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# NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

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## MBA PROFESSIONAL REPORT

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**Contractor Logistics Support of the Medium Tactical Vehicle  
Replacement (MTVR) During Operation Iraqi Freedom**

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**By: Brian R. O’Leary and  
Herman S. Romero  
December 2003**

**Advisors: Donald R. Eaton  
Michael W. Boudreau  
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**CONTRACTOR LOGISTICS SUPPORT OF THE MEDIUM TACTICAL  
VEHICLE REPLACEMENT (MTVR) DURING  
OPERATION IRAQI FREEDOM**

Brian R. O’Leary, Major, United States Marine Corps  
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Submitted in partial fulfillment of the requirements for the degree of

**MASTER OF BUSINESS ADMINISTRATION**

from the

**NAVAL POSTGRADUATE SCHOOL  
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# **CONTRACTOR LOGISTICS SUPPORT OF THE MEDIUM TACTICAL VEHICLE REPLACEMENT (MTVR) DURING OPERATION IRAQI FREEDOM**

## **ABSTRACT**

The MTVR is being fielded by the Marine Corps as a replacement of its aging fleet of five-ton cargo trucks. The MTVR program includes the Marine Corps' first use of Contractor Logistics Support (CLS) for a large tactical ground transportation vehicle. MTVRs were employed during the buildup, major combat, and initial occupation phases of Operation Iraqi Freedom (OIF). This MBA project examines the role of CLS in the supply and maintenance support of the MTVR during the aforementioned phases of OIF. Through a literature study of CLS-related materials, examination of CLS contracts between the Marine Corps and Oshkosh Truck Company, interviews with Marine Corps MTVR program management personnel, and interviews with those who maintained and operated MTVRs during OIF, an in-depth study is presented. Analysis is applied to the data gathered to develop recommendations to optimize the use of CLS in support of the MTVR in a combat environment.

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## **EXECUTIVE SUMMARY**

Contractor Logistics Support (CLS) is viewed as a way that the United States' armed services can reduce the total ownership costs of its modern defense systems. CLS is intended to reduce both personnel requirements and related infrastructure costs while providing the services with the capability to support and maintain increasingly complicated systems.

In the mid 1990's, the Marine Corps began the process of replacing its aging fleet of medium tactical trucks. In February 1999, Oshkosh Truck Corporation was awarded a contract to provide the Marine Corps with 6,854 Medium Tactical Vehicle Replacements (MTVRs). Oshkosh also was contracted to provide CLS for the MTVR.

Operation Iraqi Freedom provided the Marine Corps with its first opportunity to employ a major CLS-supported ground transportation system, the MTVR, in battle.

Our study of MTVR CLS focused on OIF forces belonging to the 1st Marine Expeditionary Force (I MEF). I MEF employed approximately 1130 MTVRs during the buildup, major combat, and initial occupation phases of OIF. MTVR-supported units traversed over 600 miles from the Kuwait/Iraq border to the northern Iraqi city of Tikrit.

Our analysis was based on a detailed study of the CLS Statement of Work (SOW) agreed upon by the Marine Corps and Oshkosh Truck Corporation. Relevant items in the SOW were compared with information gathered from interviews with I MEF personnel who employed and maintained MTVRs during OIF.

Although we did not conduct an exhaustive legal analysis, we investigated the status of U.S. Government contractors in the war zone. According to the Law of War, contractors captured by enemy forces have the right to be treated as prisoners of war, and not as mercenaries or illegal combatants. Contractors are subject to attack by enemy forces if, in the view of the enemy, they are taking an active role in the execution of military operations.

CLS is a useful concept that provides value to the Department of Defense. However, the success of CLS depends on other factors in the logistics support chain. In

the garrison environment, CLS is enabled by robust and reliable telephone systems, reliable Internet access, known locations of permanent facilities, a modern road network, the proximity of off-base contractors, and a reliable, mature distribution system. In the combat environment of Operation Iraqi Freedom, all the aforementioned enablers were either severely degraded or nonexistent. Logistics support for MTRV using units was severely limited by insufficient voice communications, the lack of Internet connectivity, constant movement of units throughout the battlefield, substandard road networks, the dearth of truck component repair capacity of host countries, and a failed in-theater supply distribution system.

Despite the CLS challenges, the MTRV performed remarkably well during OIF. Operational availability levels were in excess of 90 percent. This success was due to the reliability of the MTRV itself, and not the result of successful in-theater CLS.

We recommend that in order to enable the success of MTRV CLS in future conflicts, the Marine Corps should:

- Continue to update its battlefield information technology infrastructure, placing emphasis on communications and connectivity for Combat Service Support units.
- Carefully study the capability, or lack thereof, of contractors located in host nations to support large forces, and incorporate these studies into logistics support plans.
- Revise the requirement for contractors to use “best commercial packaging” in shipments to combat areas. Best commercial packaging usually means the contractor will ship items in bulk, resulting in extensive repackaging activities by in-theater supply units. A “one each” packaging requirement for items destined for units in a combat zone would help solve in-theater distribution problems.
- Revise the requirement for bar-code labeling of shipping containers, and replace it with radio frequency identification (RFID). Sand storms during OIF rendered virtually all bar-code labels unreadable.

- Consider the use of the MTVR during OIF as an example of using a highly reliable (although expensive compared to five-ton truck it replaced) system as a way reducing the overall demand for logistics support, and explore the possible long-term cost savings.

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## **I. INTRODUCTION**

### **A. PREFACE**

As the United States Military concentrates on transforming itself into a leaner, more efficient, cost effective organization, Contractor Logistics Support (CLS) has frequently been viewed as a way to reduce total ownership costs of modern defense systems. Incremental budget cuts during the 1990s forced the Department of Defense (DoD) to find ways of maintaining an acceptable degree of readiness with less funding. Advances in modern weapons and logistical systems have vastly increased the technical knowledge required to support such systems. CLS is intended to reduce both personnel requirements and related infrastructure costs while providing the capability to support and maintain increasingly complicated systems. (Ref. 1)

By March 2003, the 1<sup>st</sup> Marine Expeditionary Force (I MEF), with its newly fielded, CLS-supported Medium Tactical Vehicle Replacement (MTVR) providing tactical logistics transportation, was preparing to cross the Line of Departure for Operation Iraqi Freedom (OIF). OIF was the first major theater war in which the Marine Corps relied on CLS to support and maintain a major tactical ground vehicle.

### **B. RESEARCH BACKGROUND**

The Defense Department's directive DOD 5000.2-R, "Mandatory Procedures for Major Defense Acquisition Programs and Major Automated Information Systems," provided the armed services with overarching guidance pertaining to CLS. Marine Corps Order (MCO) 4200.33, "Contractor Logistics Support for Ground Equipment, Ground Weapon Systems, Munitions, and Information Systems," provides more specific guidance to the Marine Corps' acquisitions and logistics communities. MCO 4200.33 directs that the decision to use organic support, CLS, or a mixture of the two should be based upon analysis performed by the acquisition community. It directs that when making the decision, analysts must take into account, but not be limited to, the following considerations (Ref. 2):

- a. Operational readiness and support in garrison and during deployment;
- b. Security considerations;
- c. Requirement for technical information (technical manuals, parts lists, specifications, etc.);
- d. Requirement for support equipment (Test Measurement and Diagnostic Equipment (TMDE), special tools, etc.);
- e. Cost and availability of repair and spare parts;
- f. Cost, schedule, and performance;
- g. Density of equipment and geographical dispersion;
- h. Training systems and support training;
- i. Personnel skills required/available;
- j. Impact on force structure (ship/shore rotation, Training Planning Process Methodology, etc.);
- k. Maintenance levels required;
- l. Cost to provide support to contractors in garrison and ports of debarkation;
- m. Design instability and technology insertion;
- n. Commercial obsolescence;
- o. Planned life cycle;
- p. Facilities;
- q. Environmental safety and health;
- r. Packaging, handling, shipping and transportation considerations;
- s. Surge considerations; and
- t. Primary Inventory Control Activity/Secondary Inventory Control Activity

The MTRV, produced by the Oshkosh Truck Corporation (OTC), and fielded to the Marine Corps Operating Forces beginning in the Fall of 2001, is the first Marine

Corps ground transportation system of its size and magnitude to employ the concept of CLS. The MTRV's first use in a major theater war was during OIF in 2003. Marine units used it extensively during the buildup, major combat, and initial occupation phases of OIF.

### **C. OBJECTIVE**

The objective of this research is to examine the role of CLS in the supply and maintenance support of the MTRV in the garrison environment prior to OIF, in the deployed environment prior to and during OIF, and in the garrison environment after OIF.

### **D. METHODOLOGY**

This research combines a review of the Statement of Work (SOW) between the Marine Corps and Oshkosh Truck Corporation, reviews of published material regarding MTRV CLS and CLS in general, reviews of OIF after action reports from several I MEF units, and information gathered during interviews of I MEF personnel who operated and maintained the MTRV before, during, and after OIF.

### **E. ORGANIZATION**

Chapter I introduces the background of research, the objective of the research, the research methodology, and the organization of this report.

Chapter II provides a short history of the acquisition, fielding, and employment during OIF of the MTRV.

Chapter III provides an item-by-item analysis of the Statement of Work (SOW) agreed upon by the Marine Corps and Oshkosh Truck Corporation (as of Feb 03) regarding CLS. Information gathered from OIF after action reports and interviews with I MEF personnel is presented in a short discussion following each SOW item.

Chapter IV contains information gathered about the status of OTC (or any other U.S. Government contractor) employees when in a war zone. It addresses issues

involving combatant/noncombatant status, the wearing of uniforms, and arming of contractors.

Chapter V provides conclusions and recommendations regarding CLS support of the MTRV during OIF based on the research presented in the previous chapters.

## **II. HISTORY OF THE MTVR**

### **A. A SOLUTION TO THE AGING FLEET OF MEDIUM TACTICAL VEHICLES**

By the early 1990s, the Marine Corps was faced with the requirement to replace its fleet of medium-size tactical vehicles. By FY00 the existing fleet of medium trucks, the M809 and M939 series, was going to be an average of eighteen years old. They were designed in the 1950s and updated with 1970s components. By the mid-1990s the average mean miles between failure (MMBF) was less than one thousand miles.

As the Marine Corps continually modernized its weapon and logistics systems during the 1970s, 1980s and 1990s, there were no major replacements for medium tactical transportation vehicles. Upgrades to the M198 155mm towed howitzer increased its weight beyond the towing capacity of the existing 5-ton truck. The M809/939s five-ton payload was increasingly inadequate to haul modern fuel and water distribution containers. Palletized ammunition loads were too dense to make full use of the five-ton truck's bed size. (Ref. 3)

The Medium Tactical Vehicle Replacement, or MTVR, was the Marine Corps' answer to its aging and increasingly inadequate medium truck fleet. The MTVR provides the Marine Corps with increased cargo carrying capacity, off-road performance, and reliability. Its larger size and modern design permits this truck to carry full bed-loads of ammunition as well as fully loaded water and fuel containers. It can safely tow the M198 howitzer while transporting its ammunition. The MTVR includes the following state-of-the-art automotive characteristics (Ref. 4):

- Oshkosh Double A-arm 6 Wheel Independent Suspension
- Caterpillar C12 425 HP Engine
- Allison HD 4070P 7-Speed Continuous Power Automatic Transmission
- Oshkosh Single-Speed Transfer Case
- Improved Starter and Cold Weather Starting Aid

- Automatic Traction Control (ATC)
- SAE J1708/J1939 Data Bus and Built-in Diagnostics
- Michelin R16.00x20 Radial Tires
- Eaton/Bosch Antilock Brakes
- Eaton Central Tire Inflation System
- All aluminum, collapsible hardtop cab
- Composite Hood
- ISO Capable Cargo Bed

## **B. ACQUISITION AND CONTRACTOR LOGISTICS SUPPORT**

The acquisition of the MTVR began with Mission Need Statement (MNS) number MOB 211.4.2A, dated 30 March 1992. This MNS was in response to the M809/939 series of trucks reaching the end of its useful life in FY02. One of the options investigated by the Marine Corps was the remanufacture of the existing trucks in conjunction with a similar program sponsored by the US Army. After a detailed study comparing the life-cycle costs of remanufacturing existing trucks and procuring new trucks, the Assistant Secretary of the Navy for Research, Development, and Acquisition (ASN RD&A) directed the Marine Corps to procure an all-new MTVR. (Ref. 5)

In February 1999, after considering prototypes produced by AM General and Oshkosh Truck Corporation, the Marine Corps awarded the MTVR contract to Oshkosh. Low Rate Initial Production began shortly thereafter, and initial fielding of the truck began in the fall of 2001.

Oshkosh also signed a ten-year CLS contract with the Marine Corps. Oshkosh supplies the majority of repair parts for the MTVR. Requisitions for repair parts are electronically routed to OTC instead of the Defense Logistics Agency in an operation that is transparent to the ordering unit. Echelons of maintenance for the MTVR are basically the same they were for the M809/939 series trucks. As with the M809/939 trucks, first

through third echelons, and limited fourth echelon maintenance is still conducted by Marines. Major components needing repair or rebuild are sent back to the contractor, although the Marine Corps still maintains this capability. The CLS responsibilities of OTC are enumerated in the Statement of Work analyzed in Chapter III of this report.

### **C. FIELDING AND USE DURING OPERATION IRAQI FREEDOM**

The Marine Corps contracted to buy 6,854 MTVRs, of which 5,964 are cargo variants. Except for 20 telephone maintenance variants delivered during FY02, all the MTVRs used during OIF were cargo trucks. The first substantial numbers of the MTVR were delivered during FY02 to the Marine Corps' Blount Island Command, Florida for loading aboard Maritime Prepositioned Force (MPF) shipping. Actual loading aboard MPF ships coincided with previously scheduled MPF maintenance cycles. Blount Island Command and I MEF were scheduled to receive approximately 1,000 trucks each. I MEF began receiving its MTVRs during FY01. (Ref. 6) Major subordinate commands receiving the new truck were as follows: First Marine Division (11<sup>th</sup> Marine Regiment (artillery), and the division's general support truck company), First Force Service Support Group (1<sup>st</sup> FSSG) (Transportation Support Group and Engineer Support Group), and Third Marine Aircraft Wing (Marine Wing Support Groups).

During the buildup phase of OIF, approximately 780 MTVRs were transported to Kuwait by Navy amphibious shipping and by U.S. Transportation Command. By March 2003, as forces prepared to attack into Iraq, I MEF was outfitted with an additional 350 trucks drawn from MPF shipping; for a total of approximately 1130 MTVRs. (Ref. 7) Units that received the MTVR relatively early, such as 11<sup>th</sup> Marine Regiment, deployed with some operational and support knowledge of the MTVR and its subsystems. Others, like the 1<sup>st</sup> FSSG's Transportation Support Group, received their first substantial numbers of MTVRs in Kuwait during the buildup for OIF. (Ref. 8)

On March 21, 2003, MTVRs crossed into Iraq with the forward units of the First Marine Division. The 1st FSSG's combat service support units followed them closely. By the end of major combat operations, MTVR-supported Marines had traveled over 600 miles from the Kuwait-Iraq border to the northern Iraqi city of Tikrit.

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### **III. ANALYSIS OF THE MTRV CLS STATEMENT OF WORK AND EXPERIENCE DURING OPERATION IRAQI FREEDOM**

#### **A. INTRODUCTION**

This chapter is based on an examination of the Statement of Work (SOW), which was in effect in the period prior to and during OIF. (Ref. 9) The Program Manager-Motor Transport (PM-MT) Office, Marine Corps Systems Command, provided it for the research. Our analysis is based on CLS issues as seen from those at the I MEF operator and organizational maintenance communities prior to and during OIF. Therefore, only those SOW items pertaining to organizational level maintainers and operators are included in the analysis. Items in the SOW regarding program management at the PM-MT level are not pertinent to this analysis and are, therefore, omitted.

Relevant items are quoted as they appear in the SOW, followed by a short discussion. The discussion following each SOW item is a summary of information we gathered from the following sources:

1. Literature studies of MTRV CLS and CLS in general
2. OIF after action reports from I MEF, 1<sup>st</sup> FSSG Supply Battalion, and Marine Regimental Combat Team Five
3. Interviews with I MEF personnel conducted at Camp Pendleton, California from 4 Nov to 7 Nov, 2003

#### **B. STUDY OF THE STATEMENT OF WORK VS REALITY DURING OIF**

##### **1. 3.2 Web Site Information:**

The contractor shall maintain a current on-line, real time database. This database shall provide all pertinent information applicable to Class IX Parts and CLS Repairables. All information will be provided on-line and shall be accessible to the Government via an on-line system web site. This data warehouse shall be accessible through search engines developed by the contractor, which will allow data mining for any elements resident in the warehouse. In order to provide visibility to the customer,

the contractor shall provide the current status of requested materials and service via an on-line system (web-site).

**a. Discussion:**

As per the contract, OTC established a website to provide information and status of requested materials. In garrison, the website was used, although infrequently. With the close proximity of Field Service Representatives (FSRs) and ease of contacting them by telephone or e-mail in the garrison environment, Marine personnel chose not to use the website to gain information. While deployed before and during OIF, the lack of connectivity experienced by most MTRV using units precluded use of the website altogether. (Refs. 8, 10)

**2. 3.2.1 Class IX Parts:**

As a minimum the following data elements are required for Class IX Parts: nomenclature, document number, national stock number (NSN), part number, quantity, priority, status, date of receipt of document, date item shipped, carrier/tracking number, estimated delivery date and actual delivery date.

**a. Discussion:**

The above data elements were available via the online website. In the garrison environment, reliable Internet connectivity allowed for parts, to some extent, to be tracked. The Oshkosh website, however, relies on, and is limited by, the tracking capability provided by shipping companies. A I MEF OTC representative gave the following example:

Technicians on the front-line identified that the MTRV's alternators were failing very often. I was in charge of overseeing the shipment of 200 of these alternators. I was able to track them from OTC to Los Angeles International Airport via Federal Express (FEDEX); however, once they got there it seems they went into a black hole where I was not able to keep track of them. Later I found out that they showed up in Kuwait in a Lufthansa aircraft. (Ref. 11)

Items shipped via U.S. Transportation Command also had periods of limited in-transit visibility. For example, Oshkosh might ship a repair part via UPS to Charleston Air Force Base for embarkation aboard an Air Mobility Command aircraft.

Even if equipped with the U.S. Central Command's mandated Radio Frequency Identification (RFID) tag, the lack of tracking hardware and software at the distribution point and using unit level made tracking virtually impossible.

For deployed MTRV using units without Internet connectivity, the above issue was moot. (Ref. 12)

**3. 3.3 Warranty:**

Warranty repairs under the production contract shall be coordinated through the Field Service Representatives (FSRs). The FSR shall coordinate all CLS warranty repair parts issues after being contacted by the using unit. All replacement parts are warranted for one year from date of purchase from Oshkosh Truck Corporation (OTC). OTC shall pass-through any remaining Original Equipment Manufacturer (OEM) warranty, when applicable. OEM warranties begin on date of purchase by OTC. If the Government receives a defective part that is covered by a warranty, the contractor shall provide and ship another part at no additional cost

**a. Discussion:**

The OEM warrants the major mechanical components of the MTRV. Caterpillar Inc., for example, warrants engines, while Allison Transmission warrants its components. In garrison, the proximity of authorized repair businesses to major Marine bases made warranty actions simple and timely. When warranty repair work was required, the MTRV owning unit notified the FSR who arranged for repair by the respective supplier.

While deployed to Kuwait in the months preceding OIF, warranty service was accomplished in a similar manner, with FSRs coordinating repairs with factory-authorized Kuwaiti repair shops. Deployed warranty support introduced several problems. MTRV users located throughout northern Kuwait had difficulty making contact with mechanics dispatched by the Kuwaiti repair shops. Although well trained and knowledgeable, mechanics in Kuwait were third country nationals (mostly Philippine or Indian) who spoke little or no English. As the force moved north into Iraq, warranty

work ceased due to the lack of repair parts and I MEF's intent to keep FSRs away from units engaged in direct combat with the enemy. (Refs. 7, 13)

Post-OIF warranty work appears to be satisfactory. To their credit, FSRs have been very reasonable in assessing the validity of warranties regarding combat repairs to components of the MTRV. (Refs. 10, 14)

**4. 3.6 Procurement of Repair Parts:**

The contractor shall be responsible for the procurement and delivery of all unique repair parts.

*a. Discussion:*

Prior to OIF, procurement of repair parts in garrison was satisfactory. Delivery of commonly used, OTC-unique items was similar to that of non-OTC parts because all the parts flowed through the base infrastructure. If a part was not in stock at the base or station's supply activity, the FSR was contacted, and if needed, assisted in procuring the part through OTC customer service channels.

While forward deployed, FSRs attempted to procure parts in a manner similar to that used in garrison. In most cases, the orders did go through to OTC. However, the problems encountered with military in-theater distribution disrupted the flow of parts to the using units.

**5. 3.6.1 Delivery of Repair Parts:**

The contractor shall ensure that their unique parts support system supports the timely delivery of repair parts in accordance with paragraph 3.6.2 of this SOW. Delivery may be required in CONUS or OCONUS using various modes of Commercial and/or Government transportation.

*a. Discussion:*

Delivery of repair parts in garrison was satisfactory. Commonly used parts, both Defense Logistics Agency (DLA)- and OTC-supported, were kept at base and station supply points at a level that provided satisfactory service. For out of stock items, however, there was a substantial difference between the level of service provided by

DLA and OTC. “Stock outs” of DLA-supported items normally took weeks or months to receive. If an OTC-unique part was out of stock at the base or station, the using unit, with the assistance of an FSR, used the OTC customer service activity to order directly from OTC. In virtually all cases, repair parts arrived in accordance with the delivery times prescribed in the SOW paragraph 3.6.2. (Refs. 10, 15)

During the buildup phase of OIF, while I MEF units were located in a relatively small region of northern Kuwait, parts support and delivery was moderately successful. MTRV using units deployed with a Class IX repair parts block. During the major combat phase of OIF, these parts blocks produced the little sustainment experienced after the failure of the in-theater distribution system. (Refs. 15, 16)

After major combat operations began, Class IX flow to using units virtually ceased. This was largely due to the distribution failures at the Marine Logistics Command (MLC), located in Kuwait, and at the 1<sup>st</sup> FSSG, located closely behind the units moving north into Iraq. Communications shortfalls, the lack of in-transit visibility, and the large distances quickly covered by the lead units caused many FSSG-level supply officers to continually resubmit requisitions for the same parts and items or bypass the system altogether using e-mails and spreadsheets. (Ref. 17) For those units with the location or connectivity that enabled them to order either DLA- or OTC-supported parts, those parts were successfully delivered in a timely manner -- to Kuwait. The failure of the in-theater distribution system was the reason repair parts were rarely, if ever, delivered to requesting units north of the Kuwait-Iraq border. (Ref. 18)

**6. 3.6.2 Delivery Schedule:**

Required delivery time for orders for unique NSNs will be determined by the following priorities. The priority code will be identified on the requisition.

<u>Priorities</u>	<u>Required Delivery</u>
A. Priority 01 and 02 requisitions	48 Hours
B. Priority 03 requisitions	2 Working Days
C. Priority 04 through 15 requisitions	5 Working Days

A working day constitutes the first normal working day (Monday through Friday) that the contractor receives the requisition, i.e. a priority 03 requisition submitted on Friday's update will be delivered no later than 0730 the following Wednesday. Orders with quantities about those numbers considered reasonable for that particular unit, or that depletes the stock carried by the contractor, will not be processed without authorization from MARCORSSYSCOM, PMM155.

*a. Discussion:*

In garrison, OTC was very successful in ensuring delivery of OTC-unique items per the above timelines. In support of deployed forces during OIF, OTC met delivery times as required. OTC delivered items to agreed upon airports and seaports of embarkation, or shipped them directly to Kuwait, where in-theater distribution problems were encountered.

**7. 3.6.3 Receive/Transmit Requisitions via Electronic Commerce/Electronic Data Interchange (EC/EDI) Format:**

The contractor will receive and transmit EC/EDI information via Defense Automatic Addressing System Center, (DAASC) direct from the Operating Forces, and to transmit supply and shipping status back.

*a. Discussion:*

While this would be the ideal system for any unit, it is difficult to provide the proper connectivity in the battlefield to satisfy this requirement. In many cases, Marine units did not have the electronic access to order parts or check on the status of their requisitions. According to a 1<sup>st</sup> Marine Division Motor Transport Officer, there were 2000 requisitions entered into the system but only three of them were actually filled. (Ref. 10) OTC was not to blame for this problem; the problem lay with the distribution system within theater. Thousands of parts were received in Kuwait and, in many instances, shipping containers arrived with all kinds of repair parts in them. Supply personnel responsible for the proper distribution were poorly trained, and in a few cases, resorted to calling units by satellite telephone to invite them to search through the "iron mountain" to try and find what they needed. (Refs. 14, 15) The supply system in theater was so slow that a resourceful warrant officer opted to have his wife go to the local auto-

parts store, buy a few dozen fuses of different amperage, and send them via regular mail. He was able to get the fuses through the regular mail faster than through the supply system. (Ref. 10)

**8. 3.7 Procurement of Special Tools:**

The contractor shall be responsible to provide and deliver all 2<sup>nd</sup> and 3<sup>rd</sup> echelon special tool sets listed in the parts list. The composition of special tool sets shall be approved by MARCORSSYSCOM PMM155 prior to their acquisition. Packaging and marking shall be in accordance with paragraph 7.0 of this SOW.

**a. Discussion:**

The 2<sup>nd</sup> and 3<sup>rd</sup> echelon maintenance activities received their special tool kits as prescribed in the contract. At present, though, very few mechanics have been thoroughly trained in the use of the special tool kits. OTC FSRs are conducting regular training classes to address the problem. (Ref. 8)

**9. 3.8.1 On-Site Field Service Representatives:**

The contractor shall provide qualified FSRs. The number and location of FSRs will change as requirements dictate. The FSRs shall provide technical assistance and repair, and shall advise and make recommendations, to orient and instruct key Maintenance personnel with respect to operation, maintenance, repair and parts supply support for the MTVR truck. The FSRs shall be thoroughly experienced and qualified by the contractor, to advise and instruct Government personnel in the operation, maintenance, repair and parts supply of the equipment furnished under this contract. The FSRs will be required to travel within the MEF, to include units located in different geographical areas. FSRs will be available on a full time basis, so that in the event of a leave or absence, there will be no loss of support to the Operating Forces.

**a. Discussion:**

FSRs were readily available in garrison at Camp Pendleton. Prior to the commencement of OIF, FSRs were deployed to Kuwait to assist in the offload and preparation of MPF-based MTVRs. They continued to work in Kuwait during the

buildup phase of OIF, providing liaison with in-country suppliers and mechanics. (Ref. 11)

A deployed 1st Marine Division Officer described a problem he encountered with an FSR. Initially, the FSR was very helpful in troubleshooting and identifying problems with the vehicles; however, due to the lack of parts availability he became frustrated, left the unit, and returned to the United States. Aside from requesting a replacement from OTC, there was nothing the officer could do to prevent this FSR from leaving the unit. (Ref. 10) This episode seems to be an isolated incident, as most I MEF personnel we interviewed were satisfied with the performance of OTC's FSRs.

**10. 3.8.2 Field Service Representatives Roles and Responsibilities:**

In addition to duties outlined in previous paragraphs, the FSR shall:

- a. Work schedule shall coincide with that of associated Government personnel.
- b. Shall investigate, recommend, and/or perform training as required.
- c. Shall be equipped with common and special tool sets, technical manuals, and test equipment.
- d. Shall have factory engineering and technical support.
- e. Shall provide technical guidance to 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> echelon personnel engaged in repairs.
- f. Shall coordinate his responsibilities with the officer in charge of maintenance operations.
- g. Shall develop and submit configuration control documents, as necessary.
- h. Shall have appropriate security clearance.
- i. Shall ensure incorporation of Government approved engineering changes to serialized fielded MTRV assets.
- j. Shall provide deployed support during contingencies and training exercises.

**a. Discussion:**

- a. Across the board, FSR work schedules have coincided with those of I MEF personnel. In the garrison environment, there were very few, if any, complaints. While deployed in support of OIF, other than one report of an FSR leaving the theater, FSRs were available per the SOW. (Refs. 7, 10)
- b. FSRs consistently provided training and guidance to the Marines in Camp Pendleton. OTC has a thorough training program and I MEF personnel seem satisfied with the training. Both OTC and I MEF personnel reported that operational commitments, both CONUS training and overseas deployments, limited the effectiveness of OTC-provided training (Refs. 7, 8).
- c. In both garrison and deployed situations, FSRs are equipped with proper tools, test sets, and manuals. There was some frustration voiced by a 1<sup>st</sup> FSSG maintenance officer who had prior employment experience with Caterpillar Inc. He mentioned that as a Caterpillar employee, he had been trained in the use of enhanced diagnostic equipment that is not available to Marine maintainers. (Ref. 8)
- d. According to several Marine points of contact, OTC has fulfilled this part of the contract. Two examples were the installation of main battery cutoff switches and the replacement of fuel transducers. In both cases, FSRs used engineering support from Oshkosh to provide solutions to the problems. (Refs. 8, 10)
- e. Technical guidance for 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> echelon maintenance activities is being provided by FSRs. MTVRs are relatively new and the few breakdowns that have occurred have been easy fixes for Marine technicians. According to a 1<sup>st</sup> FSSG maintenance

officer, “My Marines have been able to do most of the diagnostics themselves, the truck doesn’t break so badly that they can’t identify what is wrong with it.” Since the trucks are so new, there is a very small percentage of failures. (Refs. 8, 11)

- f. Proper coordination was accomplished in Camp Pendleton; there were no complaints among the maintenance officers we interviewed. (Refs. 7, 8, 10)
- g. Configuration control documents have been submitted for the fuel transducer and the battery control switch. (Refs. 7, 11)
- h. FSRs assigned to I MEF have security clearances; virtually all of them are prior U. S. Marines. (Refs. 7, 8)
- i. As previously discussed, the engineering changes have been fielded at all levels.
- j. Deployed support was provided during OIF, although the FSR’s effectiveness while deployed was severely limited by the lack of Class IX distribution. (Refs. 7, 8, 10)

**11. 3.8.3 Customer Service Representative:**

The contractor shall provide customer service during Government working hours (CT 7:30 AM- 4:00 PM), and on-call support during non-working hours, on a 24 hour per day, seven days a week basis. The contractor shall provide a report that details the number of service calls, type of problem, and resolution given, to MARCORSSYSCOM, PMM155, Albany, GA, on a quarterly basis.

**a. Discussion:**

I MEF maintenance personnel stated that OTC has representatives available every weekday at the site (on base) at the specified times. A Marine Corps Systems Command PM-MT liaison said he was satisfied with the availability of OTC assistance. Also a 1-800 number provides customer service on a 24 hours per day basis. In this sense, OTC has been fulfilling this portion of the contract. (Refs. 7, 10)

**12. 3.9.1 Contractor Overhaul and Repair:**

The contractor shall be responsible for the overhaul and repair of the MTRV truck, all variants and selected components when required. By definition, an overhaul of the MTRV truck or components shall be returned to the customer as a condition code A (SERVICEABLE\_ISSUABLE) without qualification. These assets shall be repaired or reconditioned with materials, which are serviceable and issuable to all customers without limitation or restriction and covered by all applicable commercial warranties. The contractor shall repair all items in accordance with the manufacturers repair procedures and standards.

**a. Discussion:**

In the months prior to OIF, there was no need for OTC to provide for overhaul of MTRVs. While deployed, several MTRVs sustained significant damage due to battle action and vehicle accidents. The damaged trucks that were deemed to require an overhaul were transported directly to OTC upon return to CONUS. At the time of this report, overhaul work was still in progress and using units has not taken delivery of overhauled trucks. (Ref. 7)

**13. 3.9.2.1 Overhaul of MTRV Truck Components:**

Component overhaul shall be conducted either on site or the contractor's facility. When an engine, transmission, axle assembly, or transfer assembly is forwarded to the contractor for overhaul it shall be repaired or completed in accordance with the manufacturers' overhaul procedures and standards, and covered by all applicable commercial warranties. The components for the MTRV truck shall be returned to the customer in 30 calendar days or less, after receipt of the equipment and authorization by the PCO or his/her duly appointed representative by the contractor. The estimated overhaul cost shall be provided upon induction of the asset.

**a. Discussion:**

As described in Item 3.3, Warranty, in-garrison repair work was conducted in a timely manner, within the specifications of the SOW.

Prior to deployment for OIF, arrangements were made with contractors in Kuwait to provide component overhaul work. For example, Caterpillar Inc. in Kuwait City was contracted to provide engine component overhauls. It quickly became apparent that this dealer did not have the capacity to perform overhauls at the rate required. This severely limited the amount of component overhaul work done in theater. (Ref. 7)

**14. 3.9.3 Repair of MTRV Truck Components:**

Component repairs may be conducted either on-site or at the subcontractor or contractor's facility. The contractor shall repair all items in accordance with the manufacturers repair procedures and standards, and covered by all applicable commercial warranties. A component for the MTRV Truck shall be returned to the customer within 3 working days, upon receipt of the equipment and authorization by the PCO or his/her duly appointed representative by the subcontractor or contractor. The estimated repair cost shall be provided upon induction of the asset in response to the Government's requirement.

**a. Discussion:**

In garrison, when Marine technicians were not able to make the repairs to the trucks, the vehicles were taken to local MTRV subcontractors. The only problem described by I MEF maintenance personnel was that certain replacement components didn't come with the camouflage painting scheme while the brand new trucks out of the factory did. This presented a problem because the components were painted gray and the USMC has to absorb the cost of repainting these parts. (Ref. 8)

**15. 3.9.3.1 Repair of Deployed MTRV Truck Components:**

The contractor will deliver repaired components of deploying units to the return address as indicated or to the nearest SMU Deployed Support Unit, (DSU), within three working days.

**a. Discussion:**

As previously mentioned, the Kuwaiti Caterpillar contractor did not have sufficient capacity to repair the numbers of components needing service.

**16. 3.9.4 Calibration of Engine Control Module (ECM):**

Upon determination that the ECM needs replacing, the FSR will coordinate with the appropriate agencies to schedule the vehicle for service. The estimated calibration cost shall be provided with submission of the proposal in response to the Government's requirement. This service will usually be performed at the using unit's maintenance facility by qualified contractors.

**a. Discussion:**

The calibration of ECMs was conducted in a timely and efficient manner. Prior to deployment for OIF, I MEF took delivery of a number of MTVRs with incorrectly calibrated ECMs. OTC took action and the subcontractor, Caterpillar Inc., corrected the problems. Marine maintenance personnel agree that ECM calibration is a specialized capability that is best contracted for, rather than performed "in-house."

A useful feature of the ECM is its data collection capability. In the event of a vehicle failure or accident, ECM data can be used to determine a number of the vehicle's operational parameters at the time of the incident. (Ref. 7)

**17. 3.9.5 Wheel Alignment:**

Upon determination that wheel alignment is necessary, the FSR will coordinate with the appropriate agencies to schedule the vehicle for service. The estimated alignment cost shall be provided with submission of the proposal in response to the Government's requirement. Most likely, the service will have to be performed off base at properly equipped service facilities.

**a. Discussion:**

Wheel alignments were performed as needed, per the SOW. Wheel alignment work is usually limited to repairs after a major collision or damage to the truck's frame. The infrequency of this operation, and the training and equipment required, makes it cost effective for the Marine Corps to continue to rely on contractor support for wheel alignments. (Ref. 7)

**18. 7.0 Packaging:**

All shipments shall be packaged in accordance with best commercial packaging. Commercial packaging shall be adequate to ensure all supplies are delivered without damage and normal Government storage can be accomplished without degradation of materials furnished. Items to be trans-shipped by Government ports shall be packaged using MIL-STD 2073-1D, level A as a guide, and marked in accordance with MIL-STD 129 and MIL-STD 130.

**a. Discussion:**

OTC packaged its repair parts per the contract. However, most of the parts were packaged in bulk and once delivered to Kuwait, I MEF's intermediate supply activities did not have the proper repackaging material to properly forward the items to the requesting units. This was a major factor in the failure of the in-theater distribution system. (Ref. 18)

**19. 7.1 Bar Coding:**

The contractor shall bar code the DD form 250 or the commercial packing list or shall affix bar coded labels to same. The bar code symbology shall be Code 3 of 9 (Code 39) in accordance with Automatic Information Manufacturers Bar Code 1 (AIM BCI). Bar coded information shall be affixed to the outside of the shipping container to facilitate movement through intermediate receiving points. The following data elements are required:

Line #1	Document Number and Suffix
Line #2	13 Digit Number (National Stock Number)
Line #3	Routing Identifier Code (Vendor Code), Unit of Issue, Quantity, Condition Code

**a. Discussion:**

Bar coding is quickly becoming an old technology. While deployed, virtually all intermediate supply points relied on outdoor storage areas. During OIF,

when a major sand storm hit the coalition area, nearly all Bar Code tags were rendered illegible. Supply personnel see the need for radio frequency identification (RFID) technology. Many of the distribution problems encountered during OIF would have been solved with in-transit visibility provided by a DoD standard RFID system. (Ref. 18)

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## IV. LEGAL ISSUES INVOLVING CIVILIAN CONTRACTORS DURING OPERATION IRAQI FREEDOM

### A. INTRODUCTION

As described earlier, OIF was the first major theater war in which the Marine Corps employed a major ground vehicle that was supported by CLS. The MTRV, produced and supported by the Oshkosh Truck Corporation, provided tactical transportation to I MEF forces in every phase of OIF. Oshkosh's field service representatives (FSRs) deployed with Marine forces early in the build up phase of OIF to assist in offload of MTRVs from MPF shipping. FSRs were with Marine units as they staged in Kuwait prior to moving into Iraq. When major combat operations began, I MEF leadership was careful to ensure FSRs were kept, as much as possible, out of areas where Marine units were engaged with enemy forces.

Although it is not a new concept, and is used by all the U.S. armed services, CLS raises many questions regarding the presence of civilian contractors in close proximity to military units engaged in battle. The issue of a civilian's status on the battlefield arises from the Law of War principle of *distinction*. This principle holds that, in the conduct of military operations, nations and their military forces are obligated at all times to distinguish between enemy military forces and the civilian population of the enemy nation. Furthermore, neither the civilian population nor individual civilians not taking an active part in hostilities may be made the object of intentional attack. (Ref. 19) Knowing this, I MEF provided force protection as necessary to any contractor in its area of operations.

There is the danger of contractors becoming casualties or getting captured. If captured by the enemy, contractors are entitled to treatment in accordance with the Geneva Convention for the protection of War Victims. Civilians on the battlefield should not be intentionally attacked as long as they do not take an active part in military operations. Civilians who accompanied U.S. military units into the Iraqi theater, including FSRs, were not *unprivileged belligerents*, since they were duly authorized to

enter the theater by a contract with U.S. Government. If captured they were to be given prisoner of war status as previously indicated.

## **B. GENERAL ISSUES INVOLVING CONTRACTORS ON THE BATTLEFIELD**

The following section provides information gathered during a CLS literature study and interviews with several I MEF personnel who worked with contractors during OIF. This information applies to not only Oshkosh employees but to any civilian contractor working in support of U.S. forces.

### **1. When are civilians “taking an active part in hostilities” and risking intentional enemy attack?**

Just as there is no clear point at which a civilian person can be claimed as a *military objective*; there is no clear point at which a civilian accompanying an armed force may be at risk from legal intentional attack. Local civilian contractors supplying amenities, such as trash collection, housekeeping, food service or water, normally should retain their non combatant status at all times. A civilian on the battlefield for the purpose of maintaining or operating sensitive, high value equipment, such as weapon systems, may be at risk of intentional attack because of the importance of his or her duties. (Ref. 13) The issue should not be viewed just from the standpoint of the individual, but also how an enemy might view that person.

### **2. Should civilians accompanying the armed forces in the field wear uniforms?**

The Law of War does not prohibit the armed forces from requiring civilians accompanying the military in the field to wear a uniform. A uniform enables a commander and others readily to identify persons authorized to be within a base, a consideration in accomplishing his force protection mission. It is indicative (in addition to an identification card) of a person's authority to be in an area of operations in the event he or she is captured, reinforcing his or her right to prisoner of war status. A civilian's wearing of a uniform is not relevant to questions relating to the Law of War principle of distinction. Distinction between combatants and noncombatant status depends on the duties of that individual. From a commander's standpoint, the Law of War and a

commander's responsibility for force protection provide a legal rationale for insisting upon the wearing of uniforms by civilians accompanying the military in the field. Some of the Marines that we spoke to told us that the civilian contractors normally wore desert camouflage uniforms with name tags above the right pocket and the words U. S. CONTRACTOR over the left pocket. (Ref. 10) Normally contractors were collocated with the military units they supported.

**3. May a civilian accompanying military forces wear prior service devices (i.e., jump wings or any kind of rank) on his or her uniform?**

This is not a law of war issue as such. A civilian adorning his uniform (whether military utilities or some other form of authorized uniform) with indicators of prior service may increase the chance that he will be regarded as a legitimate target for attack, for which an attacker would bear no criminal responsibility.

**4. Is a civilian accompanying the armed forces at risk upon capture of being accused of being a mercenary because he or she is wearing a military utility uniform?**

A civilian authorized to accompany the armed forces in the field does not fit the very comprehensive definition for mercenary (Article 47 of the 1977 Additional Protocol 1), whether he or she is wearing camouflage uniforms, some other uniform, or civilian attire. (Ref. 19)

**5. Does the Law of War prohibit civilian contractors accompanying the armed forces from being transported in or driving tactical vehicles?**

No. The law of war principle of distinction does not prohibit the intermingling of civilians accompanying the armed forces in a field of operations with the forces they support. (Ref. 19)

**6. May a civilian accompanying the armed forces in the field be armed?**

A civilian accompanying the armed forces in the field is not entitled to be issued a firearm. His or her personal protection is the responsibility of the supported unit commander. However, the Law of War does not prohibit arming a civilian contractor for his/her personal defense. Arming a civilian is a commander's decision. The unit commander must base his decision on the civilian's duties; where he/she is working, the risk related to that work, adequacy of unit self defense, and whether or not the individual in question has displayed competence with the firearm to be issued. (Ref. 20)

Personal weapons and ammunition are not authorized for two reasons. First, the U.S. Government is obligated to ensure that all weapons and ammunition employed by its forces are consistent with the Law of War. It is not possible to conduct legal reviews for civilian personal weapons or ammunition or prevent their illegal use on the battlefield. Second, U. S. domestic law prohibits the unauthorized export or import of firearms or ammunition. Civilian carrying of personal firearms is not an authorized export or import. (Ref. 19)

**B. GUIDANCE FROM JOINT PUBLICATION 4-0**

According to Joint Publication 4-0, Doctrine for Logistics Support of Joint Operations, Chapter V, *Contractors in the Theater*, civilian contractor personnel accompanying U.S. forces are not combatants and must not be allowed to act as combatants during operations. Civilian contractor personnel have historically provided support to fielded military forces and international law allows for such activities. The Joint Publication also states that the risks must be minimized when determining to use contractors in providing essential services. Commanders should limit the designation of essential contract services to those truly indispensable to accomplish a unit's operational mission. When contractors are working in support of a military service, that service is responsible to provide essential services such as food, water, chemical and biological protective gear, and in some cases uniforms.

Joint Publication 4-0 also states that contractors are expected to comply with all applicable U.S. and international laws. They are also subject to the laws of any host nation. This means that contractors must be prepared to comply with all local taxes, immigration requirements, customs formalities and duties, environmental rules, bond or insurance requirements, work permits, and transportation and safety codes. The fact that the military force for which they are performing services enjoys certain exemptions from local law does not mean contractor personnel are also exempt. During OIF, contractor personnel accompanying the armed forces were subject to the criminal jurisdiction of the military and the Uniform Code of Military Justice. Additionally, contractors were subject to the host nation's criminal law, unless specifically addressed otherwise by international

agreement. The United States also retains the legal right to prosecute contractor employees and other civilians accompanying U.S. forces for criminal acts. (Ref. 21)

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## V. CONCLUSIONS AND RECOMMENDATIONS

### A. INTRODUCTION

Chapter IV provides conclusions drawn after comparing the Medium Tactical Vehicle Replacement (MTVR) Contractor Logistics Support Statement of Work with information gathered from those who employed and maintained the MTVR during Operation Iraqi Freedom, and provides recommendations on how to improve future CLS efforts.

### B. CONCLUSIONS AND RECOMMENDATIONS

#### 1. **Web-based logistics information required per the Statement of Work is not available to Marine units deployed in combat zones due to the lack of reliable Internet connectivity on the battlefield.**

##### *a. Conclusions:*

The SOW requirements for OTC to make available web-based information is based on the assumption that MTVR using units, even those in combat, will have the connectivity to access the information. OTC has performed as contracted in maintaining its website. However, the shipping status information that is intended to be used by maintenance personnel to verify the expected arrival times of spare parts is limited by the in-transit visibility provided by the shipping company. UPS, FedEx, and DHL provide the required tracking capability. Other shipping activities, like the U.S. Transportation Command and most smaller, less technically advanced shipping companies do not. In garrison, reliable Internet access allows for the use of the OTC website to track shipments, as long as the shipments are contracted with one of the above companies. In combat, the lack of reliable Internet connectivity and the sheer complexity of the supply chain make the above requirement unrealistic.

##### *b. Recommendation:*

The Marine Corps needs to continue to update its battlefield information technology infrastructure. In the last decade, the Marine Corps has made significant headway in providing connectivity to battlefield, especially for higher headquarters units.

There needs to be added emphasis on connectivity and bandwidth for organizational and intermediate maintenance activities.

For its part, OTC needs to continually evaluate its choice of shipping companies. OTC should maximize its use of growing number of shipping companies that can provide in-transit visibility.

**2. Host nation subcontractors do not have the capacity to support the MTRV component repair requirements generated by large forces.**

***a. Conclusions:***

The intent of MTRV CLS is to reduce the Marine Corps' requirement for in-house repair of components by taking advantage of the worldwide component repair capability provided by MTRV subcontractors. Contractor component repair works well in the garrison environment, but deployed component repair introduces several problems. The main problem is that most overseas subcontractor locations cannot provide the capacity required to service large numbers of MTRV components. During OIF, Kuwait's single Caterpillar dealer and single Allison Transmission service provider were quickly overwhelmed by the sheer numbers components needing repair. These repair activities were further limited by their use of third country nationals as mechanics. In most cases, the mechanics did not speak English, which frequently delayed the repair process.

***b. Recommendation:***

The lack of capacity provided by subcontractors located in foreign countries must be considered in the logistics planning process. Contractor component repair may suffice for smaller deployments, but the numbers of vehicles involved in a major theater war will quickly overwhelm most contractors. Also, the problems associated with non-English speaking mechanics must be addressed. Either the SOW needs to specify an English language requirement for repair contractors or the Marine Corps must be prepared to provide translator capability.

**3. Depending on their duties, civilian contractors accompanying U.S. forces may be viewed as taking an active role in military operations, thereby making them legal targets for intentional enemy attack.**

***a. Conclusions:***

According to the Law of War, nations are obligated to distinguish between enemy military forces and the civilian population of the enemy nation. Furthermore, neither the civilian population nor individual civilians not taking an active part in hostilities may be made the object of intentional attack. During OIF, Marine forces provided protection for its contractors in theater. Contractors in theater dressed in camouflage uniforms in order to protect the integrity of the units assigned, they also had nametapes and a strip with the words “U.S. CONTRACTOR” over the left pocket. Contractors were not allowed to wear any insignia nor allowed to carry weapons.

***b. Recommendation:***

Commanders should limit the designation of essential contract services to those truly indispensable to accomplish a unit’s operational mission. Contracts need to be specific in identifying essential services. Contractors’ support requirements need to be integrated fully into the Total Force structure and planning to ensure mission accomplishment. We also recommend that the contracts stipulate the replacement of contractors in the case they decide to leave the theater of operations, as was the case where one of the Oshkosh FSRs walked away from the unit to which he was attached. In such a case, we recommend a monetary penalty for the contractor as well as a policy that requires a replacement FSR within a reasonable time.

**4. The current SOW requirement for packaging shipments of Class IX materials “in accordance with best commercial practices” is a factor in the failure of I MEF’s in-theater distribution system.**

***a. Conclusions:***

The simple requirement for the contractor to package shipments “in accordance with best commercial practices” is inadequate and needs revision. Best commercial packaging usually results in items being shipped in bulk in order minimize cost. Bulk shipments into theater introduced the need to conduct extensive repackaging operations at the intermediate supply level. Intermediate supply activities did not have

sufficient personnel or repackaging materials, which significantly contributed to the overall failure of I MEF's in-theater distribution system.

***b. Recommendation:***

The SOW item regarding packaging needs to be revised to consider the delivery of items located throughout the battlefield. Either the contractor or the Marine Corps can address this issue. We recommend the contractor be directed to ship items destined for the combat zone in individual containers. This would reduce the need for in-theater supply activities to deploy with large quantities of repackaging materials.

**5. Bar Code labels on Class IX shipments need to be replaced with RFID tags.**

***a. Conclusions:***

The limitations and shortfalls using bar code labels to identify shipping containers were evident during OIF. All in-theater intermediate supply activities relied on outdoor storage areas. A major sandstorm during the major combat phase of OIF rendered virtually all bar code labels unreadable; significantly degrading I MEF's in-theater distribution capability.

***b. Recommendation:***

Bar coding is an obsolete technology that needs to be replaced by a radio frequency identification (RFID) system. As soon as the DoD publishes standards for service-wide RFID systems, the Marine Corps should be ready to implement it at the MEF, Group, and battalion/squadron levels.

**6. Operational availability of the MTRV was noteworthy despite I MEF's in-theater logistics problems.**

***a. Conclusions:***

From the information gathered from experience during OIF, all users of the MTRV were pleased by its operational availability. In virtually all MTRV using units, operational availability was at levels above 90 percent. That this availability level was sustained during a major theater war is remarkable. This success was due to the reliability of the MTRV itself, and not the result of successful in-theater CLS.

***b. Recommendation:***

The MTRV is an example of how the use of an extremely reliable system, although initially expensive, reduces overall demand on logistics support systems. Considering that the Marine Corps often uses its equipment well into the wear out phase of its life cycle, we rarely get the opportunity to use extremely reliable systems, and consequently have developed a large and manpower-intensive maintenance and repair infrastructure. Long term cost savings may be realized if the Marine Corps can purchase more reliable systems more often, thereby reducing demand on the logistics support system.

**C. FINAL NOTE**

The use of CLS is increasing throughout the Department of Defense. CLS is designed to reduce the life cycle costs of defense systems by reducing service-carried inventories and decreasing repair cycle times. It also enables the military services to use contractors to accomplish tasks that may not be included in core warfighting responsibilities.

The issues addressed in this research are not unique to I MEF or the Marine Corps. The success of CLS is dependent on other parts of the logistics chain. The U.S. Army experienced similar Class IX distribution problems during OIF. The lack of repair capacity of host-country contractors impacted all the services. The lack of in-transit visibility of repair parts adversely affected all deployed units. CLS is very successful when enabled by the infrastructure of a military base, but is severely limited by other factors in a deployed environment.

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