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**THE ORDINANCE CORPS IN THE 21ST CENTURY:
PREPARED TO SUPPORT THE FORCE**

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THE ORDNANCE CORPS IN THE 21ST CENTURY: PREPARED TO SUPPORT THE FORCE

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ABSTRACT

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The ongoing debate about doctrinal and conceptual issues on FORCE XXI, will no doubt change not only the way we fight the US Army in the 21st Century but also how we will support the force logistically and subsequently sustain the force. This paper is intended to examine the Ordnance Corps of today and see how ready it is to support the US Army of the 21st Century. This paper will offer some recommendations as to the future direction of the corps in meeting the 21st Century Ordnance Support. What we do today will impact the future logisticians. The recommendations for the future are evolutionary and not revolutionary.

INTRODUCTION

Envision for a moment in the 21st century a seamless Combat Service Support(CSS) pipeline that stretches from the strategic level through the operational level through the tactical level all the way to a broken combat vehicle on the forward line of own troops(FLOT). The Combat Service Support community envisions a single commander operating from the strategic level responsible to ensure all the actions to get the combat vehicle back to an operational state. Is this plausible or even possible? Picture this senior logistician operating from the strategic level responsible for all of that.

Picture a seamless web from the rear area, Continental United States(CONUS) all the way to the front. The logistician at the strategic level operating from Washington, DC having a major command located in theater of operations, who does his coordination, command and control in country and is responsible to the supported Commander In Chief(CINC) or his Joint Task Force Commander. Do not read this as the Army Component Commander as I believe the in theater element is going to be a joint or maybe even a coalition force with a multinational staff at the operational level of logistics.

The purpose of this paper is to examine the Ordnance Corps in the context of emerging future force logistics concepts and to provide recommendations concerning future US Army Ordnance doctrine, organization and material requirements for the 21st Century. The scope of this study will include an examination of conceptual thrusts and basic assumptions concerning future threats, support environments and required capabilities that are being

developed and proposed in current FORCE XXI and US Army Training and Doctrine Command(TRADOC) future force doctrinal concepts.

The US Army is entering a period of tremendous change. As we move from a post-cold war Army into the future, we face a critical question-how will we fight in the 21st Century? As Ordnance soldiers and logisticians the answers to this question is critical to our nation's security and filled with many challenges and opportunities.

On 23 February 1991 in the predawn desert of Saudi Arabia and Kuwait, UN coalition forces led by two US Army Corps executed one of the most stunning, successful and effective ground attacks in modern warfare. The resulting and decisive defeat of the Iraqi forces stemmed from a well planned and executed theater campaign that combined the combined and joint combat and logistics power of the US and coalition forces. What is significant is that this may have represented the culmination of many years of an intellectual and doctrinal journey that fundamentally changed the US Army after its withdrawal from the Republic of South Vietnam and South East Asia in 1975. In today's post-cold war world of regional, multi-polar military threats and political uncertainty, the US Army again wrestles with the challenge of change to determine the course we will follow as we enter the 21st Century.

Predicting the future is both risky and problematic. It is risky because miscalculations are paid by our young soldiers, sailors, airmen and marines. It is problematic because in the history of the US Army we have faced many similar periods of change and have met these challenges with both successes and

failures. While the post-Vietnam transformation serves as a recent example of how an Army accomplishes change, the post-World War II era of rapid demobilization accompanied by constrained budgets during a period when the US enjoyed nuclear superiority and status as the world's sole superpower is somewhat similar to today's world situation. The Army's failure in the late 1940's to meet the challenges of the future by maintaining sufficient, combat ready conventional forces (favoring emphasizing strategic nuclear warfare) had some unfavorable consequences in the Korean War of 1950-1953. Today as an Army, we are at a critical stage. The ongoing doctrinal and conceptual debates over Force XXI, the Army of the Future, and future-battle operational dynamic and concepts will affect, not only, how the Army of the 21st Century will fight but also how it will be logistically supported and sustained.

THE ORDNANCE VISION

The role of Ordnance in the future is best described in Ordnance Vision XXI. It is best put by the previous commandant, MG James W. Monroe. As he puts it, "FORCE XXI cannot afford to leave home without Ordnance Vision XXI. If it does, we will never get there from here. As the 20th Century comes to a close, we'll be facing a very different environment".¹ The next two decades will differ as sharply from the present as the 1960s does from today.² We must look vigorously for those places where we are to make bold changes and also at those places where little or no change is needed.

The process of restructuring the 1994 Army into the Army of tomorrow is called FORCE XXI. The central feature of this new Army will be its "ability to exploit and use digitally produced information".³ We will again be modifying how we fight. Preparing the Ordnance corps to support that force requires a vision; one that charts and adjusts the critical path to our future organizations, doctrine, materiel requirements and training, all important elements of Ordnance Vision XXI.

Ordnance can no longer be an enabler and provide momentum and substance to Force XXI the way we provided outstanding combat service support to our force of yesterday. We're too slow, too large, too bulky, only reactive, batch processing, demand based and sequential. This was okay for yesterday

but for tomorrow--no way! For the future, we'll have to adjust the way we do our functions by leveraging digitally produced logistics information.

Ordnance today consists of maintenance(fixing), munitions(arming), and explosive ordnance disposal(EOD). Maintenance deals with all Army equipment except air frames, rail, marine, medical, and intelligence and electronics warfare(IEW). Munitions refers to our function of providing the entire spectrum of ammunition from small arms rounds to missiles. This function includes the requirement to store, maintain, and distribute munitions from the plants to the combat unit. Explosive Ordnance Disposal is a critical force projection service that is provided not only for our Army force but to a multi-agency and joint services.

In contrast, the vision of tomorrow's Ordnance is "an Ordnance Corps of soldiers and civilians that provide a world class ground equipment maintenance, and munitions and explosive ordnance support in a seamless Combat Service Support battlespace, using situation awareness to take anticipatory and responsive actions".⁴

DOCTRINE

The Force Design Update (FDU) is a semiannual briefing process used to obtain approval from the Chief of Staff of the Army (CSA) for new force designs, concepts and significant changes to existing designs. Of the eight issues reviewed during the FDU 94-2, one was directly related to Ordnance. This was the EOD Reorganization concept, which was submitted to Combined Arms

Center(CAC) for action in 1995. Several other issues had an indirect impact upon Ordnance, and these included Corps Materiel Management Center(CMMC) Split Base Operations and Maintenance Support Teams for Theater High Altitude Air Defense Battalions. The Vice Chief of the Army approved these and further action is expected.

As noted earlier, Ordnance Vision XXI provides the framework for the Ordnance Corps that will take us through the early stages of the 21st Century. It provides a dream for what we envision the Ordnance Corps will need to function across all areas within our preview, notably Arming, Fixing, and EOD. As the 20th Century draws to a close, we find ourselves living in one of the most dynamic periods of modern history.

In the absence of a relatively fixed strategic environment, we are faced with an increasingly complex world that defies authoritative forecasts of the future. We recognize that change is the only real constant. Nevertheless, various schools of thought predict what the 21st Century will look like-- the most optimistic being devoid of major war.

We envision the need to establish a national logistics manager or command, responsible for providing all elements of logistical support to the nation's military and civil agencies.⁵ Only by consolidating and integrating requirements and capabilities can we maximize our ability to provide support across the entire spectrum of politico-military operations in the 21st Century. To

that end, the Ordnance Corps must evolve to meet the challenge of this national logistics scenario.

The vision is to establish the Ordnance Corps as a "world class equipment maintainer, munitions, and explosive ordnance disposal provider in a seamless CSS battle space using situational awareness to take anticipatory and responsive actions." Following the vision, we will remain agile, versatile, and expandible; ready and able to support the national security and military strategies as they span the operational spectrum of the future. The concept is approved and is being introduced to the TRADOC community at large.⁶

EQUIPMENT REQUIREMENTS

The Ordnance Corps, much like the remaining CSS branches, is responsible for combat development, production acquisition, and sustainment for materiel systems and equipment used in ground maintenance, recovery, troop support equipment and explosive ordnance disposal. It also incorporates Battle Damage Assessment (BDAR) initiatives during development and fielded systems reviews. To this end, a number of systems are being reviewed by the Ordnance Corps for acceptability and to ensure our vision is executable in the 21 Century.

The Contact Maintenance Truck(CMT) consists of an enclosure mounted on a heavy HMMWV. The enclosure contains an ensemble of enhanced maintenance and power tools, test, measurement and diagnostic equipment(TMDE), welding and cutting equipment, and a pneumatic compressor to support Direct Support(DS) level repair of trucks and equipment. The CMT's

in the CUCV and Dodge truck configurations are not mobile enough, nor do they have the carrying capacity to meet mission requirements. Reconfigured CMT's are undergoing field trials and a final configuration is undergoing testing. It is imperative the funding be allocated for the procurement of this important piece of equipment to ensure our force can be supported effectively.

The Improved Recovery Vehicle(IRV), recently changed to Heavy Equipment Recovery Utility Lift and Evacuation System, or HERCULES, is the answer to the current recovery deficiency with the M1 series tanks. Upgraded engine power, improved transmissions, final drive, power brakes and suspension; better armor protection increased weight, an upgraded main winch, and a better auxiliary winch. This equipment is intended to replace the M88A1, and the Army plans to produce some 346 HERCULES beginning this year.

The Contingency Force Recovery Vehicle(CFRV) project began with the fact that existing recovery vehicles could not adequately tow Sheridan tanks across country. Tests are being conducted to ascertain whether various combinations of the M984 Wrecker Cranes and M984A1 HEMTT wreckers will meet requirements following necessary modifications. With the recent decision to not field the AGS, this may prove to be more difficult to complete.

The Forward Repair System (FRS) provides the capability which currently requires the use of three vehicles; the M113 Maintenance vehicle, the M88 and the 2 1/2 ton cargo truck. The idea is to combine all heavy repair functions into one vehicle, incorporating the necessary tools, test, measurement, and

diagnostic equipment(TMDE), lift, repair parts, equipment, and personnel. Test and demonstrations are in the offing. This could conceivably eliminate a number of maintenance systems that are outdated and used well past its predicted life cycle.

The Family of Medium Tactical Vehicles(FMTV) Wrecker is a 5 ton wrecker assemblage mounted on an FMTV chassis. It can provide evacuation and recovery capability for light vehicles and equipment, but has experienced many failures and an intensive "get well" program is underway. The current prognosis is good but may be in jeopardy if significant improvements do not occur in the upcoming tests. This is a much needed improvement with great potential.

The less than 3kW generators are under study, since more modern, more mobile and frugal equipment necessitates their use. Improved technology since the 1980's suggest that small and relatively light diesel engines can probably be produced. Canadian 2kW generators are also being tested. The 3kW program, under way for a number of years, has had many problems and has consistently failed three first article tests. The recommendation for this piece of equipment should be to terminate the program, however, the primary production contractor is being given an opportunity to overcome the difficulties. The larger tactical generators, 5-60 kW, following six years of work on 27 separate and distinct configurations, is fast approaching the pre-procurement stage to award a competitive post-production contract.

Other equipment under study or in various stages of production include several new cargo bed covers; an improved mechanics coverall; a lightweight maintenance enclosure(LME); an electronically driven army space heater(ASH); turbine engine diagnostics(TED) (a computerized diagnostic expert system for the M1 Abrams tank full up power pack); a new base shop test facility(BSTF); contact test set; an electro-optic program for contact test sets and off-systems testers; improved toxilogical agent protective suits; self-contained toxic environment protective outfits; mobile ordnance disrupter systems; remote ordnance neutralization systems; and remote controlled reconnaissance monitors.⁷

FORCE DESIGN

Any new mission design, new equipment, or other developments which become part of a new concept must undergo the Force Design Update (FDU) process. Changes in recommended doctrine, mission design, and personnel issues can originate from the field, the schools, Combined Arms Support Command(CASCOM) or a higher headquarters. Combined Arms Center(CAC) has the overall charge of many of these issues.

Among the specific issues dealt with last year was the Total Army Analysis(TAA). TAA 03 reduced the Army's active component to 495,000, the National Guard to 367,000 and the Army Reserve to 208,000. A Force Structure Conference took place during late 1994 and decided these requirements. A second such conference was held in February, 1995, at which time resources

were applied to the requirements, and the results reviewed in April. Work on the PATRIOT Direct Support and General Support Team and on maintenance support to Patriot was reviewed during this same time.

A newly revised concept for the mission and structure of the Combat Service Support Automation Management Office(CSSAMO). The actual duties and functions being performed by the CSSAMOs have been much broader than the section's mission requires or allocated resources allow. A recent study done by the TRADOC Analysis Center At White Sands Missile Range, NM, concluded that CSSAMOs are in fact performing hardware repair on any and all systems, supporting deployments and split operations, automation training, customer assistance visits and the like. The findings and recommendations of the study, coupled with the reports from the field and concerns from the field clearly supports the concept of changing and enhancing the mission and structure of the CSSAMOs.

The new structure provides a support structure that is staffed, trained, and equipped to maintain and sustain the Army's automated systems. CSSAMO will now be responsible for supporting all authorized Army information automated systems. With the expanded mission and restructuring of the organization, the capabilities and responsibilities are increased. It will now be responsible for supporting all authorized Army information systems to include all associated software, limited hardware, and communication devices. The organization is deployable, split operations capable, and will provide one stop complete

customer service. The CSSAMO is not designed or intended to replace or perform the mission of the supporting Direct Support Unit(DSU). Direct Support(DS) maintenance will continue to be performed by the supporting DSU or electronic maintenance company.

The current mission and structure of the CSSAMO limits the types of systems supported and severely limits the extent of repairs performed on items of hardware. The CSSAMO is responsible for only the CSS systems. The majority of all maintenance responsibilities and capabilities are software related. Hardware maintenance and repair capabilities are limited to preventative maintenance checks and services and component replacement and exchange (monitors and keyboards, etc.). Office automation equipment, tactical and command and control systems and all other than CSS systems are not included in the current mission of the CSSAMO. The personnel and equipment needed to execute the expanded mission will increase substantially from what is indicated in the present authorization documents. The number of personnel assigned to a Division or COSCOM will more than double, from 12 in a division to approximately 30, and from 6 in a COSCOM to approximately 15.⁸

TRAINING

The training budget for fiscal year 1995 included \$120,000 for Reserve Component(RC) leader development. The money was earmarked to help revise RC courseware that supports officer education. Due to limited funding, the majority of the revision effort focused on the branch specific portion of Phase I,

RC Officer Advanced Course(OAC). After a thorough review, the training development team recommended that six out of the 18 subcourses be revised. The tasks have been identified requiring updating and await the final award a contract.⁹

In December, 1994, the Curriculum Development Center(CDC) submitted course administrative data to Headquarters TRADOC, requesting implementation of three additional skill identifier courses in support of the M1A2 tank. Two of the courses, the M1A1 Armament Repairer(45K) and the M1A2 Fire Control Repairer(45G) will be conducted at Aberdeen Proving Ground beginning this year. The third course will be conducted at Ft. Knox, Ky. Resourcing for these courses was obtained through tradeoff arrangements.¹⁰

Under direction from Headquarters TRADOC, Advanced Individual Training(AIT) courses were reduced by ten percent. Unlike the fiscal year 1991 mandated ten percent reduction, HQ TRADOC directed that the course lengths and instructor requirements be reduced by a predetermined aggregate number, but that the schools had the option of taking the cuts as they saw best. Ordnance School decided to make major reductions to the Light Wheeled Vehicle Mechanic and Heavy-wheel Vehicle Mechanic courses while taking only minor cuts in the remaining courses. The Program of Instruction is in place to support the cuts for implementation this year.¹¹

In 1992, the Ordnance Center and School completed its last revision of selected RC configured courseware(RC3) products. A year later, in 1993, limited

funding and staffing compelled the school to divest responsibility for the timely update of RC3. Following the CASCOM reorganization in 1994, inadequate staffing in CDC again precluded any RC3 update. The recent Army-wide divestiture of the Self-Development Test may allow some Ordnance training developers to make nominal revision in RC3 as the team begins the developmental transition to Total Army Training Courseware(TATSC). At present the task force is preparing a strategy whereby the CSS community will phase TATSC while concurrently phasing out RC3.¹²

In February of 1994, the Ordnance Missile and Munitions Center and School(OMMCS) requested a revision of the Integrated Family of Test Equipment(IFTE) Direct Support/General Support(DS/GS) Maintenance Course. An increase in the course length was initiated and the training development was completed and delivered to TRADOC. The change was approved for implementation during the 1996 fiscal year.

In addition, the elimination of the Automatic Test Equipment Operator/Maintainer(39B) determined a need for a transitional course incorporating training from 39B to the IFTE Operator/Maintainer(35Y) course, as well as development of a separate MOS and course specifically for those soldiers holding the additional skill identifier(ASI) X1, Apache repairer. The transition course is designed to provide enlisted personnel with the skills and knowledge required to test, align, troubleshoot and repair a large assortment of IFTE equipment and weapon system Line Replaceable Units(LRUs), using the

appropriate Test Program Sets(TPS). The separate MOS and course will be similar in content and instruction mix to the previously validated DS/GS Test and Repair Station Maintenance course for the Apache ASI.¹³

In light of the incorporation of DS/GS repair and maintenance training into the 35Y course, OMMCS and CDC reviewed, in conjunction with Gumman Aerospace Corp., to establish lesson plans which would provide the foundation for future training. At the request of the Department of the Army and Grumman, OMMCS participated in the Multiple Launch Rocket System(MLRS) Test Program Set(TPS) verification. The purpose of the verification was to further incorporate the MLRS components to be diagnosed by IFTE, ensuring that the TPS was capable of troubleshooting and that the Stabilization Reference Package and Portable Positioning Table was diagnosed at 100% capability.¹⁴

THE FUTURE

Force XXI pamphlets provide fairly comprehensive outlines for future threats, doctrinal imperatives and required combat and CSS capabilities for the US Army of the 21st Century. They predict future operational environments that range from General War through Major and Lesser Regional Contingencies to Operations Other Than War(OOTW).¹⁵ While general war is considered less likely, the operational environments most likely to be encountered by the U. S. Army of the early 21st Century will be Major Regional Contingencies, Lesser Regional Contingencies, and OOTW which include a wide variety of military

operations including; peace operations, noncombatant evacuation operations, anti and counter-terrorism , counterinsurgency, civil support, domestic and international disaster relief, arms control and environmental operations.¹⁶

The nature of future enemies and their armies will also impact on the development of the future US Army. TRADOC Pamphlet 525-5 characterizes future enemy threats as ranging from non-national to information-based, complex and adaptive armies. The Toffler's describe future force threats and warfare from an historical, economic and cultural context, but capture, essentially the same range of threats. In their model, future armies and warfare are described as being either First, Second or Third Wave.¹⁷

First Wave wars were fought essentially between agrarian societies, and were limited in scope and objectives.¹⁸ Logistics support for these armies was generally accomplished by foraging and by using preestablished stores or magazines. Second Wave war is characterized as industrial aged and based upon the social, economic and cultural factors of production in the modern-industrial nation state. Since Second Wave war involved the fate of the collective nation, the resources of the entire nation were committed.¹⁹ Logistics support of Second Wave armies reflected the changes and increasingly freed armies from foraging to systems of continual supplies and reliance on the industrial and agrarian capacity of the nation. Also, as the technologies of mass production, interchangeable parts, industrial standardization, and the steam and

combustion engines radically changed the conduct and support of modern armies, this further contributed to the rise of an industrial style "total" warfare.²⁰

The final warform, or Third Wave warfare, began evolving in the late 1970's and early 1980's and is still in progress today.²¹ In describing Third Wave warfare, the Toffler's model again links the interrelationship of a nation's economic system and means of production with its capacity to wage war. While a Second Wave nation relies on its industrial factors of production for waging war, a Third Wave army leverages knowledge and information based technologies as the primary sources of economic and military strengths.

RECOMMENDATIONS

The implications concerning future warfare and armies are clear. The US Army of the future must not only be prepared for military operations ranging from General War through OOTW but must also be structured to fight and logistically support forces engaged in both Second and Third Wave military operations, simultaneously.

When these various future force concepts are synthesized, the US Army of the early 21st Century will be predominately CONUS based force projection army that is organized and equipped to be flexible, tailorable and expandable, strategically deployable and effectively employable across the spectrum of future based environments.²²

Using the future force characteristics and the lessons learned from ODS some future force CSS logistics imperatives is proposed. First, we must have

improved strategic mobility and deployability. Second, improve force sustainability through improved communication, automation and asset visibility and greater reliance on current and future technologies. Third, reliance on a flexible and adaptive CSS doctrine at all levels. Fourth, enhance CSS equipment capabilities to improve vehicular mobility and maintenance supportability. Fifth, continued maintenance of a sufficient, flexible and viable industrial base with the identification and stockpiling of critical long-lead production components and items. And finally, continue development of doctrine, tactics, technologies and procedures to facilitate joint and combined logistic support operations in multinational alliances and coalitions.

FUTURE DOCTRINE

In studying future force and doctrinal thoughts and concepts, it is easy to be swept away by the alluring jargon and comfortable simplicity of "future speak". In proposing future U. S. Army Ordnance doctrine, organization and equipment, it is critical to remember that regardless of the future war models, the basic mission of ordnance will not change. The support and sustainment of armies in future wars will continue to be accomplished in the terrible crucible of battle with all the frictions, attending fears, deprivations and constraints that only war provides.

Doctrine is the major driver of future change in the US Army and logistics doctrinal changes should be evolutionary and not revolutionary. This note of caution stems from the suspicion that if the US Army commits to a future doctrine

that cannot be sufficiently funded or relies on technologies that cannot be obtained- then it will be doomed to failure. Consequently, future Ordnance doctrine must be based on the fundamental premise that it must be both effective in supporting the Army of the 21st Century and feasible.

Future doctrine must continue to emphasize flexibility and adaptiveness. As future technologies provide increased management capabilities and asset visibility, theater centralized control of CSS planning and operations will become possible and desirable. Centralization of Theater Army CSS control and management supports the envisioned increased operation and support tempos. A single logistics manager in the theater exercising asset visibility over theater supplies, transport, maintenance and coalition capabilities should be the objective and the standard. This should lead to a more accountable, responsive and proactive system of assured logistics. This concept is equally applicable in the mature and immature theaters and particularly adaptable in contingency operations.

FUTURE FORCE DESIGN

Ordnance units must be manned, organized, trained, and equipped to conduct successful sustainment operations in a high tempo, mechanized theater-level regional conflicts fought in nuclear and chemical threat environments. The standard of success in the early 21st Century must remain rapid strategic deployment, immediate establishment of the logistics support and sustainment infrastructure and the continuous sustainment of combat mechanized operations

in two nearly simultaneous conflicts. To adapt a lesser standard ignores the lessons of history and the perils of the future.

This imperative impacts several issues. First, the US Army active component(AC) and reserve component(RC) mix of CSS force structure must be carefully reviewed because the implications of imbedding approximated 70% of the Army's CSS force structure in the RC at a time when the Army is devolving from a forward presence to a force projection Army. As LTG(ret.) Pagonis suggests, serious consideration must be given to forming a mixed AC and RC CSS headquarters and units that are capable of rapid deployment with little or no train-up period.²³ This tends to favor greater, not lesser, AC CSS headquarters and force structure. Second, if the nature of battle is evolving as Operation Desert Storm(ODS) suggests, to the application of massive, synchronized, and overwhelming artillery and air firepower then the implications on future CSS doctrine is still uncertain. Exactly how emerging future artillery doctrine will impact on ammunition requirements and doctrine is still uncertain. The immediate answer would suggest that the use of large concentrated artillery fires will increase ammunition requirements, transportation, material handling equipment and ammunition handlers. As munitions become increasingly smart and brilliant the impact is very uncertain. In future conflicts the requirements for specialized munitions such as the MLRS and other long lead time production munitions will increase.²⁴ The implication must be accurately assessed, projected and incorporated in future doctrine.

If effective future doctrine is to become an operational reality then a key will be redesigned organizations and force structures -from the strategic to the tactical levels. The organizations of the future must possess the following qualities and characteristics. They must be: modular in design and function, be sufficiently robust and capable of conducting split operations, be designed and equipped to accomplish missions across a wide range of operations in both nuclear and chemical environments and be designed for greater connectivity with joint, combined, coalition, and commercially contracted architectures and systems.

The modular units of the future must be standardized by function, manning and equipment in order to facilitate seamless task organizing, and force tailoring. The basic unit of this concept would be the functionally aligned company in a multifunctional support battalion attached to a brigade level task force. Functional companies capable of being subdivided into easily detachable platoons and detachments will serve as a building block upon which support battalions are built. As envisioned almost identically sized and configured CSS forward support battalions will be attached to either divisional or corps maneuver brigades task forces or brigade sized units. These battalions should be sized and nearly standardized army-wide. If additional functional logistics capability is required then a platoon, detachment, company or even support battalion would be placed under the operational control of the gaining battalion, group or brigade on a mission basis.

The second characteristic of future organizations, must be the capability to conduct split-based operations. As envisioned in TRADOC Pamphlet 525-200-6, Combat Service Support: US Army Battle Dynamic Concept, split based operations are an objective capability that will rely on vastly improved data transfer and digital technologies to, "allow routine management functions to be accomplished in CONUS while critical wartime functions can be projected forward early in an operation."²⁵ While the Corps Materiel Management Center split based operations is an example of split-based operations. it is not a far stretch to envision split-based technologies and capabilities being employed down to support battalion/company level for resupply requisitions, personnel reporting, even diagnosing repairs on the battlefield and in the motorpool using the telemedicine concept. We do it today for medical purposes and it is a short leap to take it to another step. Another less obvious aspect of split based operations is to expand split-based operations to split-location operations at the tactical unit level. CSS battalions must be configured with required manning and equipment to control and conduct operations from two distinct locations on a continual basis in support of rapidly moving operations. When implemented, split-based and split-locations operations will revolutionize tactical level, operational and strategic CSS planning operations.

Operations in Somalia and Haiti have demonstrated the utility and argument for the expanded use of commercial contractors to provide many of the supplies, sustainment and services normally provided exclusively by military

logistics units. The reliance on an expanded use of commercially contracted CSS is certainly a dual edged sword. It does offer, however, potential cost savings and CSS force preservation of limited theater CSS force structure. Additionally, expanded use of commercial contractors will provide the future logistician with immediate responsiveness and a considerable range of capabilities with implications of activating RC soldiers or employing AC CSS forces.

FUTURE EQUIPMENT REQUIREMENTS

Future-force material requirements and recommendations fall in a number of broad categories: improved strategic lift; improved CSS transportation; improved automation, communications and data transfer capabilities and identification procurement and stockpiling of critical war reserve stockage of long lead components and items.

While considerable attention is naturally paid to the development and procurement of strategic airlift programs, lesser is provided to current sealift improvement programs. It is essential in the near term that current sealift improvement programs be adequately funded to ensure that the US retains preeminence in strategic deployment into the 21st Century. During ODS over 90% of the Army supplies and equipment were sent by ships which accounted for 523 ship loads of over 26.9 million square feet of cargo space delivering over 2.11 million s/tons of supplies and equipment.²⁶ Although these totals are impressive, it should serve as a reminder that even in spite of all the money

spent during the 1980's to improve sealift capabilities, that during ODS there were insufficient large RO/RO ships to adequately support the deployment and that the Ready Reserve Fleet was less than adequate.²⁷

Concerning CSS equipment shortfalls and shortages, the 22d SUPCOM After Action Report states succinctly that, "a large theater and an offensive scenario requires more transportation equipment than currently available."²⁸ Concerning off road mobility the report further stated "Enhanced off road capability of transportation assets is necessary."²⁹ Both deficiencies were overcome by a combination of ingenuity, Host Nation and coalition equipment donations. However, additional transportation and MHE assets are required in both AC and RC units and the off-road mobility issue must be resolved through improved equipment design and modernization programs. The funding of truck and MHE modernization programs may not be particularly exciting but is vital to future success in the logistic operations high tempo, offensive mechanized operations.

The final materiel recommendation concerns the future of the US defense industrial base. ODS provided an extremely valid test of the US industrial base's capability to surge or accelerate production of critically needed items and components in time of war. Many problems concerning shortages of long lead items and long lead components, such as Patriot missiles chemical defense equipment and water chillers, certain munitions were identified.³⁰ While it is true that the industrial base surged to meet ODS demand, problems with the long

lead items and long lead components were resolved primarily as the result of the six months preparation time before the ground offensive operations began. The lesson is clear. Not only must long lead items and components be aggressively identified, procured and stockpiled for future contingencies but the entire issue of the adequacy of the industrial base to support reconstitution of critical major end items is the question that must be continually assessed and reviewed.

CONCLUSION

In the final analysis, the challenges of change will be accomplished by a combination of cautious hindsight, visionary foresight and determined convictions. The Ordnance Corps is indeed able to meet the projected future force requirements. The changes required that will transform the US Army and the Ordnance Corps will not be driven simply by the lessons of the past. In this respect history provided a tantalizing hint of the future while serving to provide a foundation upon which to build. Changes to current CSS doctrine should be evolutionary to ensure that the resulting future CSS doctrine organizations and materiel are mission effective and fiscally attainable. How we meet this challenge will be the legacy we leave to the U. S. Army and to the logisticians of the 21st Century.

ENDNOTES

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- ¹ MG James W. Monroe, interview by Keir B. Sterling, 22 June 1995.
- ² Keir B. Sterling, interview by Dave K. Lunasco, 6 July 1995. In 1983 General Rozier was able to recreate a clear sense of direction from a reconstituted Chief's office. It was clear from the outset of his tenure, MG Monroe's incumbency as Chief of Ordnance and Schools Commandant would be as pivotal in its ways as General Rozier's had been. The transition to a radically new organizational configuration would naturally constitute an enormous challenge. At the outset, MG Monroe felt he would have to hold the Corps together, not only in light of the relocation of many key personnel and positions to Fort Lee, but also the unrelenting pressures of downsizing.
- ³ MG James W. Monroe, interview by Keir B. Sterling, 22 June 1995.
- ⁴ BG Robert D. Shadley, briefing to SSC students, 19 Dec 95.
- ⁵ Department of the Army, THE ARMY STRATEGIC LOGISTICS PLAN(Alexandria, Virginia, Logistics Integration Agency, 1995), 9.
- ⁶ Department of the Army, TRADOC Pam 525-68, Concept for Modularity; TRADOC Pam 525-5, Force XXI Operations; TRADOC Pam 525-200, CSS Battle Dynamic Concept; Ordnance Vision 2020; Battle Distribution Concept Paper; Integrated Sustained Maintenance (ISM) Concept; Single Stock Fund Concept.
- ⁷ Major Albert McDonald, telephone interview by author, 14 Dec 95; Feeder Report, Fix Branch, Modernization and Technology Directorate, CASCOM, Mar 1995.
- ⁸ Juanita Gunn, telephone interview by author, 13 Dec 95.
- ⁹ Department of the Army, AR 351-1, Individual Military Education and Training, 15 Oct 87; TRADOC Reg. 350-33, Extension Training Material (ETM) Management and Development, 31 May 91; TRADOC Reg. 25-34, Alternate Format for preparing and Publishing United States Training and Doctrine Command (TRADOC) Administrative publications, 8 June 93; Feeder Report, Combat Development Center, April 95.
- ¹⁰ Department of the Army, TRADOC Reg. 351-1, Training Requirements Analysis System, 1 Oct 92; TRADOC Reg.350-7, A Systems Approach to Training, 26 Feb 88.
- ¹¹ Department of the Army, TRADOC Reg. 351-1, Training Requirements Analysis System, 1 Oct 92; TRADOC Reg. 350-7, Systems Approach.
- ¹² Department of the Army, TRADOC OPLAN-2, 1994.
- ¹³ Department of the Army, AR 611-201, Enlisted Career Management Fields and Military Occupational Specialties; TRADOC Reg. 351-1, Training Requirements Analysis; TRADOC Reg. 350-7, A Systems Approach.
- ¹⁴ Department of the Army, TRADOC Reg. 350-15, TRADOC Training Evaluation, Assessment, and Quality Assurance Program, 1 Mar 93.
- ¹⁵ Department of the Army, TRADOC Pam. 525-5, Force XXI Operations, (Ft. Monroe, Va., US Training and Doctrine Command, 1 Aug 94), Chap 1,4.
- ¹⁶ Ibid.
- ¹⁷ Alvin Toffler and Heidi Toffler, War and Anti-War: Survival at the Dawn of the 21st Century, (Boston: Little, Brown and Company, 1993), 33-36, 38-42, 64-79.
- ¹⁸ Toffler and Toffler, 38.
- ¹⁹ Ibid., 40-41.

²⁰ Ibid.

²¹ Ibid, 64-66.

²² US Department of the Army, TRADOC Pam. 525-5, Chap 3, 1-3.

²³ LTG William G. Pagonis and Jeffrey L Cruikshank, Moving Mountains: Lessons in Leadership and Logistics From the Gulf War, Boston, MA: Harvard Business School Press, 1992, 67-69.

²⁴ U.S. Department of the Army, Operation Desert Storm Sustainment, Washington: Office fo the Deputy Chief of Staff, Logistics, (ODCSLOG, 1992), 84.

²⁵ U.S. Department of the Army, TRADOC Pam. 525-200-6, Combat Service Support: U.S. Army Battle Dynamic Concept, 1Aug 1994, 7.

²⁶ ODCSLOG, 58.

²⁷ Ibid.

²⁸ U.S. Department of the Army, 22d SUPCOM AAR Vol. 1, Lessons Learned Charts (pages not numbered).

²⁹ Ibid.

³⁰ ODCSLOG,84.

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