examine is the land aspect and how the nature of land warfare is impacted. Operations on this nonlinear battlefield will be conducted at a rapid tempo. Ground forces will have to remain dispersed in order to protect themselves from enemy long-range attacks. Forces must then mass and fight short battles of destruction, and later disperse and prepare to fight again (Ruhlman, 2001).

To sustain and supply units on land in this type of battlespace, it will be necessary to develop the skill and capability necessary to hit a moving target with a resupply package in a short period of time. Units will not be able to constantly be active on the communication network as it presents the enemy with the opportunities for enemy intelligence to intercept the communication, determine the location of units and command nodes, and even impersonate the American communication network to further identify the locations of U.S. forces. As units move and fight, Logisticians at the tactical and operational levels need to make sure that units are as self-sustaining as possible and that sustainment plans are carefully planned and executed. The front is constantly shifting so supply lines need to be mobile and light in order to ensure freedom of movement and maneuver. While it is possible to preposition munitions, equipment, and repair

parts closer to the battlefield than the continental U.S., large stockpiles of equipment and munitions within the battlespace present an incredibly tempting target to enemy forces.

Resupply caches need to be established where they are far enough from the battlefield that they are not easy targets but close enough that they can quickly provide sustainment to the moving and fighting units. The logistics of MTW share more outward similarities with the logistics of World War II than they do the War on Terror, but it is important to not neglect the lessons learned in the Middle East about readiness.

Chapter 5

Near Peer Competitors

For an extended time, following World War II, the U.S. military was without peer and following the end of the Cold War American military power outmatched any rival or even group of rivals, but now that is no longer true. The term Near Peer Competitor has cropped up in the lexicon of defense planners and strategists to refer to countries that threaten the U.S.'s place at the head of the "liberal international order."ⁱⁱⁱ As the number of countries considered near peers rises so does the threat to U.S. security.

Power is a necessary but not sufficient condition for a country to be a peer competitor. Without economic, political, military, and other types of power, a country can present a danger to the United States but is not likely to challenge the fundamentals of the U.S.-led international system. A peer competitor seeks to challenge the status quo, "both to gain more power for itself and to decrease the relative power of the dominant state. To do so, the rising power must transfer relative influence in the world from the dominant power to itself," (Szayna et al., 2001).

America's greatest military advantages are its network of allies and the ability to project military power worldwide. Both China and Russia understand this strength and Russia looks to undermine NATO in Eastern Europe while China is seeking to challenge America's network of allies in the Pacific (Garamone, 2018).

Regional Players

Regional players are countries that are looking to consolidate power in a particular geographic area to boost their own status on the world stage and secure a more favorable

regional environment to exist in. In both the National Security Strategy (2017) and the National Defense Strategy (2018), Iran and North Korea are identified as regional threats to U.S. interests in the Middle East and Asia, respectively.

The danger that comes from engaging with regional players does not come from the power that they organically possess, but from the power of their network of allies as they engage with more “Great Powers” who have shared values or common foes. Since the Korean War, North Korea has maintained a special relationship with neighboring China and while North Korea's nuclear ambition has caused friction points in the relationship, China is still North Korea's closest ally. As the U.S.-Iran tension continues into the 21st Century, Russia presents itself to Iran as a valuable ally to have in limiting American influence in the Middle East, providing both economic trade benefits and military capabilities. Additionally, Iran operates and supports a network of proxies outside of conventional forces across the Middle East that are a destabilizing force in the region.

Great Powers

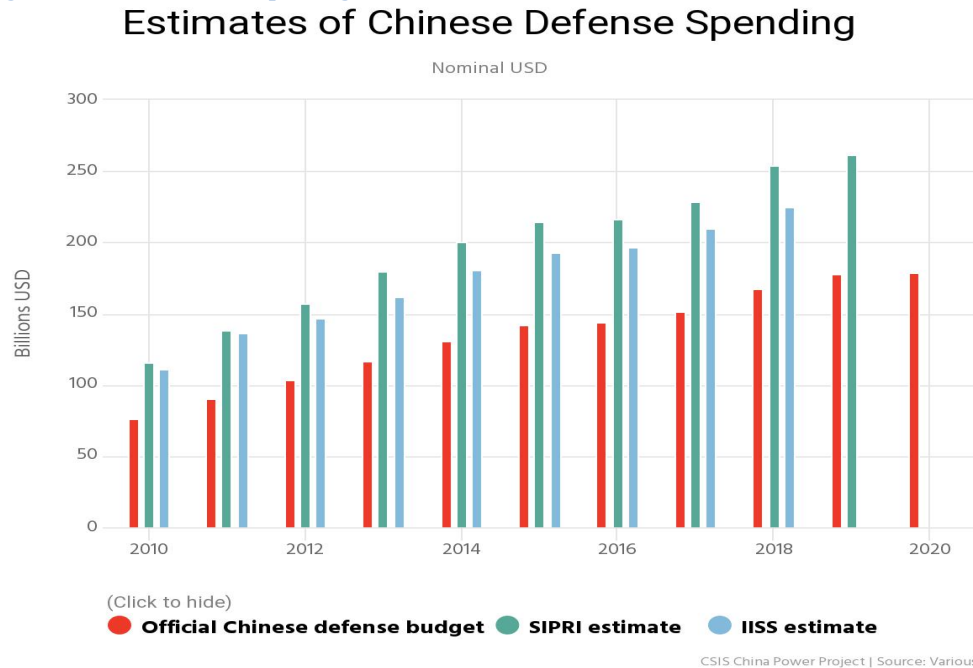
The shift to renewed great power competition was acknowledged alongside other considerations in the Obama Administration's National Military Strategy (2015) and was placed at the center of the Trump Administration's National Security Strategy (2017) and the most recent publication of the National Defense Strategy (2018). The National Security Strategy and the National Defense Strategy established a primary focus on great power competition with China and Russia (O'Rourke, 2020). DoD officials have subsequently identified countering China's technological military capabilities as a top priority (*National Security Challenges and*

U.S. Military Activities in the Indo-Pacific, 2019). The shift to renewed great power competition has profoundly changed the conversation about U.S. defense issues. There is a renewed emphasis on grand strategy^{iv} and the geopolitics of great power competition as a starting point for discussing U.S. defense funding levels, strategy, plans, and programs. As planners look to the other Great Powers it is important to identify what actions they have taken and policies they have executed that have created their new strength. China has invested heavily in its military thanks to its rising Gross Domestic Product (GDP) and these investments are primarily in technology (China Power Project, 2015). A revanchist Russia looks to regain influence both in Europe and the world with territorial expansion and challenging the U.S.'s position (Jenkins, 2017).

China

As previously stated China has used its economic success as a way to bolster its military forces with a defense budget that has only increased in the past ten years (See Figure 5). For the past decade China has only invested about two percent of its GDP into the military, but as China's GDP continues to climb so does defense spending (China Power Project, 2015). Official military spending is complicated by the Chinese government's inconsistent reporting of figures, which is why there are two estimates included with the official Chinese number

Figure 5. Chinese Defense Spending Over Ten Years



Source: CSIS China Power Project

Almost half of the Chinese defense budget goes towards equipment (See Table 1) for the development of new technology and fielding of new equipment to make the Chinese military a more deadly and capable force. As China continues their island-building in the South China Sea it is clear that they aspire to increase their already significant influence both in East Asia and the world. The Chinese military buildup is a cause for concern for the U.S. and allies in Asia, particularly Japan. Historically, there has never been a strong China and a strong Japan at the same time (Pan, 2006).

Table 1. China Defense Expenditure Breakdown (2017)

Billions of Dollars (2017)					
	Active Forces	Reserve Forces	Militia and others	Total	
				Amount	Percentage (%)
Personnel	47.04	0.48	0.00	47.51	30.8
Training & Maintenance	39.76	0.69	2.97	43.41	28.1
Equipment	62.79	0.63	0.04	63.47	41.1
Total	149.59	1.80	3.01	154.39	100

Source: CSIS China Power Project

Russia

After the fall of the Soviet Union, the United States believed that the new Russia could join the West and would want to become more like Western Europe and America. This was not the case as the Russian identity and their understanding of their position in the world was not something that just ended with the collapse of the USSR. Since the end of the USSR, there have only been two periods of positive U.S.-Russia collaboration: the post-9/11 period when Russia assisted the United States in the first phase of the war in Afghanistan; and the four years of Dmitry Medvedev's presidency (2008-2012) when he and President Obama attempted to "reset" U.S.-Russia Relations (Stent, 2020). However, when Vladimir Putin returned to the Russian presidency in 2012 the relationship ended.

The 2014 Russian invasion of Ukraine and subsequent annexation of Crimea have shown that President Putin is not content with the current balance of power in Europe. The actions

taken by Russia in recent years demonstrate a country that is not afraid of U.S. power. Russia is a nuclear power and has the capability to reach the U.S. with both nuclear and conventional forces. Although the likelihood of a Russian attack on the U.S. absent any provocation related to a NATO conflict is unlikely the existence of such capabilities cannot be forgotten. According to former Joint Chief GEN Joseph Dunford, “there is not a single aspect of the Russian armed forces that has not received some degree of modernization over the past decade,” (The Heritage Project, 2019). Russia is looking to destabilize the current system of alliances in place in Europe and by doing so reducing the power of the U.S. in Europe. By shifting the balance of power away from the U.S. it will give Russia an opening to expand its sphere of influence into the former Soviet States.

Chapter 6

Recommendations

The readiness of U.S. forces to conduct operations as effectively and safely as possible is a crucial component of America's national security. Yet the readiness has suffered in recent years, due to extended operations in the Middle East as well as severe budgetary uncertainty and austerity. The three largest barriers to Army supply chain readiness are the munitions supply chain, the uncertain balance of readiness and modernization priorities, and the need for reliable and secured 5G mobile technologies.

The Army, through JMC, is responsible for the munitions' readiness of each of the Armed Services and needs to be able to provide bombs and bullets to meet the needs of the Warfighter in every theater and service. However, in recent years, budgetary constraints like the forced sequestration of the Budget Control Act (BCA) have impacted the ability to manufacture in the organic industrial base. At a 2019 hearing of the House Armed Services Committee ADM Phillip Davidson, the commander of United States Indo-Pacific Command, was asked "do we have enough ammunition stocks on hand and prepositioned to fight and win a war?" and his response was as follows:

"Sir, I would like to take most of that question down to the closed hearing, if we could. I will say that in stocks in the theater of critical munition supplies is a challenge and an ongoing challenge and one of my consistent requests of the Department as they pursue their budgets. As well as the ability to resupply out there, that remains a need as well," (*National Security Challenges and U.S. Military Activities in the Indo-Pacific*. 2019).

While Secretary of the Army Ryan McCarthy testified on March 3, 2020, to the House Armed Services Committee that "we have also strengthened munitions readiness," (*Statement on the Posture of the United States Army*, 2020), it is important to acknowledge the cost of stocking out of munitions against a near-peer. If an operational unit ran out of ammunition it would present the potential for catastrophic losses the likes of which the U.S. has not experienced since World War II. The unit would be an easy target for hostile forces as they waited for either resupply or reinforcements.

Another struggle seen in the Army supply chain is the balance between prioritizing readiness and the need for modernization. This struggle stems from the lack of consistent, predictable funding from Congress. It is incredibly difficult to plan and execute priorities with funding in question. The DoD has started the fiscal year under a CR (continuing resolution) for thirteen of the past eighteen years (FY2002-FY2019). This creates uncertainty for the DoD as depending on how the CR is written, because it creates limits on the types activities that can be done under it (Towell et al, 2019). One common stipulation is that an interim CR may prohibit an agency from initiating or resuming any project or activity for which funds were not available in the previous fiscal year. So, this means if the Army wanted to manufacture a newly developed capability they would be unable to do so (Towell et al, 2019). This creates gaps in modernization efforts as the Army is required to wait to use the funds until another budget is passed.

In this context, readiness activities are easier to execute because the money for sustainment of a particular pre-existing system already exists so there is not the same lag between budget appropriation and actual ability to execute. In testimony to the House Armed Services Committee GEN Robert Abrams, the Commander of the United Nations Command, the

Combined Forces Command, and of United States Forces Korea had this to say about the military budget:

“I cannot underscore enough the importance of the on-time appropriation in 2019, as it has enabled us, for the first time in many years, to make smarter investments, improve our planning, and provide predictability to our commanders in the field so they can sustain the hard-earned readiness that is essential for being a ‘fight tonight’ force,”

(National Security Challenges and U.S. Military Activities in the Indo-Pacific, 2019)

Every senior leader from the Army to the Marine Corps knows that reliable funding is needed to accomplish the tasks needed to support and train U.S. power projection capabilities.

As mentioned in Chapter 4, operational and tactical units will only survive in high-end conventional warfare if they are capable of executing rapid and independent movement and maneuver across a physically large battlespace so the need for reliable, secure, and fast communications is paramount. The Army (and DoD) needs to invest in 5G mobile technologies apart from the Huawei network as the Chinese-owned telecommunications firm’s technology is likely to contain backdoors that are very easy for the Chinese government to access. A reliable 5G network would prove to be an invaluable asset to empower the current C4ISR (command, control, communications, computers, intelligence, surveillance, and reconnaissance) systems especially in a fight against a competitor that already possesses the advanced technology, like China. Additionally, Russia has already proven itself adept at intercepting and tracking their enemy’s communication and locking onto important targets, like command nodes. The need for fast, secured, and reliable means of communication for the 21st Century battlefield cannot be overstated.

All three of these supply chain weaknesses share a common cause and that is lack of consistent and reliable funding from Congress. Army leaders are forced to prioritize certain sustainment activities over others due to budgetary uncertainty, in order to really be ready to fight tonight the Army supply chain needs to be able to modernize and sustain readiness at the same time.

Chapter 7

Conclusion

The strategic work being done by the HQDA G-4, Army Materiel Command, and its subordinate commands, and the Defense Logistics Agency are vital to creating a ready force with an agile and resilient supply chain that can effectively project its power in order to protect vital American interests overseas. However, the strength and capability of the Army supply chain can only sustain Cold War-era weapon systems and equipment for so long.

The Department of the Army has failed to successfully field a new major weapons system acquisition since the 1980s. While our competitors have invested heavily in the modernization of their ground force and multi-domain capabilities, the U.S. continues to extend the life of weapons systems that were once the best technology available. There is a need for acquisition reform in the services and a more pressing need for the acquisition of more modern capabilities across the Armed Forces. Part of the struggle with successful acquisition stems from budgetary uncertainty and the other part from the acquisition policy itself.

Importance of the Kill Chain

While much of this research looks at logistics from a large-scale perspective of major commands and government policy it is important to acknowledge the importance of Army Logisticians responsible for sustaining the fight and keeping the kill chain running on the ground. The term kill chain was originally used as a military concept related to the structure of an attack: consisting of target identification, force dispatch to target, decision and order to attack the target, and finally the destruction of the target, or the kill, it has now been parlayed into

cybersecurity, but the original spirit remains. When considering the future of high-end conventional warfare, one must remember that it is ultimately the Warfighter, men, and women on the ground, at sea, in the air, and even operating in cyberspace, who will be responsible for closing a multitude of targets.

The Army's greatest asset is its Soldiers and the Army's supply chain end customer is the Soldier. The Army must continue to operate a flexible and resilient supply chain that is capable of supplying Soldiers with all they need to fight and win the Nation's wars.

Appendix A

Military Classes of Supply

Class	Item
I	Subsistence (food) and gratuitous (free) health and comfort items
II	Clothing, individual equipment, tentage, organizational tool sets and kits, hand tools, unclassified maps, administrative and housekeeping supplies, and equipment
III	Petroleum, oil and lubricants (package and bulk): petroleum, fuels, lubricants, hydraulic and insulating oils, preservatives, liquids and gases, bulk chemical products, coolants, deicer, antifreeze compounds, components, additives of petroleum and chemical products, and coal.
IV	Construction materials, including installed equipment and all fortification and barrier materials
V	Ammunition of all types: bombs, explosives, mines, fuzes, detonators, pyrotechnics, missiles, rockets, propellants, and associated items
VI	Personal demand items (such as health and hygiene products, soaps and toothpaste, writing material, snack food, beverages, cigarettes, batteries, and cameras—nonmilitary sales items)
VII	Major end items such as launchers, tanks, mobile machine shops, and vehicles
VIII	Medical materiel including repair parts peculiar to medical equipment
IX	Repair parts and components to include kits, assemblies, and subassemblies (repairable or nonrepairable) required for maintenance support of all equipment
X	Material to support nonmilitary programs such as agriculture and economic development (not included in Classes I through IX).
Misc	Water, salvage, and captured material

Source: Office of the Under Secretary of Defense for Acquisition & Sustainment

Appendix B

Army Materiel Command Organization



Source: 1

Appendix C

10 U.S. Code § 2229

Strategic policy on prepositioning of materiel and equipment

(a) Policy Required.—The Secretary of Defense shall maintain a strategic policy on the programs of the Department of Defense for the prepositioning of materiel and equipment. Such policy shall take into account national security threats, strategic mobility, service requirements, and the requirements of the combatant commands.

(b) Limitation of Diversion of Prepositioned Materiel.—The Secretary of a military department may not divert materiel or equipment from prepositioned stocks except—

(1) in accordance with a change made by the Secretary of Defense to the policy maintained under subsection (a); or

(2) for the purpose of directly supporting a contingency operation or providing humanitarian assistance under chapter 20 of this title.

(c) Congressional Notification.—The Secretary of Defense may not implement or change the policy required under subsection (a) until the Secretary submits to the congressional defense committees a report describing the policy or change to the policy.

(Added Pub. L. 109–364, div. A, title III, §351(a), Oct. 17, 2006, 120 Stat. 2160.)

Deadline for Establishment of Policy

Pub. L. 109–364, div. A, title III, §351(c), Oct. 17, 2006, 120 Stat. 2160, provided that:

“(1) Deadline.—Not later than six months after the date of the enactment of this Act [Oct. 17, 2006], the Secretary of Defense shall establish the strategic policy on the programs of the

Department of Defense for the prepositioning of materiel and equipment required under section 2229 of title 10, United States Code, as added by subsection (a).

“(2) Limitation on diversion of prepositioned materiel.—During the period beginning on the date of the enactment of this Act [Oct. 17, 2006] and ending on the date on which the Secretary of Defense submits the report required under section 2229(c) of title 10, United States Code, on the policy referred to in paragraph (1), the Secretary of a military department may not divert materiel or equipment from prepositioned stocks except for the purpose of directly supporting a contingency operation or providing humanitarian assistance under chapter 20 of that title.”

Improving Department of Defense Support for Civil Authorities

Pub. L. 109–364, div. A, title III, §359, Oct. 17, 2006, 120 Stat. 2164, provided that:

“(a) Consultation.—In the development of concept plans for the Department of Defense for providing support to civil authorities, the Secretary of Defense may consult with the Secretary of Homeland Security and State governments.

“(b) Prepositioning of Department of Defense Assets.—The Secretary of Defense may provide for the prepositioning of prepackaged or preidentified basic response assets, such as medical supplies, food and water, and communications equipment, in order to improve the ability of the Department of Defense to rapidly provide support to civil authorities. The prepositioning of basic response assets shall be carried out in a manner consistent with Department of Defense concept plans for providing support to civil authorities and section 2229 of title 10, United States Code, as added by section 351.

“(c) Reimbursement.—To the extent required by section 1535 of title 31, United States Code, or other applicable law, the Secretary of Defense shall require that the Department of Defense be

reimbursed for costs incurred by the Department in the prepositioning of basic response assets under subsection (b).

“(d) Military Readiness.—The Secretary of Defense shall ensure that the prepositioning of basic response assets under subsection (b) does not adversely affect the military preparedness of the United States.

“(e) Procedures and Guidelines.—The Secretary may develop procedures and guidelines applicable to the prepositioning of basic response assets under subsection (b).”

Appendix D

10 U.S. Code § 2464

Core depot-level maintenance and repair capabilities

(a) Necessity for Core Depot-level Maintenance and Repair Capabilities.—(1) It is essential for national security that the Department of Defense maintain a core depot-level maintenance and repair capability, as defined by this title, in support of mission-essential weapon systems or items of military equipment needed to directly support combatant command operational requirements and enable the armed forces to execute the strategic, contingency, and emergency plans prepared by the Department of Defense, as required under section 153(a) of this title.

(2) This core depot-level maintenance and repair capability shall be Government-owned and Government-operated, including the use of Government personnel and Government-owned and Government-operated equipment and facilities, throughout the lifecycle of the weapon system or item of military equipment involved to ensure a ready and controlled source of technical competence and resources necessary to ensure effective and timely response to a mobilization, national defense contingency situations, and other emergency requirements.

(3)(A) Except as provided in subsection (c), the Secretary of Defense shall identify and establish the core depot-level maintenance and repair capabilities and capacity required in paragraph (1).

(B) Core depot-level maintenance and repair capabilities and capacity, including the facilities, equipment, associated logistics capabilities, technical data, and trained personnel, shall be established not later than four years after a weapon system or item of military equipment achieves initial operational capability or is fielded in support of operations.

(4) The Secretary of Defense shall assign Government-owned and Government-operated depot-level maintenance and repair facilities of the Department of Defense sufficient workload to

ensure cost efficiency and technical competence in peacetime, while preserving the ability to provide an effective and timely response to a mobilization, national defense contingency situations, and other emergency requirements.

(b) Waiver Authority.—(1) The Secretary of Defense may waive the requirement in subsection (a)(3) if the Secretary determines that—

(A) the weapon system or item of military equipment is not an enduring element of the national defense strategy;

(B) in the case of nuclear aircraft carrier refueling, fulfilling the requirement is not economically feasible; or

(C) it is in the best interest of national security.

(2) The Secretary of a military department may waive the requirement in subsection (a)(3) for special access programs if such a waiver is determined to be in the best interest of the United States.

(3) The determination to waive requirements in accordance with paragraph (1) or (2) shall be documented and notification submitted to Congress with justification for the waiver within 30 days of issuance.

(c) Applicability to Commercial Items.—(1) The requirement in subsection (a)(3) shall not apply to items determined to be commercial items.

(2) The first time a weapon system or other item of military equipment described in subsection (a) is determined to be a commercial item for the purposes of the exception under subsection (c), the Secretary of Defense shall submit to Congress a notification of the determination, together

with the justification for the determination. The justification for the determination shall include, at a minimum, the following:

(A) The estimated percentage of commonality of parts of the version of the item that is sold or leased in the commercial marketplace and the version of the item to be purchased by the Department of Defense.

(B) The value of any unique support and test equipment and tools needed to support the military requirements if the item were maintained by the Department of Defense.

(C) A comparison of the estimated life-cycle depot-level maintenance and repair support costs that would be incurred by the Government if the item were maintained by the private sector with the estimated life-cycle depot-level maintenance support costs that would be incurred by the Government if the item were maintained by the Department of Defense.

(3) In this subsection, the term “commercial item” means an end-item, assembly, subassembly, or part sold or leased in substantial quantities to the general public and purchased by the Department of Defense without modification in the same form that they are sold in the commercial marketplace, or with minor modifications to meet Federal Government requirements.

(d) Limitation on Contracting.—(1) Except as provided in paragraph (2), performance of workload needed to maintain a core depot-level maintenance and repair capability identified by the Secretary under subsection (a)(3) may not be contracted for performance by non-Government personnel under the procedures and requirements of Office of Management and Budget Circular

A-76 or any successor administrative regulation or policy (hereinafter in this section referred to as “OMB Circular A-76”).

(2) The Secretary of Defense may waive paragraph (1) in the case of any such depot-level maintenance and repair capability and provide that performance of the workload needed to maintain that capability shall be considered for conversion to contractor performance in accordance with OMB Circular A-76. Any such waiver shall be made under regulations prescribed by the Secretary and shall be based on a determination by the Secretary that Government performance of the workload is no longer required for national defense reasons. Such regulations shall include criteria for determining whether Government performance of any such workload is no longer required for national defense reasons.

(3)(A) A waiver under paragraph (2) may not take effect until the expiration of the first period of 30 days of continuous session of Congress that begins on or after the date on which the Secretary submits a report on the waiver to the Committee on Armed Services and the Committee on Appropriations of the Senate and the Committee on Armed Services and the Committee on Appropriations of the House of Representatives.

(B) For the purposes of subparagraph (A)—

- (i) continuity of session is broken only by an adjournment of Congress sine die; and
- (ii) the days on which either House is not in session because of an adjournment of more than three days to a day certain are excluded in the computation of any period of time in which Congress is in continuous session.

(e) Biennial Core Report.—Not later than April 1 on each even-numbered year, the Secretary of Defense shall submit to Congress a report identifying, for each of the armed forces (except for the Coast Guard), for the subsequent fiscal year the following:

- (1) The core depot-level maintenance and repair capability requirements and sustaining workloads, organized by work breakdown structure, expressed in direct labor hours.
- (2) The corresponding workloads necessary to sustain core depot-level maintenance and repair capability requirements, expressed in direct labor hours and cost.
- (3) In any case where core depot-level maintenance and repair capability requirements exceed or are expected to exceed sustaining workloads, a detailed rationale for the shortfall and a plan either to correct, or mitigate, the effects of the shortfall.

(f) Annual Core Report.—In 2013 and each year thereafter, not later than 60 days after the date on which the budget of the President for a fiscal year is submitted to Congress pursuant to section 1105 of title 31, the Secretary of Defense shall submit to Congress a report identifying, for each of the armed forces (other than the Coast Guard), for the fiscal year preceding the fiscal year during which the report is submitted, each of the following:

- (1) The core depot-level maintenance and repair capability requirements identified in subsection (a)(3).
- (2) The workload required to cost-effectively support such requirements.
- (3) To the maximum extent practicable, the additional workload beyond the workloads identified under subsection (a)(4) needed to ensure that not more than 50 percent of the non-exempt depot

maintenance funding is expended for performance by non-Federal governmental personnel in accordance with section 2466 of this title.

(4) The allocation of workload for each Center of Industrial and Technical Excellence as designated in accordance with section 2474 of this title.

(5) The depot-level maintenance and repair capital investments required to be made in order to ensure compliance with subsection (a)(3) by not later than four years after achieving initial operational capacity.

(6) The outcome of a reassessment of continuation of a waiver granted under subsection (b).

(g) Comptroller General Review.—The Comptroller General shall review each report required under subsections (e) and (f) for completeness and compliance and provide findings and recommendations to the congressional defense committees not later than 60 days after the report is submitted to Congress.

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ACADEMIC VITA

Kylie Weaver

EDUCATION

The Pennsylvania State University | The Schreyer Honors College

Smeal College of Business Bachelor of Science (B.S.) in Supply Chain and Information System
Minors in Military Studies, German, and History

EXPERIENCE

Cadet Troop Leader Training

Fort Polk, LA

Platoon Leader

Summer 2019

- Served as Platoon Leader of an Airborne Support Platoon for the Joint Readiness Training Center (JRTC)
- responsible for training and executing support and distribution operations
- responsible for the morale, welfare, and safety of 13 Soldiers; responsible for the maintenance and accountability of 10 armored combat vehicles, and all associated equipment totaling in excess of \$5,000,000

Congressional Research Service, Library of Congress

Washington, D.C.

Research Intern

Summer 2016 and 2017

- Coauthored InFocus report on Depot Maintenance Statutory Framework
- Analyzed congressional legislation to prepare reports on the Defense Acquisition process and appropriations bills and created an interactive tracking system to organize data for reports
- Organized and hosted panel discussions on significant issues for interns and staffers with subject matter experts

LEADERSHIP & ACTIVITIES

Penn State Army ROTC

Fall 2016 - Present

Kaizen

Fall 2016 – Present

President, Public Relations Coordinator

Penn State IFC/ Panhellenic Dance Marathon

Sigma Sigma Sigma National Sorority

Spring 2019 - Present

Ritual Chair

Penn State Lion Ambassadors

Spring 2019 - Present

New Member Education Chair, Schuyler Fund Allocation Committee

Cadet Recruiting Team

Fall 2016 – Spring 2018

ⁱ Older Army doctrine and writing refers to Sustainment as combat service support (CSS), this also includes branches like Medical Services, Finance, and Adjutant General

ⁱⁱ While AMC is responsible for the spare parts of Army service managed items, DLA does the same with all other repairs that are not managed by a specific service

ⁱⁱⁱ There is much discussion over the validity and legitimacy of this endeavor, but for the sake of this work it is assumed that the U.S. is one of the leaders of this order and that by maintaining this liberal international order it creates an environment for the U.S. to thrive globally

^{iv} The term grand strategy generally refers to a country's overall strategy for securing its interests and making its way in the world, using all the national tools at its disposal, including diplomatic, information, military, and economic tools (sometimes abbreviated in U.S. government parlance as DIME).