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THE HISTORY AND SIGNIFICANCE OF MILITARY PACKAGING

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The History and Significance of Military Packaging

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Joseph C. Maloney, Jr.
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EXECUTIVE SUMMARY

This work deals with the logistics doctrine of military packaging. Military packaging came about because military planners overlooked the need to protect materiel from the storage and transportation stresses first encountered during World War II. These experiences led the War and Navy Departments to maintain cadres of expertise in this emerging technology, and to establish a training school for teaching military packaging materials and processes. Senior leadership changed, new people decided that military packaging was not needed and that commercial packaging would serve future needs. Logistical operations during the Korean War showed that commercial packaging could not protect military materiel in combat support operations, and the Military Services restored military packaging for general use. Following the Korean War, the Military Services tried to retain military packaging and minimize the use of commercial packaging in the name of readiness, but new leaders failed to recognize the need for proper packaging.

The environmental conditions encountered by U. S. troops during the war in Southeast Asia in the 1960s and 1970s forced the Military Services and Defense Agencies to again abandon commercial packaging in favor of military levels of packaging protection. By the end of the war, no one was able to provide or define a logical balance between military and commercial packaging. Once again, new leadership mandated the Military Services and Defense Agencies to use more commercial packaging under the guise of a money saving initiative. This endeavor led to new operational problems for the Military Services and Defense Logistics Agency (DLA) alike at CONUS and OCONUS locations during both peacetime operations and mobility exercises. This massive shortfall in packaging capability drew the Military Services and DLA together to establish and refine the appropriate balances between the military and commercial packaging. However, due to several Congressional reviews, GAO audits, and pressure from industry, this balance was short-lived and eventually forced the pendulum to swing back to commercial packaging.

At the outset of the Persian Gulf War, problems again cropped up with commercially packaged materiel. Much of the commercially packaged materiel did not survive the rigors from transportation from the United States to Saudi Arabia, and was not suitable for use. Some of the materiel that survived through transportation could not withstand the storage conditions of the harsh desert climate, and literally fell apart. Once the problem was identified, the Military Services and DLA promptly imposed military packaging and the problems were quickly resolved.

Less than a year after the Persian Gulf War and the lessons learned concerning commercial versus military packaging were still being briefed, senior officials again started the wheels in motion to eliminate military packaging, except for rare instances where waiver approvals would be required, along with the standards used to develop and maintain it.

Military packaging exists based upon lessons learned when improper packaging failed to protect materiel in combat logistics support missions. The use of commercial packaging in these sorts of scenarios for the sake of penny pinching is, at best, a short sighted management decision that results in unacceptable levels of losses of much needed materiel and resources. This work examines why military packaging exists, and why we need not continue to repeat the lessons of history, over and over, in the name of short-term savings.

PREFACE

This work was commissioned by the Defense Packaging Policy Group, consisting of the senior packaging management officials from the four Military Services, the DLA, and the School of Military Packaging Technology (SMPT). It started in late 1988 when I had the distinct fortune of attending the Joint and Combined Staff Officers School at the National Defense University's Armed Forces Staff College in Norfolk, Virginia. Few of my fellow students had ever before encountered a Packaging Specialist during their careers, and were surprised to learn about how packaging had impacted military operations during past armed conflicts. As we learned during that course, tactics and strategy will win battles, but effective logistics wins wars. Effective logistics include the correct application of packaging to protect materiel. As you will find throughout this work, when packaging worked well, few people ever noticed, but when it failed, it drew much high level attention.

The purpose of this work is to introduce people to how military packaging first came to exist as a distinct logistics discipline, and how it has evolved over the years. It presents the story about how military packaging has grown and adapted itself to the changes in how materiel is distributed and how management officials have brought different approaches to solving distribution challenges. This work will not teach you how to package materiel to protect it during military distribution operations - that function is best left to the SMPT's. Hopefully, after reading this work, you will come away with a better understanding of why the military packaging discipline exists, and how it might be best applied in the future for the distribution scenarios that the Defense Department's components are likely to encounter.

This work is a "living" document, that is, those who handle military packaging in the future need to document the problems encountered and the lessons learned for the benefit of those who later follow them. With that in mind, I have deliberately ended the military packaging story at the conclusion of the Persian Gulf War, and avoided trying to assess the significance of such things as the Defense Packaging Policy Group and other challenges in the Post Cold War era.

"Those who do not remember the past are condemned to repeat it."

--George Santayana--

THE HISTORY AND SIGNIFICANCE OF MILITARY PACKAGING

INTRODUCTION

As with any well thought out and planned packaging scheme, the logistical discipline of military packaging for the United States Government developed from a well-recognized logistical need. As a key element of integrated logistics support planning, military packaging has evolved over the course of its life to accommodate the many technology changes in how the military distributes its supplies. It remains a dynamic force that can either provide a positive or negative contribution to the success of military missions. Unlike most elements of military doctrine, military packaging is rarely understood and appreciated for its contributions, thus making it a prime target for criticisms from uninformed opinions.

The purpose of this paper is to make the reader aware of the basic reasons behind why military packaging exists. This paper will review the many historic factors that first led military leaders to recognize the need to protect supplies and equipment, and then follow the evolution of the science of military packaging through current day practices.

GENESIS

The need for specific military procedures and requirements on how to package materiel first surfaced on two different fronts. The Army had run sustainment exercises to Iceland during the summer of 1941, and experienced high levels of supply losses that troop units attributed to bad packaging. The same problem hit the Navy quite dramatically during the amphibious operations at Guadalcanal in 1942. The commercial packaging that the Army, Navy and Marine Corps used during the early months of World War II colossally failed to serve its intended purpose, and seriously jeopardized the War Department's and Navy Department's abilities to sustain operations then being planned. No one in either of those Departments had paid attention to the changes that had occurred in packaging designs since Armistice Day.

In 1918, the most common shipping containers for military supplies were wood boxes, crates, kegs and barrels. These were very much like the common commercial shipping containers of that era, and were well suited for all types of supply distribution environments. These containers were heavy-duty, sturdy designs, generally built by craftsmen. With proper care, some surviving examples of these containers could be readily used today as intended.

Immediately prior to World War II, military planners failed to recognize that the packaging they had been receiving with their supplies would not meet their vital needs for overseas operations. Industry had recognized that they could lower costs and improve profit margins by getting their products to market in suitable packaging that weighed less and cost less to produce than traditional packaging. In 1914, American railroads, who at the time were carrying most of the freight in the United States, recognized and authorized the use of corrugated and solid fiberboard shipping

containers for packing many different types of products. Motor carriers, in turn, followed the railroads' example in 1935 when they adopted their own packaging rules that often called for fiberboard boxes. The United States Treasury Department issued the first federal specifications for corrugated and solid "fiber boxes" in 1930 for packing supplies used by the civil agencies.

Industry, at the time, was also moving toward marketing plans that products would be consumed within a few months after production, and that handling during transit would be closely controlled. This lead to increasing use of such packaging materials as cellophane and coated or waxed glassine that offered little protection from moisture. These changes meshed with general industry practice for retail sales that was based largely on such factors as eye appeal for enhancing sales, reducing package weight, and reducing the amount of packaging required (1). When you combine these factors with the low interest paid to national defense in general from the Congress and public alike, the prescription for disaster was quietly being filled.

WORLD WAR II—WAR DEPARTMENT

The War Department and the Navy Department quickly learned lessons in the early days of the war that united both Departments in changing their doctrine on protecting their supplies and equipment. The War Department, Army Quartermaster Corps found that the commercial techniques for packaging subsistence, while well suited for domestic distribution, was inadequate for military sustainment. When shipped overseas, subsistence packages broke and spilled their contents, and foods in flexible packages picked up moisture. Subsistence losses due to the failure of packaging materials were substantial. The Army Transportation Corps and the Quartermaster Corps had jointly experienced many failures of commercial corrugated fiberboard shipping containers during shipments to Iceland during the summer of 1941. But a veritable flood of criticism followed deliveries of subsistence to North Africa and the Pacific Theaters. The losses of stock raised the question of whether to pack supplies in more durable containers, or to simply overpack commercial containers before shipping them overseas. Since it seemed that it was impractical to purchase all canned goods in wood or solid fiberboard boxes, overpacking became the policy. However, two days after the attack on Pearl Harbor, the Office of the Under Secretary of War issued a general specification for packing canned goods for overseas shipment (2). This specification called for the use of corrugated or solid fiberboard boxes, nailed wood boxes or wirebound boxes. It is clear that a lot of confusion existed between policy and actual practice.

During the early months of 1942, various Government agencies grappled with the problems of effectively packing vast quantities of materiel for overseas theaters, and arrived at solutions that eliminated the former policy on overpacking. In place of over-packing, directions issued by the Quartermaster Corps in April, 1942 for overseas packing called for a new type of weatherproof solid fiberboard box, nailed wood boxes or wirebound boxes(3). The only known requirement for overpacking was for food packaged in glass containers. The Quartermaster Corps and industry pushed development work on the use of an asphaltic barrier lamination in the kraft paper use to fabricate fiberboard boxes, and the use of sisal in the construction of the kraft paper itself. The "sisal box" originated from these efforts(1). Industry pushed the development of the V-board boxes (V for "Victory") which represented the most significant triumph of American wartime packaging research. These boxes withstood rougher handling than nailed wood boxes, took up less space and formed

better camouflage than wood. On the downside, they lacked the rigidity of the wood boxes and did not stack as well(1).

At the suggestion of the Chief, Packing and Crating Section, Office of the Quartermaster General, the new box material was named "V-board." The first specification for V-board boxes appeared 2 December 1942(4). The three grades, V1, V2 and V3 were specified with the idea in mind that V1 boxes would be used to support front line operations, and V3 would support rear operations. Critical shortages of kraft fiber at the time delayed production of these boxes until Spring, 1943.

WORLD WAR II—NAVY DEPARTMENT

The Navy Department experiences with commercially packaged supplies mirrored the War Department's problems. Nothing has been found to document Navy problems until the Battle for Guadalcanal. Early planning called for the Navy to handle defensive roles to support Army amphibious operations. The Navy's first operations to stop Japanese forces were Task I in Operation WATCHTOWER in the Tulagi area northeast of Guadalcanal. The extremely short planning cycle did not provide any time to develop any new scheme on packaging Navy supplies, nor to consider how supplies that were already in the theater would fare in amphibious conditions. Packaging merely followed how the balance of logistical plans was handled - basically, logistic planning was conducted in a vacuum(5).

Debarkation was set up for the Aotea Quay in Wellington, New Zealand. U. S. Marines displaced the unionized New Zealand dockworkers because the Government refused to make them work during "inclement conditions." The Marines found that Aotea Quay was a seemingly endless nightmare. They reported, "under the dim lights, drenched Marines wrestled with rain soaked cartons of clothing, food, medicines, cigarettes and chocolate bars. The cheap cardboard cartons containing Navy rations and Marine Corps supplies disintegrated; one officer remembers walking a hundred yards through a swamp of sodden cornflakes dotted with mushed Hershey bars, smashed cigar boxes, odd shoes and stained, soggy bundles of socks.(6)"

The need for accurate marking also surfaced in a most critical manner during the intelligence gathering for the operation. Colonel Charles A. Willoughby, USA, who was General MacAurthur's intelligence officer, had ordered thorough photo coverage of Guadalcanal and Tulagi as a crash project, and by 20 July 1942, a controlled mosaic of the Lunga beaches had been prepared. The packages containing this invaluable photo-map were improperly addressed, and were lost somewhere in Auckland(7).

WORLD WAR II—"JOINT ARMY/NAVY PACKAGING"

The inadequacies of Army and Navy packaging practices were well established soon after Pearl Harbor. Transportation in wartime conditions involved rough handling and faulty stowage in break bulk ships. Unprotected metal parts corroded as the result of contact with salt air or salt water. After discharge at the Ports of Debarkation, supplies were often stored in open dumps, either uncovered or poorly covered by tarpaulins. Complaints came from all over the world, even Great Britain, where the conditions were as close to "normal" as any being encountered(8).

These compounding problems with packaging prompted the Chief of Transportation, General Gross, to initiate a study of how to best cope with packaging. This action lead to the creation of Packaging and Packing Section of the Water Division, Transportation Corps. This group had general supervision over the ports of embarkation which afforded the best opportunity to study packaging in relation to transportation. The port commanders were instructed to fully cooperate with representatives sent out by the Chief of Transportation, and to also add packing experts to their own staffs. These experts functioned as port inspectors who had a profound impact in identifying the sources of packaging problems, as well as the extent improper handling in transportation contributed to packaging failures. The success of this cadre of experts leads the Chief of Transportation to conclude that the problem should be attacked on a broader scale beyond his control, and in June 1942, he recommended that the Commanding General, Services of Supply establish a permanent agency for packaging. This agency would have general supervision and overall coordination of the packaging activities of the technical services. The Chief of Transportation also recommended that any of the services that had not already done so be required to "engage fully qualified personnel to deal with packing and packaging.(9)" This became the Container Coordinating Committee which, in cooperation with the War Production Board, Lend-Lease Administration, War Shipping Administration, and Office of Defense Transportation, set the first ground rules for military packaging. Those ground rules made up Army-Navy General Specification for Packaging and Packing for Overseas Shipment No. 100-14A(Army)/39P16a(Navy), dated February 15, 1943. They set up a Packing and Crating Unit in the Procurement and Distribution Division, Services of Supply, which later became the Packing and Packaging Section, Procurement Division, Army Services Forces. This section dealt with packaging as it related to production points by developing specifications for packaging, and coordinating the inspection activities of the services. The Army Services Forces also had another section that dealt with packaging from the standpoint of depot organizations. To correct faulty packaging from production points received by troop units about to move overseas, the service commands were directed to set up packing squads to instruct and assist units in this work(10).

This was the birth of Military Packaging as we now know it - Support to Inventory Control Points, Support to Distribution Depots, and Support in Training People.

Both the Army and the Navy quickly took advantage of the opportunity to develop military packaging and, in some instances, took advantage of their combined influence. By early 1945, both the Military Services had set up individual Packaging Boards to facilitate their individual communications and exchange ideas from the technical services on the lessons then being rapidly learned on military packaging from all types of military operations. At the same time, they set up a Joint Army-Navy packaging Board to develop uniform specifications and methods for packaging supplies, as far as it be found to be practicable(11). The joint board lead the two Departments to begin issuing such common packaging specifications as the famous JAN-P-108, PACKAGING AND PACKING FOR OVERSEAS SHIPMENT - BOXES, FIBERBOARD (V-BOARD AND W-BOARD), EXTERIOR AND INTERIOR, dated 30 June 1944. Other specifications for Packaging and Packing for Overseas Shipment that were completed by the end of WW II included those shown in Table 1.

As the war progressed, military packaging gradually evolved from the inadequate, haphazard processes to better defined, detailed instructions relating to the cleaning, spraying, and sealing of

principle items before they were packed. These instructions were generally controlled by the Army Services Forces Headquarters and the Navy Bureau of Supplies and Accounts. The instructions

TABLE 1. JOINT ARMY-NAVY PACKAGING SPECIFICATIONS

JAN-P-100, General Specification
JAN-P-102, Composition Topcoating Materials, Bituminous
JAN-P-103, Boxes; Wood Cleated; Solid Fiberboard
JAN-P-104, Crates, Sheathed, Wood, Nailed
JAN-P-105, Boxes, Wood, Cleated, Plywood
JAN-P-106, Boxes; Wood, Nailed
JAN-P-107, Boxes, Wood, Wirebound
JAN-P-109, Barrels, Tight
JAN-P-110, Drums, Metal, 55-Gallon (For Other Than Petroleum Products)
JAN-D-111, Drums, Fiberboard (Overseas Type)
JAN-P-112, Drums, Plywood
JAN-P-113, Textile and Paper Laminated Bag
JAN-P-115, Compound, Sealing, Dipcoating
JAN-P-116, Preservation, Methods of
JAN-P-117, Bags, Interior Packaging
JAN-P-118, Sacks, Paper, Shipping, Multiwall
JAN-P-120, Cartons, Folding, Paperboard
JAN-B-121, Barrier Materials, Greaseproof
JAN-P-122, Barrels, Slack
JAN-P-124, Cans, Pails and Drums, Metal (For Other Than Subsistence Items)
JAN-P-125, Barrier Materials, Waterproof, Flexible
JAN-P-127, Tape, Adhesive, Pressure-Sensitive, Water Resistant
JAN-P-128, Tape, Water-Resistant, Gummed
JAN-P-132, Crates, Unsheathed, Wood, Nailed
JAN-P-133, Boxes, Set-Up, Paperboard
JAN-P-134, Kegs, Slack
JAN-P-138, Boxes, Wood, Fiberboard Lined
JAN-P-140, Adhesives, Water-Resistant, Case-Liner
JAN-B-148, Barrier-Material, Aluminum-Foil
JAN-C-149, Compound, Protective, Strippable (Hot-Dipping)
JAN-P-196, Engines, Ground, Air-Cooled
JAN-P-197, Anti-Friction Bearings and Bearing Parts
JAN-P-207, Electrolyte: Storage Battery (In U. S. 1-Gallon or Imperial 1-Gallon Bottles)
JAN-B-233, Boxes, Spare Parts (Shipboard Use)
JAN-P-630, Paint, Oil-Type, Ready-Mixed (For Camouflaging)
JAN-P-658, Packaging and Packing of Electrical Equipment and Spare Parts (Electronic, Electrical, and Electro-Mechanical)

pertaining to complicated assemblies were detailed as needed to deal with the removal of detachable parts, the packaging of spare parts, the removal of fuel and lubricants from engines, the coating of metal surfaces and wiring, and the taping of openings and joints(12).

The Theaters still had problems with packaging that were attributed to the faulty doctrine in place before the war, and the massive catch-up work that the Army and Navy were overcoming. For the Army, after the Chief of Transportation furnished the documentation for proper packaging, he sent officers who were skilled in packaging to survey the packaging conditions during 1943. Since most of the materiel used to mount assaults against the enemy were packaged in theater, the Chief of Transportation, ETOUSA in June 1943 created traveling packing squadrons to train troops in proper packaging(13).

Toward the end of the war, palletization became a concern related to military packaging, and its adaptation to military packaging took three distinct forms. What the Army called *palletization* differed from the commercial warehousing pallet loads by the fact that supplies had to be fastened to the pallet. *Palletized unit loads* were supplies that were strapped or otherwise fastened to pallets that had been especially designed for particular commodities, such as ammunition. *Skidloads* were supplies fastened to pallets or platforms that were constructed so that they could be used as sleds and drawn across beaches during assault landings.

For the transportation of the era, palletization posed both advantages and disadvantages. If the loads were not too bulky, they could be easily handled at rail and shipping terminals, and quickly loaded into ships. However, heavier loads could not be easily loaded into the wings of the breakbulk holds. Some of these loads had to broken up to help fill the available cube of the ship, which needlessly wasted time in port. Overseas, palletized loads could be readily handled only at ports that had forklift trucks or other suitable equipment. With palletization, there were fewer loose shipping containers available to fill void spaces in ships holds. Recognizing that palletization created problems, the Chief of Transportation directed that only certain commodities would be palletized, the size of palletized loads would be limited, and that palletized cargo would make up ***no more than 25 percent*** of the total cargo on any ship(14).

The Army Services Forces and the Chief of Transportation continued to clash between themselves and with the Navy over the pros and cons of palletization, and this lead to the creation of the joint Army-Navy Conference on Palletization, 12 January 1944. Skidloads of ammunition were successfully deployed during the invasion of Attu in May 1943, and several months later during the invasion of Sicily. During the Sicilian campaign, many Quartermaster classes of supplies were also skidded quite successfully. Afterward, skids were often used in amphibious operations whenever possible(14).

WORLD WAR II—"JOINT ARMY/NAVY MARKING"

Marking of shipments for identification and to indicate their destinations underwent a thorough revamping during the war. The inadequacy of existing marking systems, as well as the unreadiness of the Army supply services to recognize the need for reliable marking, was already apparent in San Francisco during the reinforcement work for the Philippines before the Japanese attack(15). Since

many organizations had vested interests in marking schemes, the Army and Navy made slow progress in developing a consistent system that could satisfy everyone involved - shippers, the Transportation Corps, the various overseas commands, as well as the overall interest of military security. After learning some tough lessons with incomplete and inconsistent markings on shipments during the North African campaign, the European Theater protested for a consistent marking scheme during late 1942 and early 1943. The theater was especially concerned with complete markings on shipments going to the United Kingdom where ports and depots alike were overcrowded, and transportation lines of communication were creating special problems in the receipt and consignment of materiel. After several attempts to convince Headquarters, the European Theater prevailed in setting two marking schemes; one for materiel that accompanied troops overseas, and one for materiel that was consigned to units already overseas(16).

In the latter scheme, the address for the overseas customer was manually stenciled on each container, and consisted of five parts.

1. Shipping Designator - a four letter code designating the port of debarkation or the general destination of the cargo.

2. Time Indicator - a single letter designating the priority of the shipment by indicating the month and the half of the month that the shipment would leave the United States.

3. Coded Abbreviation - Two part code indicating the name of the shipping service (i.e. Ord, QM) and the class of supply.

4. Consignee Combination - A group of letters and digits that separately identified the packed components of an assembly or supplies that would have to be brought together to fulfill a specific mission.

5. Shipment Information - Letters and digits that identified the requisition number, the depot which originated the shipment, and the number of the shipment when several shipments were made on separate shipping documents from a single depot against a single requisition.

Under this system, an overseas address marking on a shipping container could appear as: BOBO-A-ORDII-GT4-A313RA6.

Color markings were also required to identify materiel from each of the technical services. These markings appeared as a either a color band for some services, or a corner triangle for other services. These markings aided material handlers in quickly segregating materiel by services without deciphering the coded markings.

Additional standard markings included cubic displacement, weight, and data concerning the contract. These marking were restricted to specific areas on only one or two sides of the shipping container. When the contents were uniform and simple to describe, the information would be marked on the shipping, but for other situations, the contents information would appear only on the packing list that was affixed to the outside of each shipping container. When equipment was shipped unpacked,

markings would be applied directly onto the equipment whenever possible, rather than on a tag or label.

Whenever organizational equipment, individual equipment, and initial supplies moved with the troop units, materiel was marked with a four digit, coded shipment number. To the very few persons permitted to know the meaning of the code, this number identified the owning troop unit, the overseas destination, and the approximate time of debarkation. These codes were used only once.

To bring consistency among all the players involved with packaging marking in the summer of 1942, the War Department set up the Code Marking Policy Committee to reflect Army needs and promote coordination with the Navy and with the British who were both transporting supplies on lend-lease ships and receiving increasing volumes of supplies at ports, depots and supply dumps. The Transportation Corps was put in charge of this committee, and not only handled the determination of marking requirements, but also policing their application. The policing aspect involved preventing the compromise of shipping designators and shipment numbers, as well as improving the legibility of marking characters. In late 1942, more than 25 percent shipments arriving at ports were so poorly marked that the ports had to remark them. By June 1944, the Chief of Transportation reported that marking quality had improved so significantly that they could curtail their enforcement work(17).

The Navy used a marking system similar to that described above, but slightly different in aspects peculiar to naval operations. This document was the Navy Shipment Marking Handbook(19). In the case of joint operations, the Army and Navy each agreed to go with the decision from the commander of the operation as to whose system would be used(18).

Both the Army and Navy recognized the need to hold down the number of packaging documents they would have otherwise independently created. These documents were designated as Army-Navy Joint Packaging Instructions (JPI).

JPI-2 - Preservation, Packaging and Packing of Ground Air-Cooled Engine Units (0-32HP), 31 August 1945.

JPI-6 - Preservation, Packaging and Packing of Spare Parts for Internal Combustion Engines, 25 August 1945.

JPI-8 - Packaging and Packing of Machine Tools and Accessory Parts for Long Term Storage, 20 May 1946.

JPI-9 - Packaging and Packing of Machine Tools and Accessory Parts for Overseas Shipment, 3 June 1946.

JPI-12 - Packaging and Packing of Hand Tools, 24 September 1945.

SIGNIFICANCE OF EARLY MILITARY PACKAGING DEVELOPMENTS

The sections above outline that through the course of the war years, both the War Department and Navy Department recognized that commercial packaging was unable to support their distribution need for supporting overseas operations around the world. By war's end, the Army and Navy had developed joint documents for the packaging materials and containers needed to protect their materiel, had developed compromise systems for marking supplies, and had begun to grapple with how to best unitize cargo to ease material handling operations in all types of operations. Each had established packaging boards to deal with new packaging problems, and had set up a Joint Army-Navy Packaging Board as a forum for settling packaging problems common to both.

POST-WORLD WAR II

The development of military packaging after WW II is not as well documented as the initial developments chronicled for the war. Both the Army and Navy Packaging Boards continued to function as separate entities, but the Joint Army-Navy Packaging Board disappeared concurrent with the creation of the United States Air Force in 1947.

One of the most significant steps taken after WW II involved standardizing the methods of preserving materiel and equipment. The Army Ordnance Corps had developed JAN-P-116 which defined the processes used to preserve ground equipment, supplies, and spare parts. The Army Air Force and Navy Aviation Supply Office also had a document, AN-P-13, which defined the processes used to preserve aeronautical equipment. The Department of Defense tasked the Army to consolidate those documents and develop a standard scheme for describing the most commonly called for preservation processes. Army Ordnance took several years to develop the first draft based upon the lessons learned from the experiences of WW II. In 1950, the Army called a meeting of all the Military Services to coordinate and sign off on their draft. After meeting for two and a half days, the discussions never got beyond the first paragraph.

The Department of Defense Standards Agency decided to transfer the responsibility for a standard preservation system to the Navy Aviation Supply office who finally concluded the project in 1952. The Navy's new system was outlined in MIL-P-116 which broke out three broad methods of preservation consisting of 21 separate submethods. The major methods were Method IA - Waterproof, water-vaporproof package, Method IB - Strippable compound coating, Method IC - Water resistant package, Method II - Water-vaporproof package including desiccant, and Method III - Mechanical and physical protection only.

When the United States Air Force became an independent Military Service, it took with it the packaging specialties that were associated with aeronautics at the time, including the first scheme to define technical packaging requirements using codes. This system was outlined in Air Force-Navy Aeronautical Bulletin No. 302, dated 11 May 1946, "Preservation and Packaging Card List for Aeronautical Spares: Form and Instructions For." In this system, packaging data was developed by prime contractors for review by local Government inspectors, and approval by either Navy Aviation Supply Office, or Air Force Plant Representative or Air Force Procurement Field Office. The process established an item by item description of standard preservation and packaging for spare parts, end

items and components. By 1952, the ANA Bulletin No. 302a included codes for each of the MIL-P-116 methods and submethods, as well as the wrapping materials, cushioning materials, and various containers. The Army Signal Corps also adopted this procedure in 1952 for their spares packaging requirements. ANA Bulletin 302 eventually became MIL-STD-726(19).

The Military Services at this time were aggressively developing weapons systems, which required new means to develop the associated packaging requirements. Navy program offices would develop letters of intent to buy spare parts worth a given amount of money, which also would include packaging requirements for those spare parts. At the time of the letter, neither the Government program office nor the contractor would necessarily have any idea what those spare parts looked like. These panic-like situations led the Navy to develop MIL-STD-794 that would provide general guidance on how to develop packaging requirements based upon MIL-STD-726 codes. This standard then resulted in the need for a means of recording packaging data which became MIL-STD-834. The Air Force adapted these standards to their general practices for developing packaging data.

By this time, the Army Technical Services had become Major Support Commands of the Army Materiel Command (AMC). These commands developed their own means of developing packaging requirements that focused on item such characteristics as size, weight, material composition and finish, and fragility to attempt to define packaging in terms of predetermined Army packaging data codes. The decision logic evolved into Military Specification MIL-P-14232, and used MIL-STD-647 for data code definitions. These packaging data codes were uniquely structured with definitions that did not correspond with the definitions for the codes in MIL-STD-726.

The Military Services were also developing packaging requirements as part of the many commodity-type Federal Specifications that were replacing the JAN documents from WW II for common type items. Rather than agree to a common set of packaging requirements, each of the Military Services would develop their own unique requirements that would appear as Section 7 - Departmental Requirements. In some instances, the Department Requirements for packaging amounted to more than half of the total requirements contained in a given specification (see Federal Specifications H-B-101a, 13 Feb 51; CCC-C-422, 10 May 53; GGG-P-151a, 13 Oct 53). This practice drew fire from contractors who were expected to comply with varying packaging requirements for identical items being bought by different military purchasing offices for generally the same sort of distribution patterns and similar end uses.

Another practice was to supersede purchase descriptions with Military Specifications, and tailor Service-unique requirements. For instance, the Army Quartermaster General issued a specification for shoeing knives, No. 17-103, 21 September 1921, with separate sections covering packing and marking. The Philadelphia Quartermaster Depot replaced that purchase description with MIL-K-1950, 31 January 1950, which was a cover sheet that included the following unique marking requirements for the Air Force.

FOR AIR FORCE PROCUREMENT

Articles, unit and intermediate containers shall be marked in accordance with the current issue of specification AN-M-13. Exterior shipping containers shall be marked in accordance with Specification 94-40645.

KOREA AND THE 1950s

While these various processes for developing, recording and communicating packaging data and requirements were evolving, there was a significant reduction in appropriations for the military. The Military Services reverted to specifying general commercial practice for much of the packaging coming with supplies. With that change came a repeat of the adverse packaging performance that had occurred during the outbreak of WW II. The Army, in particular, deemed that the technicians they had developed for teaching military packaging to their troop units during WW II were no longer necessary for Post-War operations. With this came a large loss of the people who were technically proficient in military packaging. This situation was particularly acute for Army Ordnance which moved to develop military packaging training(20).

The Chief of Ordnance sent a letter on 3 November 1948 to the Automobile Manufacturers Association (AMA) to assist in developing the recommendations for a course of training in the "preservation, packaging, and packing of military supplies and equipment for the Ordnance Corps." Committees composed of AMA and Ordnance personnel, working in conjunction with specialists from the United States Department of Agriculture Forest Products Laboratory, developed suggestions on how to teach military packaging based on both existing military specifications along with the latest industrial processes. Additionally, the Ordnance Corps requested assistance in developing plans for a packaging line to serve as a model and to be used for an on-the-job training phase of the proposed packaging course(21).

The Chief of Ordnance approved the recommendations of the committees, and the resultant course of instruction, "The Ordnance Packaging Training Course," began on 2 October 1950 at the Rossford Ordnance Depot, Toledo, OH. On 24 July 1951, the Secretary of Defense announced the creation of the Joint Military Packaging Training Course that would become the packaging training activity for all components of the Department of Defense. The Joint Military Packaging Course (JMPC) was first taught on 17 September 1951 and replaced the former course. This was a 76 hour course that attempted to cover the full spectrum of military packaging, but student feedback, coupled with increasing lessons learned in the Korean War, forced JMPC to split the course into two phases. Phase I covered Unit and Intermediate Protection and Phase II covered Packing and Carloading(20).

The Korean War forced the Military Services to relearn the lessons that they had previously learned during WW II. Commercially packaged materiel initially arrived on the Korean peninsula with extensive water damage, rendering much of materiel unusable. The Military Services had the benefit of the packaging specifications that they had developed during the previous decade, as well as some materiel that had been produced too late for use in WW II and held in storage depots around the United States. The corrective action to replace commercial packaging with military

requirements did not require the trial and error that characterized the early phases of WW II, and shipments to the Korean Peninsula from both depots and contractors alike improved considerably by the end of 1950.

By the time the cease fire was declared on 27 July 1953, none of the Military Services took any immediate action to relax the military packaging requirements. The Military Services had rejuvenated their packaging operations at the various principle logistics centers and depots across the country. Packaging test laboratories were set up to support data development and packaging design functions, including one laboratory that was collocated with the JMPC. The JUMP had remained a permanent Army School and expanded to provide military packaging training to members of the Military Services, as well as Industry(21). Military packaging had proved its worth and had become a new institution in the total scheme of military logistics(22).

This resulted in complaints from industry that the Department of Defense (DoD) was calling for excessive packaging beyond what was needed for peacetime operations. Senior packaging specialists began developing a solution that would prevent repeating the dilemma faced by their counterparts at the end of WW II. Materiel needed to be properly protected, and available to be used anywhere in the world on a moment's notice. But, not all materiel would necessarily be called for worldwide shipment, nor outside, unprotected storage for indeterminate periods. Different packaging designs for the same item would be needed to match different logistical requirements such as overseas shipments, long term storage, and direct shipments for immediate use. This resulted in late 1954 with DoD directing the Military Services to begin specifying packaging in terms of different levels of packaging protection. Three levels were deemed to be adequate to address all shipping and storage situations. Level A was set up as the maximum protection that could afford to an item so that it would capable of surviving the worst conceivable shipping, storage and handling conditions anywhere in the world for an indeterminate period of time. Level B designated the protection needed to protect an item through the rigors of shipping, storage and handling for an in determinant period of time anywhere in the United States. Level C covered the minimum protection an item would need to survive direct delivery within the United States to the intended user without any sort of long term storage(22). The Army was the first Military Service to include provisions for the three levels of protection in their policy guidance on packaging, by Army Regulation 740-15, Change Notice 2, dated 27 July 1954.

The Defense Department revised the rules of MIL-STD-961 for packaging requirements in Federal and Military Specifications to include the three levels of protection. The change applied the levels of protection to cover distinct "packaging" and "packing" requirements. Packaging was loosely defined to mean everything that was applied up through the intermediate package, while packing was applied to the assembly of interior packages into a shipping container. This change forced the Military Services to once again work together to develop common requirements for each of the three levels of protection, and to spell out those requirements in the "Preparation for Delivery" Section (Section 5) of commodity specifications. This process forced the packaging offices that supported procurement offices to routinely review invitations for bids to match the appropriate levels of packaging and packing to the item manager's plans for storing and delivering the item being purchased(22).

With the relative heavy workload at hand, military packaging offices settled into routines to develop comprehensive sets of packaging requirements based on the three level of protection standard. Packaging offices standardized on consistent requirements for many items that did not pose significant design challenges. This led parts of the Military Services to start working on using the emerging technologies for data processing to handle the growing volume of military packaging requirements. It also led the Department of Defense to create Federal Stock Class "PACK" to handle Military Specifications that contained only packaging and packing requirements for families of related items. Such specifications were first developed during WW II(23).

Concurrently, the Military Services began to develop means for weapons systems program offices to develop packaging considerations as weapons programs were being planned, tested, and fielded. These standards, including MIL-P-9024A(USAF) issued 2 June 1958, provided the Military Services the opportunity to require weapons systems contractors to lay out a packaging system plan that would support both the develop phases and the ultimate fielding of a system. On 27 April 1972, the Naval Sea Systems Command issued their own version of a packaging program document, MIL-STD-1367. Through these standards, the Military Services could opt for the weapons system contractor to develop the detailed packaging requirements for complete systems, follow-on spares, or some combination in between.

In the late 1950's, the ACM's Tank and Automotive Command in Warren, Michigan spearheaded the development of a system that used five separate physical characteristic considerations to design military packaging. This standard, MIL-STD-647, allowed package designers to quickly determine if they needed a previously developed standard package, or needed to design a new package for a given item. At the same time, the aeronautic and space systems industries had convinced the Navy and Air Force to modernize the packaging coding systems in MIL-STD-726A, 31 August 1962, to better automate how they developed their packaging data. As each purchasing command was able to develop a means of getting their data into some sort of computer architecture, they did so independently of each other(22).

Meanwhile, packaging training was likewise changing. By 1958, the Military Services were pushing JUMP to provide more types of packaging training to meet their needs. That year, JUMP developed a new course covering advanced packaging and packing, and reorganized as the Joint Military Packaging Training Center (JMPTC) better reflect their expanded responsibilities. They further expanded in 1960 with specialized packaging training courses that focused on packaging for Air Freight Operations, Missiles, Vehicles and Household Goods. Next came a course for the Air Force for airman specialized training in packaging that followed their basic training(49).

In 1963, the AMC packaging center moved from Rossford Ordnance Depot, which was being closed. JMPTC moved to Aberdeen Proving Ground, MD, and the balance of the center moved to the Tobyhanna Army Depot, Tobyhanna, PA(22).

CONTRACT ADMINISTRATION

Through the 1940s and 1950s, each of the Military Services developed their own means of administering their individual supply contracts for materiel. This extensive duplication of work led

the Kennedy administration to establish "Project 60" to establish a centralized activity to assume responsibility for DoD contract administration functions for the Military Services and the newly established Defense Supply Agency (DSA). Packaging was part of the Transportation function in the Air Force, which reflected the Air Force Systems Command (AFSC) approach to weapons systems development where various 'parts' must come together to form a 'fully integrated whole.'" The Air Force example served as the guide for setting up the Defense Contract Administration Service (DCAS) in DSA. The Navy determined that DCAS Packaging Specialists should be responsible for monitoring contractor costs. Quality assurance of packaging operations would remain with the Quality Assurance Specialists. DCAS Packaging Specialists would provide technical support to Quality Assurance in much the same way as would be provided to contracting and property management functions(28). When packaging functioned as part of quality assurance, that organization would generally place its emphasis on compliance with contractual requirements. This situation contributed to the problem of excessive packaging costs since packaging specialists were not organizationally placed to capitalize on reducing costs. Their role to make sure contractors either met or exceeded minimum contractual requirements for packaging(29).

Although the goal was to put all contract administration functions under DSA, the Navy and Air Force opted to retain contract management for major weapon system. These were the Air Force Plant Representative Offices (AFPROs) and the Naval Plant Representative Offices (NAVPROs). Only the AFPROs maintained a cadre of Packaging Specialists(28).

DCAS stood up in 1962 with three districts that were not organized consistently. When the Air Force terminated the "Plant Level Approval Program" upon activation of Project 60, packaging in DCAS had no significant foundation from which to begin operations. Even worse, Army and Navy contract administration packaging expertise had not been identified to Transportation and Packaging, but remained in quality assurance. DCAS hired their first packaging specialist from the Supervising Inspector of Naval Material (INSMAT) in 1965, who brought to DSA a commitment to control packaging costs. Based on the Air Force's Plant Level Packaging Program, DCAS assigned their packaging specialists to the production element of their field operations with a clear charter to control packaging methods and costs. DCAS adopted a Navy example that reduced packaging costs on some contracts through technical evaluations of contractor packaging cost proposals on negotiated procurements(29).

At the outset, packaging in DCAS faced significant problems, mainly in personnel management and guidance to the field. With personnel, most of the DCAS packaging specialists had formerly worked in Air Force contract management activities, while less than one half dozen had come from the Army and Navy. Since the Plant Level Packaging Approval Programs had been eliminated, the Air Force attempted to reclaim the packaging specialists that they had transferred to DSA. DCAS Headquarters successfully integrated DCAS packaging duties into their day-to-day operations, and the Air Force lost their bid to regain their former employees(29).

The other major flaw in early DCAS operations involved "pre- conversion" guidance in how DCAS would carry on its day-to-day duties. DSA Headquarters had wanted to hold a meeting with all the DCAS Regions (DCASRs) Packaging Specialists to organize the DCAS packaging mission and workload that would have made up for the guidance that should have come out during the pre-

conversion period. The meeting was disapproved, and DCAS had to rely on individual on-site visits to the DCASRs. These visits did not serve the intended purpose, and each DCASR set up individual packaging programs without the benefit of crossfeed from the other DCASRs facing similar challenges(29). This situation did not change until April, 1970 when DCAS held its first Transportation and Packaging Workshop at Cameron Station, Virginia.

The guidance for DCAS packaging operations was incorporated as part of DLAM 8300.3, Transportation and Packaging, in 1971. This guidance reflected the need for DCAS packaging expertise to focus on improving military packaging. DCAS Packaging Specialists were responsible for controlling contract packaging costs by weeding out gold plated requirements, and to recommend improvements to packaging methods, materials and containers that would improve packaging performance for lower costs(28). This guidance has stood the test of time since much of it has survived in its basic iteration until the Defense Contract Management Command (DCMC) was created in 1990.

VIETNAM

In the early 1960s, the United States began to play an increasing military role Southeast Asia (SEA). Until 1964, the volume of materiel that the Military Services sent to SEA did not cause an appreciable strain on the supply systems' capabilities to provide proper Level A packaging and packing. The harsh natural environments being encountered in SEA with the breakbulk ships, multiple handling operations, primitive transportation incountry, and open storage conditions mandated Level A/A packaging and packing. This situation changed at the time of the Gulf of Tonkin resolution in the summer of 1964 when the Military Services geared up for increasing volumes of materiel to be delivered in short time frames from contractors and depots alike. In the haste to move the needed amount of materiel to SEA to sustain the increasing tempo of operations, DoD packaging specialists found themselves in the same sort of predicament that haunted their predecessors at the outbreak of WW II and the Korean War. And lessons were about to be relearned.

One of the early packaging catastrophes in SEA involved exterior shipping containers fabricated from weather resistant grades of fiberboard, both corrugated and solid. The Military Assistance Command - Vietnam (MAC-V) reported that fiberboard were literally falling apart with very little exposure to the environment. This failure was caused by a change to the performance requirements for such fiberboard that eliminated the water emersion test that boxes had to successfully pass prior to 1958. Further, the industry no longer had the production capability to produce the earlier forms of fiberboard which had relied on an asphalt core in the outermost facing in order to pass the emersion performance test. A new class of corrugated fiberboard, known as Water and Watervapor Resistant (WWVR), was included in specifications in the late 1960s, but never caught on with military packaging specialists. This type of fiberboard relied on a polyethylene film core in the center of the outer facing. WWVR fiberboard was very costly to manufacture, and was prone to failure due to pinholing in the polyethylene film core.

The immediate solution from the AMC Packaging, Storage and Containerization Center (AMCPSCC) was to require all shippers to provide Level A packaging and packing to SEA and the

exterior shipping containers could not be fabricated from any type of fiberboard. To better camouflage the containers consigned to SEA, all exterior containers were required to be painted olive drab in color. To help identify the class of materiel packed in those painted containers, triangular corner color codes were reinstated from the WW II practices.

This lead to an overuse of Level A/A packaging and packing since the automated data systems at the time were not able to accurately predict how much materiel would be reserved for use in SEA, and how much would be used elsewhere. Without knowing this information, the fallback policy was to specify level A/A unless the buying activity knew ahead of time that the materiel ***would not be shipped to SEA***(22).

Concurrently, the Navy had encountered similar sorts of fiberboard box failures when weather resistant grades of exterior fiberboard shipping containers were transferred from supply ships via high line to other ships underway at sea. The immediate solution from the Navy Packaging Board was different from the Army solution due to space and weight constraints aboard ships. The Navy opted for the use of wax impregnated corrugated fiberboard boxes like those then used to commercially pack fresh produce. The Navy decided that the additional expense for this sort of packing would more than offset the losses of materiel then being sustained in their operations(19). Later, the Navy also permitted materiel to be packed in weather resistant boxes provided that those boxes were unitized on winged pallets, and completely shrouded by shrink wrap plastic film, or stretch wrap film.

Despite improvements in packaging performance for deliveries to SEA through the late 1960s, MAC-V reported that shipments continued to sustain damage and loss attributable to poor packaging. These reports helped sustain Army guidance to use level A/A, which drew fire from many contractors. Significantly, procurement activities had begun to write their own packaging standards, or unilaterally supplementing or altering military packaging specifications already in use. These complaints led the General Accounting Office (GAO) to investigate military packaging to determine "the extent to which packaging costs for shipments from contractors and military depots, and to and from repair facilities, could be reduced(24)."

GENERAL ACCOUNTING OFFICE REVIEW OF MILITARY PACKAGING

This comprehensive report, issued in 1973 as U. S. Involvement in SEA was winding down, severely criticized the full spectrum of military packaging practices, including such complaints as—

1. Spending millions of dollars for packaging that was not really needed.

2. Ignoring commercial packaging practices that could fulfill DoD packaging needs, if not the letter of detailed requirements.

3. Proliferating packaging specifications beyond the basic number of documents really needed.

4. Not knowing or routinely determining when commercial practices could be suitable for DoD packaging needs.

GAO recommended to Congress that military packaging was "an area of expense that long has been overlooked, under the stresses of military urgency, and long has been in need of review and correction." While GAO acknowledged that improvements had been made, the primary issues remained unresolved and that DoD could make significant additional improvements for concomitant savings. GAO suggested the following to the Secretary of Defense.

1. Discontinue blanket assignment of Level A packaging.

2. Determine suitability of commercial packaging for military requirements.

3. Make greater use of commercial packaging when it meets minimum Government requirements.

4. Closely monitor the progress of the AMCPSCC, and reaffirm its authority to carry out its intended objectives(24).

The final GAO report included an appendix with the DoD response to the report recommendations(25). The DoD letter explained how the levels of protection were being applied at the time of the report, but did not report any action on the blanket Level A problem. The letter refuted claims from several contractors about the benefits of commercial packaging by citing experience of different contractors using different "standard commercial packaging designs, as well as one contractor using different methods for the same item(25).

The GAO report forced a direction for military packaging in addition to the lessons learned from the recent experiences in SEA. The Military Services could not afford the cost of specifying artificially high levels of protection based on not knowing where an item would be shipped. By 1973, the Army and DSA had taken steps to get away from the blanket Level A practices of the late 1960s. The Army embarked on a project on 5 May 1971 to adopt commercial packaging for items identified for consumption by posts, camps and stations(26). Starting with a series of letters and circulars, the Army changed military packaging designations to "degrees of protection" which consisted of Level A, Level B, and Commercial Packaging. On 26 February 1975, AMCPSCC issued Federal Standard No. 356A which defined the parameters for commercial packaging that would be acceptable for military distribution. In March, AMCPSCC authorized the Army depots to change their computer program logic to provide the degree of packaging protection required for each requisition they filled.

At the same time, DSA incorporated a decision logic table in their procurement systems to automatically determine the levels of packaging protection needed for each DSA procurement action. The logic involved various such things as codes in requisition numbers and accounting classification numbers that identified specific purposes for a recommended buy. If there was a match, the system automatically selected levels of protection to match the guidance from policy documents.

For both the Army and DSA, the idea was not to forget the lessons learned from SEA when much of the materiel was being purchased with Level C protection for which there had been few controls. Much of the Level C packaging received was actually a form of bulk packing which did not afford adequate protection to materiel against loss and damage(27).

The Navy and the Air Force retained their packaging policies which generally tailored how levels of protection were applied by considering the type of item involved, and where it was being shipped(24).

SIGNIFICANCE OF MILITARY PACKAGING DEVELOPMENTS 1945-1975

The Department of Defense had failed to recognize how military packaging impacted procurement and distribution operations. When properly applied, military packaging requirements stipulated the Military Services'/Agencies' minimum essential needs to protect materiel at the lowest overall cost. When misapplied, excessive levels of protection were being imposed which sometimes employed inappropriate or obsolete technical requirements. The Military Services and DSA had built up overlapping capabilities with no oversight from the DoD, nor were they consistently applying the DoD packaging policy of the time. This breakdown in inter-Service communication would force long needed changes in how the Military Services and DSA handled their packaging missions.

THE JOINT LOGISTICS COMMANDERS (JLC)

The JLC is a standing board of the senior military logistics commanders who are responsible for logistics policy and execution. Set up in 1966, the JLC consisted of the commanders of the AMC, the Naval Material Command (NMC), the AFSC, and the Air Force Logistics Command (AFLC). The Marine Corps and Defense Logistics Agency (DLA, formerly DSA) at first were advisory members. On 9 January 1976, the JLC received a briefing about the problems facing military packaging, and established the Joint Packaging Coordinating Group on Packaging (JTCG/PKG). The JLC charged the JTCG/PKG with the mission to "monitor, evaluate requirements and provide recommendations on matters relative to packaging management, technology and standardization(30)." The charter called for the JTCG/PKG to complete its work within two years, and provide the JLC a briefing on the accomplishments. The JTCG/PKG consisted of packaging specialists from each of the JLC organizations, along with representatives from the Marine Corps, DLA and DCAS. The AFLC member chaired the group for its entire existence.

The JTCG/PKG focused on four major topics within the scope of their charter - proliferation of military packaging laboratories, creation of lead responsibilities for testing specific families of packaging materials and containers, controls for hazardous materiels packaging, and controlling contractor packaging costs. The JTCG/PKG members set up a matrix to assign lead responsibilities for testing specific packaging materials, containers and processes, and directed field operations to discontinue routine tests beyond those needed for specialized weapons systems packaging. The JTCG/PKG members also adopted the AFSC procedure for approving hazardous materials packaging configurations for all Military Services' use. In late September, 1977, the JTCG/PKG

briefed the JLC about their progress, and recommended that they remain in existence for two more years. While they had laid the foundation for improving packaging policy, they had not completed their charter mission. The JLC directed them to return with a new briefing in late 1978, and not to concern themselves with disestablishment(30).

In September, 1978, the JLC directed the JTCG/PKG to continue its work in completing the various command regulations and handbooks needed to fulfill the 1976 charter. This kept the JTCG/PKG on a rigid schedule of meeting face-to-face at least once per quarter, which lead the members to better understand the operations and constraints of their counterparts' operations.

During this time frame, the JTCG/PKG took on the responsibility to improve how the National Inventory Control Points developed packaging requirements by setting a goal to develop one packaging document from which all military packaging requirements would be developed. Concurrently, DoD asked the National Security Industrial Association (NSIA) to independently look at how the Military Services and DLA called out packaging requirements in contracts. These separate initiatives led to a NSIA briefing to the Under-secretary of Defense for Manpower, Reserve Affairs, and Logistics on 30 April 1980. The NSIA concluded that the Military Services and DLA should adopt industrial packaging(22). Industrial packaging was not the same as commercial packaging since commercial packaging was aimed at protecting goods to the point of retail sales, while industrial packaging could replace one or more of the levels of military packaging. Subsequently, DoD revised its packaging policy to incorporate the NSIA concept as the preferred packaging for materiel(32). The concept proved to be unwieldy for routine spare parts procurements since most of those actions did not involve any human intervention to evaluate whether such packaging could work.

Through 1981, the JTCG/PKG completed the joint regulations needed to carry out the taskings from the 1976 charter, and developed a briefing that recommended to the JLC that the JTCG/PKG be disestablished, but the members would set up a permanent forum to continue to function as the JTCG/PKG had. The JTCG/PKG briefed the JLC on 9 December 1981 by outlining the series of accomplishments from the charter and the JLC approved JTCG/PKG being disestablished as of 28 December 1981(31).

THE JOINT PACKAGING COORDINATING GROUP (JPCG)

The JPCG started functioning at a meeting at NSC Norfolk, 14-15 January 1982. The group consisted of representatives from AMC, Naval Supply Systems Command (NAVSUP), AFSC, AFLC, U.S. Marine Corps (USMC) and DLA. The members set up a joint command regulation (33) that would guide how the newly formed "Command Points of Contact (CPOC)" would operate. The CPOC decided that their name did not describe their stated purpose, and decided the final name at their 14-15 July 1982 meeting. The JPCG also laid out means for setting up projects that were of mutual interest to all members, and began focusing on some common concerns.

1. The newly created MIL-STD-2073 series of standards for developing and recording packaging requirements.

2. Packaging technologies and applications of packaging of Electrostatic Discharge Sensitive materiel.
3. The need for a central DoD data base for packaging data.

4. Modernizing military packaging policies.

5. Developing a workable approach to the impending change in packaging requirements for hazardous materiels.

6. Learning the lessons in packaging from the operations in Grenada in 1983.

7. The feasibility of imposing fire retardancy performance on military packaging designs.

The JPCG continued to meet on a semi-annual basis, and refined their operations based upon individual topics that each member submitted. Whenever packaging training concerns were included on the agenda, the JPCG would bring in the Director, JMPTC. The JPCG chair rotated among all the members over its existence, and the JPCG rotated its meeting sites among the members' various packaging organizations. This provided the rare opportunity for the JPCG to learn firsthand about initiatives being undertaken to improve military packaging efficiencies and technologies.

On 9 December 1983, the Deputy Assistant Secretary of Defense for Installations and Logistics tasked the Logistics Systems Analysis Office (LSAO) to study the packaging of materiel(35). The study objectives were to—

1. Assess how the DoD Components had implemented DoDI 4100.14, and associated goals,

2. Review private industry packaging practices for their adequacy and applicability in support of DoD and non-DoD customers, and

3. Recommend changes in policies, procedures and practices which would improve DoD packaging effectiveness.

LSAO concluded the study in August 1984(36). They reported that the Military Services had generally adopted the concept of industrial packaging in similar ways, but had made little progress in meeting the DoD packaging goals. They compared military packaging requirements with those in the commercial world, and found significant differences between them. They found that military packaging and industrial/commercial logically differed because of the more favorable and predictable conditions encountered by commercial entities than those by DoD(36). LSAO went on to criticize the Navy's blanket policy of requiring Level A/C protection for stock in Navy depots. They also recommended that Office of the Secretary of Defense (OSD) set goals to implement the DoD Packaging Data System. Finally, LSAO recommended that OSD further study policy development and execution in the areas of Quantity Unit Pack and Reports of Discrepancy(36).

The JPCG was instrumental in getting the MIL-STD-2073 series documents completed in 1984, and urged the Office of the Assistant Secretary of Defense for Installations and Logistics to

make those documents mandatory for all military packaging requirements. DoD sent a letter to the Secretaries of the Military Services and the Director, DLA tasking each of them to implement the new military standard as the means for developing the comprehensive DoD Packaging Data Base(34). However, the policy that industrial packaging was the preferred means of protecting DoD materiel remained in place.

In January, 1986, the AMC and USMC representatives met with the DLA representative at Cameron Station, Virginia to develop an outline plan for new study of military packaging. The plan evolved into the Military Packaging Simplification Study and was the only such study ever collectively undertaken by the Senior DoD Packaging Specialists. The reasons for the planned study were—

1. Military packaging requirements are too complex and need to be simplified.

2. Many items in the military inventory can be packaged to the same package size and to common levels of protection.

3. There is an overabundance of packaging materials which are seldom or never used, making them candidates for reduction or elimination.

4. Simplified packaging is required for today's mobile forces.

5. The current packaging posture is a "cost driver" to both industry and the military.

The idea behind the study was to pool the talent of packaging expertise in the field from all the Military Services and DLA, and apply that joint talent to five specific study areas that were causing the most trouble for effective policy execution(37).

1. Policy Regulations

2. Procedural Documents

3. Materials and Methods of Packaging

4. Modular Containers/Automation

5. Cost/Benefit Analysis

The JPCG briefed the Deputy Assistant Secretary of Defense for Installations and Logistics on 30 June 1986 about the planned study, and received the endorsement to proceed with it. The JPCG chartered each of the working groups and brought all the participants together on 22 July 1986 at what became known as the "RAH-RAH" meeting to give them the incentive to not consider anything about military packaging as being sacred. The groups promptly started their work which was expected to take no more than eighteen months. The JPCG brought the individual group chairs into the JPCG meeting on 14 July 1987 to go over what they accomplished and what more remained to be done. The groups were progressing, but not as well as the JPCG had envisioned. By June, 1988, each of the

groups had stalled in their work due to members retiring, being promoted into other work, or lack of travel funds. On 19 October 1988, the JPCG disbanded what remained of the five working groups, and chartered a single project team to fold the completed work into a final report. The JPCG required that the report would provide recommendations concerning policy on levels of protection, policy documents, procedural documents and automated systems requirements. The project team director put together a team from each of the Military Services and DLA, and completed the study by the following summer. On 13 July 1989, the JPCG again briefed the Deputy Assistant Secretary of Defense for Installations and Logistics about the study and provided a series of recommendations that required help from that office(38).

For policy changes, the JPCG recommended that the definitions for the levels of protection be broken apart to differentiate preservation versus packing since they address different aspects of materiel protection. They recommended that the five regulations generated during the JLC era be consolidated into the one policy document.

For procedural changes, the JPCG recommended that MIL-P-116 be folded into the MIL-STD-2073 series of documents and that the number of submethods be reduced. They recommended that the MIL-STD-2073 series of documents be restructured and that at least 197 codes be eliminated. Finally, they called for eliminated the Section 5 of commodity type specifications, eliminating 51 packaging specifications and combining 68 other packaging specifications into 21 documents.

For automated systems changes, the JPCG recommended that packaging codes become sequential rather than fixed length data fields with a lot of nonsensical data. JPCG went on to call for DoD chartering a multifunctional task group that would include expertise from Packaging, Contracting and Automated Data processing functions to accomplish this recommendation.

The JPCG analyzed the recommendations and determined that the estimated cost to implement would be $1,982,013 in 1989 dollars. The corresponding benefits would amount to $13,499,739 and intangibles that could not be accurately measured, along with an annual recurring cost avoidance of $407,037.

The JPCG concluded by stating that "The simplification study proves that DoD packaging people have found a large, fertile area for doing business more intelligently and at much less cost than our current, decentralized methods. The study report documents specific cost avoidances and savings that have never been identified before through any previous study or analysis of military packaging. Unlike any prior study, there were no political axes to grind, and none were ground. We can only improve ourselves by changing the way military packaging is handled today. We expect fewer valid complaints from the outside about military packaging and we will be able to manage our technical data within existing resources constraints using modern capabilities. We believe that by comprehensively adopting the study's recommendations, DoD will substantially improve its packaging of materiel that will significantly improve logistical readiness(38)." The Office of the Assistant Secretary of Defense approved the study recommendations in 1991, coincidental to the GAO starting a new review of military packaging.

SIGNIFICANCE OF UNIFIED MILITARY PACKAGING 1975-1991

The simplification study provided the senior military packaging specialists with the foundation for the new ways of doing business in the DoD that started with the end of the Cold War. Needless documents were eliminated, and similar documents were combined. The JPCG had become the institution through which the Military Services and Agencies jointly worked on common packaging management problems. This jointness led to the completion of the only study of military packaging from within the packaging community with recommendations that made both operational and economic sense. The study strengthened the reason that the JLC had created the JPCG a decade earlier, and helped the Military Services and DLA in handling their roles and missions during the Gulf War in 1990-91, and another GAO Study in 1991-92.

THE GULF WAR

Military packaging functioned during the Gulf War as military planners predicted whereby the war was a "come-as-you-are" affair resulting from crisis action planning(39). This conflict was the first large conflict in which sustainment materiel was routinely shipped from sites in the United States and Europe in International Standards Organization (ISO) intermodal transport containers, commonly known as SEAVANS. As happened in earlier wars with new distribution technology, military packaging specialists learned that this new technology solved past problems, and created new ones as well.

The ISO containers allowed materiel to move through water ports without the extensive handling that otherwise would have been required for breakbulk operations. When the loaded containers arrived in Southwest Asia (SWA), the coalition forces found that they could not readily identify the materiel loaded in each container which resulted in multiple orders being placed for the same needed item. The packages inside the loaded ISO containers were simply not readily visible for reading the identification markings.

When troops began preparations to move to SWA in August, 1990, the AMCPSCC and DLA issued instructions to shippers on packaging materiel consigned to SWA(40). Routine replenishment was to be packaged Level A/B, and high priority shipments were given Level C/C. DLA also told shippers not to mark the words "DESERT SHIELD" on shipping containers(41).

Within several days, feedback from the DLA representative in SWA confirmed that packaging for sustainment materiel needed Level A/A protection. The DLA representative reported temperatures that reached 130 degrees Fahrenheit, high relative humidity at the coastal areas where supplies were marshaled, frequent sandstorms with dust as fine as talcum powder. All receiving and storage areas were open areas on the ground. DLA issued new orders for Level A/A for materiel shipped under the various project codes for Operation Desert Shield (ODS), except where the ultimate consignee was in the CONUS(42), and when a Foreign Military Sales case was involved with an ODS project code(43). In lieu of wood, plastic or metal overpacks, DLA authorized the Defense Depots to consolidate small

packages in weather resistant triplewall corrugated fiberboard consolidation boxes furnished with polyethylene film liners as a means of keeping the sand from damaging materiel.

The United States Transportation Command created a special air transportation service for high priority small parcels consigned to SWA, known as DESERT EXPRESS. DLA issued packaging guidance for such shipments calling for Level C/C protection for project code 9AU, regardless of priority or ship-to address since this custom service included the provision that someone would be on hand to meet the planes arriving in SWA to pick up the packages(44). The Military Airlift Command created a special label for this service which was promptly put into use(45).

Additional exception situations continued to be created which forced the Military Services and DLA to modify general ODS packaging guidance for the final time in mid-December 1990(46). These instructions remained in effect until 12 April 1991 when HQ DLA-OWP rescinded all ODS-related special packaging directives(47). DLA and the Military Services' packaging operations had completed a job well done.

SIGNIFICANCE OF MILITARY PACKAGING FOR THE GULF WAR

The Military Services and DLA pooled their talent in quickly developing packaging directions, and promptly responding to feedback from SWA to match the levels of packaging protection needed for different distribution challenges. All the senior military packaging specialists knew one another from their work in the JPCG, and worked with one another to issue consistent packaging instructions. The success of ODS packaging, however, is clouded by the relatively short duration of sustainment operations, which did not afford military packaging specialists the opportunity to see how well the packaging would have survived as was the case with the Vietnam War.

GAO STUDY—1991

At about the time that hostilities ceased in SWA, the GAO accepted an assignment from the Honorable Carl Levin, Chairman of the Senate Subcommittee on Oversight of Government Management to examine DoD packaging practices(48). The GAO auditors looked at—

(1) How the DLA depots were consolidating packing of shipments going to the same military installation at the same time.

(2) Whether the DLA depots were packing and shipping materiel in the most effective and cost-effective manner.

(3) What sort of emphasis the Military Services were placing on recycling discarded packaging materials.

GAO focused this study on consumable items which they considered to be "materials that are not economically reparable and are discarded when worn out or broken(48)." At the time, DLA managed about 70 percent of all consumable items used by the Military Services, so GAO concentrated their reviews on DLA operations. From September, 1991 through August, 1992, GAO

interviewed DLA and Military Services' packaging specialists at Headquarters and field locations, as well as School of Military Packaging Technology (SMPT) which had evolved from the former JMPTC, and the Michigan State University School of Packaging(48).

The GAO reported on each of the Chairman's concerns that operations were generally being conducted efficiently, and that some improvements could be made.

> "DLA routinely consolidates the packing of low priority shipments going to the same location at the same time. However, DoD regulations do not permit the consolidation of the highest priority orders going to the same location at the same time, even though consolidation would likely result in considerable cost savings. One DLA depot has estimated that it could save approximately $250,000 annually through consolidated packing of these priority orders.
>
> "DLA depots generally pack and ship supply items in an efficient and effective manner. Although the Navy requires supply items to be packaged in costly fire retardant boxes, ship crews usually remove this protective covering before the items are taken aboard the ship.
>
> "DLA is incurring unnecessary costs as a result of a new Army supply system that automatically expedites transportation for high priority requisitions that fail to show a required delivery date. This procedure contradicts a DoD directive that allows DLA depots to downgrade the transportation priority of requisitions when the materiel is not needed within 20 days.
>
> "Finally, recycling efforts varied from one military installation to another."

SIGNIFICANCE OF UNIFIED MILITARY PACKAGING 1991-1992

The GAO study validated both military packaging policies and the abilities of the Military Services and DLA to properly carry out those policies. Except for GAO commenting on the Navy requirement for fire retardant packaging, all of the GAO findings concerned issues that affected packaging operations, but were outside the scope of responsibility for military packaging. The senior military packaging specialists from both DLA and the Military Services accompanied the GAO auditors at each of the field locations they asked to visit, and were on hand to accurately answer the questions that they posed.

POSTSCRIPT

Historical aspects of military packaging arbitrarily end at the conclusion of the 1991-1992 GAO audit. More recent changes and events have not been in place long enough to accurately judge the effectiveness of decisions behind them. The Department of Defense is undergoing tremendous challenges in all aspects of its mission and roles, and the ways in which its components conduct their day-to-day operations. Nothing is so constant in our current world as change, and military packaging will meet these new challenges as it has met the historical problems that lead it to where we are today.

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This work deals with the logistics doctrine of military packaging. Military packaging came about because military planners overlooked the need to protect materiel from the storage and transportation stresses first encountered during World War II. These experiences led the War and Navy Departments to maintain cadres of expertise in this emerging technology, and to establish a training school for teaching military packaging materials and processes. This work examines why military packaging exists, and why we need not continue to repeat the lessons of history, over and over, in the name of short-term savings.

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