

THE HISTORY AND SIGNIFICANCE OF MILITARY PACKAGING

INTRODUCTION: As with any well thought out and planned packaging scheme, the science of military packaging for the United States Government developed from a well recognized logistical need. This science 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 led to increasing use of such packaging materials as cellophane and coated or waxed glassine which 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, were 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 were 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 rainsoaked 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 MacArthur'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 led 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 led 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 pack-aging."(9) A Packing and Crating Unit was set up 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.

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)

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 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 was 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 adoption 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 be 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 fork-lift 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 led 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 Quarter-master 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 as follows:

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 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 markings 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 which 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), and included such documents as:

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. 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 needs 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 with the creation of the Department of Defense and 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 sub-methods. 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. 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 in 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 JMPC 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 be 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 indeterminate 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 Military Services included provisions for the three levels of protection in their policy guidance on packaging, starting with Army Regulation 700-15, as of 23 September 1955.

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 Army Materiel Command's (AMC) 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 JMPC to provide more types of packaging training to meet their needs. That year, JMPC developed a new course covering advanced packaging and packing, and reorganized as the Joint Military Packaging Training Center (JMPTC) to 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 goldplated 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.

VIET NAM. 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 timeframes 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 was 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 (PSCC) 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 led 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 that the Secretary of Defense should:

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; and,
4. Closely monitor the progress of the U. S. Army Materiel Command Packaging, Storage and Containerization Center, 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. 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. The Joint Logistics Commanders (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 (JTTCG/PKG). The JLC charged the JTTCG/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 JTTCG/PKG to complete its work within two years, and provide the JLC a briefing on the accomplishments. The JTTCG/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 JTTCG/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 materials packaging, and controlling contractor packaging costs. The JTTCG/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 JTTCG/PKG members also adopted the AFSC procedure for approving hazardous materials packaging configurations for all Military Services' use. In late September, 1977, the JTTCG/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 JTTCG/PKG to continue its work in completing the various command regulations and handbooks needed to fulfill the 1976 charter. This kept the JTTCG/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 timeframe, the JTTCG/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, NAVSUP, AFSC, AFLC, USMC and DLA. The members set up a joint command regulation (33) that would guide how the newly formed "Command Points of Contact" would operate. The CPOC decided that their name did not describe their purpose, and decided on 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 such common concerns as:

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 materials.
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 of the Joint Military Packaging Training Center (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,
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 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 that:

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 four specific study areas that were causing the most trouble for effective policy execution (37). These areas were:

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 March 25, 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 15 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)" OASD approved the study recommendations in 1991, coincidental to the GAO starting a new review of military packaging.

SIGNIFICANCE. 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 Joint Logistics Commanders 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. 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 Viet Nam 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:

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 repairable 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. The GAO found that:

"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. The GAO study validated both military packaging policies and the abilities of the Military Services and DLA to properly carry out those policies. With the exception of 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.

DPPG STAND-UP. By 1991, the members of the Joint Packaging Coordinating Group (JPCG) realized that their structure was flawed by not having a charter that brought in the office of the Deputy Under Secretary of Defense for Logistics (ODUSD (L)). That office had full authority over DoD packaging policies and had controlled those policies through Department of Defense Instruction 4100.14 – Packaging. While that instruction outlined such policy concerns as cost control, a single data system, and the use commercial packaging, it did not require the DoD components to work with one another in consistently carrying out their individual packaging programs. Remarkably, despite this omission, the ODUSD (L) had started informally participating with the JPCG starting in June, 1989 with a meeting held in Carlisle, PA, but for the next two years, their personnel changed over several times. That inconsistent support helped result in the JPCG essentially floundering by not necessarily knowing how the ODUSD (L) expected various issues to be handled. When no one from the ODUSD (L) attended JPCG meetings, nor showed any interest in its activities, various JPCG members did not see the need to necessarily accommodate each others’ requirements. At the Spring, 1991 meeting, the JPCG addressed the situation with the arrival of a new ODUSD (L) representative, COL Malcolm “Mac” McClellan, USA, ORD, who took an interest and decided that the JPCG needed to be shaken up and reinvented.

COL “Mac” asked DLA to host the Fall, 1991, and DLA arranged for the meeting to occur November 4-8, 1991, in the caves near Atchison, KS used to store Industrial Plant Equipment and some other War Reserve Materiel. COL “Mac” arranged for a facilitator trained in Total Quality Management principles to guide the attendees through the process that led to their writing the framework of a charter that both addressed the lessons learned from the problems with the JPCG structure, and “to establish itself as the preeminent packaging organization within the DoD.” (Barry Bryant’s reference). The JPCG quickly evolved into the Defense Packaging Policy Group (DPPG), completed the charter from the framework outlined in Atchison, and received approval from the Deputy Assistant Secretary (Logistics), who fully sanctioned the DPPG by signing the charter on January 28, 1992.

One of the first items that the newly formed DPPG took up was discussion paper from the Dean of the School of Military Packaging Technology about the need for better awareness about the need for Military Packaging throughout all echelons of the DoD logistics community. The DPPG discussed this concern extensively throughout 1992, and those discussions lead to three potential means improving packaging awareness. The most controversial of the original ideas was establishing the DoD Packaging Awards. Two awards were proposed that would recognize and honor the most outstanding individuals in the DoD packaging community who contributed significantly to the packaging effort. One award would be for Packaging Excellence that would be geared toward General Schedule (GS) employees or military equivalent (officer), who worked as a packaging specialist, technologist, engineer, chemist, instructor, or similar position within the packaging community or directly related field. The other award would be for Packaging Achievement that would be geared toward wage schedule (WG, WL, or WS) employees or military equivalents (enlisted) who work in the packaging field. Each award would be presented annually by an unspecified senior DoD official involved with packaging or logistics management. The DPPG agreed that this was the most important idea to pursue, and the Navy and Marine Corps DPPG members agreed to draft administrative procedures.

In June, 1994, the draft administrative procedures were complete, and the DPPG provided

comments which were resolved at the December, 1994 meeting. The DPPG subsequently provided the awards procedures to the ODUSD (L) and, in February, 1995, held a special meeting with Mr. Jeffrey Jones, Assistant Deputy Under Secretary of Defense (ADUSD) (Supply), to discuss the idea. Mr. Jones did not see the need to immediately act on the idea and told the DPPG members to resubmit the package in another year or so. The DPPG deferred on further action on the idea of awards until the Fall, 1996 meeting when the members suggested the time had come to resubmit the package to the new DUSD (Supply). The package was subsequently staffed, and Ms. Diane Morales, the Deputy Under Secretary of Defense (Logistics) signed the Memorandum establishing the two awards on May 21, 1997. The DPPG initiated the first call for nominations, which subsequently led to the first two award winners receiving their awards at the Pentagon in March, 1998. The DPPG has continued handling the DoD Packaging Awards Program, which has had the originally intended effect of bringing high-level recognition to the people who daily deal with military packaging concerns and problems.

UN HAZMAT Performance Oriented Packaging presented a concurrent challenge to the DPPG. In April, 1982, Mr. Allen Roberts, the Associate Administrator for Hazardous Materials Safety, Research and Special Programs Administration (RSPA), U. S. Department of Transportation (DOT), had provided an information briefing to the Air Force Systems Command Packaging & Transportation Conference concerning performance oriented packaging for hazardous materials. Mr. Roberts introduced the participants to an Advanced Notice of Proposed Rulemaking (ANPRM) docket that his staff was currently working that would radically change the packaging standards that DOT required for hazardous materials. That ANPRM turned out to be the opening to a nearly ten year effort for the DoD packaging community to come to grips with how best to deal with changing packaging requirements when the Military Services and Defense Agencies had extensive inventories of various hazardous materials.

The ANPRM was known as Docket HM-215, and was generally focused with the packaging requirements for all classes of hazardous materials except compressed gases and radioactive materials. In it, the ANPRM would replace the DOT design-oriented packaging requirements in Title 49, Code of Federal Regulations, with the packaging requirements that had been originally prepared by the United Nations (UN) Committee of Experts on the Transport of Dangerous Goods (ST/ECA/43-E/CN.2/170). The original UN recommendations came out of the UN Economic and Social Council at its twenty-third session (Resolution 645 G (XXIII) of 26 April 1957) and were subsequently amended and updated by succeeding sessions of the Committee of Experts. While the United States had succeeded in not adopting the performance packaging requirements, DOT had decided by 1982 that it was time for the United States to join with the rest of the world. That decision profoundly impacted DoD, and led to a continuing series of face-to-face working group meetings between RSPA and DoD personnel as the docket evolved into the final rule.

The new packaging requirements became known as Performance Oriented Packaging (POP). The JPCG initially addressed coming changes to hazardous materials packaging by bringing together the DoD packaging experts who worked closely with hazardous materials distribution and set up what became known as the DoD POP Working Group. This group operated in close coordination with a similar working group that the Joint Ordinance Commanders Group had previously chartered that worked packaging issues concerning explosives. The groups' members closely tracked the progress of the DOT docket, and evaluated how that docket would impact DoD operations, and quickly

concluded that the impacts on Class 1 (explosives) would significantly differ from the impacts on the remaining 8 classes of hazardous materials. That difference drove the two separate approaches the combined groups recommended.

For class 1, the Military Services had extensive inventories of munitions and ammunition that had been packaged and stored since the 1940s. These items were generally packaged in either nailed wood boxes or metal reusable containers, and had been subjected to severe performance testing before the designs had been approved for use. Various group members searched laboratory files to match the known designs in use with the test records, and found that many of the older designs no longer had test reports on file. The containers, however, had performed satisfactorily during their long lives in storage, and some more with their subsequent shipments to support various conflicts in which the United States had been involved. While senior DOT officials were confident that the test reports still existed, DoD officials convinced them that, even without the tests, the designs were more than adequate. Because the cost of retesting and/or redesigning these long proven package designs did not justify the expense that would otherwise be involved, the DOT okayed the idea of grandfathering any hazardous materials packaging that had been packed prior to January 1, 1988 and had retained its integrity. Subsequently, DOT extended the grandfathering provision for class 1 hazardous materials packaging to January 1, 1990 (49CFR173 (e)).

For the remaining 8 classes, the UN recommendations did not change requirements for non-flammable compressed gases (class 2) nor radioactive materials (class 7). For the balance of the hazardous materials classes, the UN recommendations changed the focus of the packaging requirements from designed-based descriptions of what combinations of materials and containers were authorized for a given chemical or device, to a series of test procedures from which any chosen packaging design would need to successfully pass. Tests would be conducted by a third-party entity. When a packaging design passed the prescribed tests, the shipper could then certify the packaging for subsequent shipments of that hazardous material against the test results, as opposed to the current practice of certifying that the package was constructed according to a subparagraph of 49 CFR. To ease the conversion process for United States shippers, the DOT outlined a series of transitional implementation dates that would start voluntary compliance with POP procedures on October 1, 1991, and stretch the process until October 1, 2001. The two key actions in the transition process for DoD would be to (1) convert existing hazardous materials packaging processes to the performance-based requirements and (2) attrite as much of the existing inventory as possible to minimize the costs that would be involved with repackaging work.

The POP working group started operating with a major flaw in that no one had authority to make decisions that would bind the players together, with the result that individual DoD activities quickly started unilateral actions that duplicated one another. Once these duplicate activities came to light, no one was generally willing to either back off what had already been started, nor forge some sort of compromise. For example, each of the Military Services had identified various packaging configurations that would need to be tested, but did not coordinate those lists with one another. In all cases, the metal drums were identical, and in some instances, certain fiberboard boxes, cleated plywood boxes and nailed wood boxes were either identical or nearly so. Another flaw was that the Services and DLA each started developing separate computer systems to track containers being tested, document those that passed tests and could be used, and display the various computer screen image to guide packers on how to construct and configure the packaging. This situation was quickly

getting out of hand, and the JPCG could not reach an agreement about the best course of action.

In January 1990, several JPCG members met with Mr. Peter O'Toole in the Office of the ADUSD (Supply), to discuss the problems being encountered and find the right means to bring these problems under control. Mr. O'Toole agreed to review each of the systems and plans to evaluate them in relation to one another and to pick either the most logical approach being taken or to find the best parts of each to combine with one another, and finish with a consolidated DoD approach. For collecting and disseminating packaging data and test reports, and controlling test programs, Mr. O'Toole selected the PC-POP program that the DLA Distribution Operations Support Office (DOSO) had created at their Richmond, VA location, but cautioned DLA that PC-POP needed to be restructured to handle test reports for class 1 explosives and to generate packaging requirements on a NSN basis. DOSO then extensively revised PC-POP into PC-POP II which contained two separate options as Generic and Explosives. DLA assumed full responsibility for identifying and obtaining the containers to be tested to support the generic option, and scheduling those tests with the testing laboratories that had agreed to support this requirement. Meanwhile, each of the Military Services retained their testing programs for explosives, and subsequently forwarded their test reports to DOSO to be loaded into the database. DOSO initially pushed this information to subscribers via floppy disks to upload on personal computers, then later changed to push to a broadcast via telephone modem.

In May, 1990, the working group members decided that this arrangement needed to be institutionalized in some manner, but could not decide among several approaches how to best tie this together with several other hazardous material packaging processes. They brought in the DLA JPCG member to settle their concerns since they were meeting at HQ DLA at Cameron Station, Alexandria, VA, and he recommended consolidating their various hazardous materials packaging issues into a Joint Service Regulation. The working decided that the regulation should combine an old joint command regulation on Certifications of Equivalency, outline when and how to apply for Department of Transportation Exemptions, and introduce DoD shippers to the oncoming changes to POP. From the working group's recommendations, DLA took the lead in consolidating the working group's inputs and formatting a draft Joint Service Regulation (JSR). After coordinating the draft among the Military Services, DLA-OWP published the JSR as DLAR 4145.41/AR 700-143/AFR 71-5/NAVSUPINST 4030.55/MCO 4030.40, Performance Oriented Packaging of Hazardous Materials, dated 26 September 1991, just in time for the voluntary change from using detailed specifications to POP for hazardous materials. The working continued to provide inputs to the JSR as shippers became familiar with the POP requirements, and lessons learned needed to be documented. The JSR was subsequently revised July 23, 1996, and January 14, 2000.

DOSO, in the meantime, continued to refine the PC-POP program, added more test reports, and began eliminating nearly redundant packaging designs. This occurred where two packaging configurations were nearly identical, but one container was slightly smaller than the other. DOT allowed one test report to apply in these situations, and by cutting the volume of redundant testing needed each year, DOSO minimized test costs. Concurrently, DOSO provided hands-on training to anyone using PC-POP since, at that time, many shippers were only beginning to use personal computers in their operations, and were not generally familiar with operating such computers. As DOSO taught more people, DLA asked SMPT to accept the training responsibility for POP. SMPT declined the opportunity to expand their training mission, mainly because their limited instructor

resources which were already principally committed to other needed hazardous materials training.

As DOSO operations matured and refined, DLA undertook several reorganizations, one of which abolished DOSO entirely and shifted responsibility for the PC-POP III to the Defense Distribution Center (DDC) located in New Cumberland, PA. The DDC stood up on October 1, 1997, through the consolidation of the former Defense Distribution Region East and the former Defense Distribution Region West as a Primary Level Field Activity (PLFA) of DLA. One former DOSO employee transferred to DDC, and started modernizing the PC-POP program by converting it from a MS-DOS based program to a web-based that would be available 24 hours per day from the Internet. DDC defined the system requirements through discussions with the POP Working group, and awarded a contract to the Intellimark Corporation in April, 1999 to develop the web-based program. The contractor delivered the first modern program based off WINDOWS 95© on January 15, 2000, and provided the test program for the web-based program then next month. After comprehensive tests with users around the world, the web-enabled POP program went live on July 3, 2000, and replaced the PC-POP program. The program currently runs either off the Internet or as standalone program that may be downloaded off the DDC web page.

Training in Hazardous Materials presented yet another challenge (49). Since 1976, the Air Force required anyone who packaged and certified a hazardous material as being suitable to be shipped aboard a military aircraft to be trained. The JSR, AFR 71-4/TM 38-250/NAVSUP PUB 505/MCO P4030.19/DLAM 4145.3, Preparing Hazardous Materials for Military Air Shipments, spelled out requirements for the 80 hour basic training course, along with a 40 hour refresher course that needed to be repeated every two years. The JSR authorized specific courses offered by SMPT, the Army Ammunition School in Savanna, IL, the Navy Transportation School in Oakland, CA, and the Air Force Technical Training School at Sheppard AFB, TX, for both the basic and refresher training. By the late 1980s, some Air Force officials at Military Airlift Command (MAC) and Air Force Logistics Command (AFLC) were becoming concerned about the increasing numbers of in-flight incidents aboard military aircraft involving hazardous materials that had been prepared by people trained in such packaging. Their investigations found few similarities between specific incidents, nor among the individuals who had prepared the shipments. Problems occurred among people who had been trained at all four schools, and that lead the MAC and AFLC officials to look closely at the four schools' programs of instruction (POIs), in the absence of any other trends. This review revealed that each of the four POIs emphasized vastly different areas of hazardous materials packaging, so that students were graduating with vastly different packaging skills. This incongruity lead AFLC to advocate that three of the four schools discontinue teaching their basic and refresher courses, and that they become regional schools who would only teach a single Air Force-approved course. This brought out such an uproar from all four schools that the POP working group essentially spun off a separate group who focused on hazardous materials packaging training. The training group consisted of representatives of each of the four schools, along with several Military Services representatives involved with hazardous materials packaging and/or transportation policy. This group prepared a charter that would place them under the auspices of the DoD Inter-Service Training Review Organization (ITRO) with the idea that could bring in the discipline to control a common core curriculum without the schools having to reorganize as Air Force regional operations.

While this group developed a common curriculum, the DOT was encountering packaging and documentation problems akin to what the Air Force was experiencing. DOT decided that commercial

hazardous materials shippers and carriers needed be trained in the increasingly more complex regulations. On May 15, 1992, DOT revised 49 CFR 172.704 to define who need to be trained and generally what sort of training should be provided, based upon an employee's job responsibilities. The new rule also defined what constituted general awareness and function specific training, required new record keeping processes to verify that affected employees had received specific training, when that training occurred, from what source they received the training, and certification the employee was tested and passed the training. The example DOT provided with these changes prompted the working group to look at DoD hazardous materials as a whole, and recognize that DoD quickly needed to bring much more discipline to bear in training.

The working group first agreed upon a charter whose primary goal was to define a common core curriculum that would comply with the DOT's intent behind 49 CFR 172.704. The charter also met the Air Force intent for training requirements for a sufficiently rugged core curriculum that they would realize fewer in-flight incidents with packaged hazardous materials. The schools exchanged their current POIs for their certifiers' courses, and the group reluctantly forged a compromise common core curriculum for the basic and refresher courses, and documented that compromise in a Memorandum of Understanding. The schools continued to meet annually and periodically updated the MOU through May 1999 based on lessons learned.

AFLC had included the list of schools and approved courses in AFR 71-4, knowing that the schools taught their courses either in residence or on-site when there were sufficient numbers of students to warrant the cost of sending an instructor. AFLC was merged with AFSC and became the Air Force Materiel Command (AFMC) on 1 July 1992. MAC had become the Air Mobility Command (AMC) on 1 June 1992. Collectively, they continued to update the JSR, which, by 1994, had become AFJMAN 24-204/ TM 38-250/NAVSUP PUB 505/MCO P4030.19/DLAM 4145.3, Preparing Hazardous Materials for Military Air Shipments. However, the problems with some packages leaking or venting in-flight continued to concern both AMC and AFMC officials, and the common core training was becoming suspect.

In 1995, the DLA Civilian Personnel Support Office (DCPSO) in Battle Creek, MI drafted a POI aimed at becoming the fifth school to be authorized to teach the basic and refresher courses for military airlift, and presented their POI to the training working group for review. The working group critiqued the draft in terms of the MOU requirements, and returned the draft to DCPSO. DCPSO dropped the effort when DLA consolidated the Battle Creek office with the Columbus, OH office. The four schools had not welcomed the idea of any competition, and no additional schools have ever been approved.

Concurrent with DCPSO Battle Creek being closed, the Air Force school at Sheppard AFB, TX was moved to Lackland AFB, TX 1995, the Navy school in Oakland, CA moved to the Naval Supply Corps School (NSCS) in Athens, GA in 1995, and the Army school in Savannah, IL moved to McAlester, OK in 1999. This effectively eliminated the long dormant idea of setting up regional hazardous materials packaging training.

Resource shortfalls continued to adversely impact the schools' ability to provide the volume of training shippers demanded. To counter that impact, each of the schools began to independently look at other means of teaching their course loads, including such evolving technologies as Computer-

Based Training, Satellite Training, and Video Tele-Teaching (VTT). Their aim was to provide fewer course offerings to more students simultaneously, thus lowering both the unit costs of providing training while not having to find other venues for the training, such as contracting out for supplementary instructors. Such courses as the awareness training, and other job specific courses became ready candidates for the emerging education technologies, and the Military Services and Defense Agencies went along with the schools adopting such technologies. In 1999, the NSCS developed a VTT version of their course "Transportation of Hazardous Materials-Basic" (A-822-0012) that they intended to replace the traditional classroom instruction with an instructor in the classroom. The SMPT followed by developing a similar VTT course for their "Defense Packaging of Hazardous Materials for Transportation (8B-F7{JT})" in 2000. Both courses drew nonconcurrences from DPPG members after being previewed, and that began a prolonged series of various attempts from NSCS to impose their views about cost effectiveness of VTT over the views of the HAZMAT packaging and materiel distribution specialists that VTT training was not a suitable training mode for this course. Those specialists were legitimately concerned that such technology did not lend itself to students taking basic HAZMAT Preparer Courses and receiving adequate comprehension about the course material to proficiently do their very critical jobs. This standoff between the training community and the HAZMAT distribution specialists has not been resolved.

DEFENSE MANAGEMENT REVIEW DECISIONS. In late 1989, the Secretary of Defense created the Defense Management Review Council, charged with reviewing the top-to-bottom structure of the Department and developing an outline of Defense Management Review Decisions (DMRDs) to extensively change how DoD would conduct its operations. The panel announced a long list of DMRDs that would extensively reassign various programs and operations among the Military Services and Defense Agencies. Several of the DMRDs directly affected military packaging.

The first impact came from DMRD 910 which consolidated many individual DoD materiel management regulations, instructions, and handbooks into a single regulation. That regulation was DoD 4140.1-R, which included the DoD packaging policy and doctrine that had previously been handled in DOD Instruction (DODI) 4100.14 – Packaging of Materiel. In addition to what the cancelled DODI 4100.14 had covered, DoD 4140.1-R also defined the levels of protection, and chartered the DPPG under the chair of the Office of the Deputy Under Secretary of Defense for Logistics.

The second impact came from DMRD 929 which combined the AFSC Air Force Contract Management Division (AFCMD) and its Air Force Plant Representative Offices, along with several Navy Plant Representative Offices, into DCAS to become the Defense Contract Management Command (DCMC) within DLA. DCMC consolidated these operations under its Districts and closed the last vestiges of AFCMD on March 1, 1990. In turn, DCMC was split out from DLA and became the Defense Contract Management Agency (DCMA) on February 25, 2000.

The final impact came from DMRD 902 which consolidated the materiel distribution functions at seven Army Depots, seven Naval Supply Centers, five USAF Air Logistics Centers, and two Marine Corps Logistics Bases with the six DDs under DLA. DLA approached this consolidation by planning to bring in one site per quarter starting with the former New Cumberland Army Depot in May 2000, then increasing the frequency to one site month to complete the process by December, 1993. Despite

the heavy workload increases that the Persian Gulf War imposed on the DDs from August 1990 through most of 1991, DLA kept with its consolidation schedule. But, that schedule did not satisfy ODUSD(L), who directed that all remaining DDs be consolidated by March 1, 1992. The last DDs were stood up effective March 16, 1992, some 21 months ahead of schedule. DLA Headquarters created three Defense Distribution Regions (DDRs) in New Cumberland, PA, Memphis, TN, and San Joaquin, CA, and passed operational control for the DDs to the DDR Commanders effective March 16, 1992. Concurrently, DLA established the Defense Distribution System Center (DDSC) and brought in systems analysts from the Military Services and DLA to create a new operating system for the DDs to replace the various legacy systems that DLA had inherited through the consolidation. DDSC defined the new system as the Distribution Standard System (DSS) and isolated the broad areas which would collectively make up DSS. DDSC then brought together several hundred functional specialists and analysts for the DSS Interface Conference at Fair Oaks, VA from July 25 – August 5, 1994. This conference and its various break-out sessions brought out a series of initiatives and systems improvements that Military Service and Defense Agency specialists had been seeking for years, including better describing packaging levels needed for various requisitions, identifying the SPI needed to correctly pack a given item, and a rapid decoding process for MIL-STD-2073-1 coded packaging data. As DSS was fielded through the 1990s and DD personnel became familiar with it, DDSC further refined its packaging capabilities, especially for properly recognizing, and providing accurate packaging requirements for hazardous materials for each transport mode involved with a given shipment.

NAVY PRIME → WRAPS. The U.S. Congress passed legislation in the form of Public Law 100-220. Title II of the law is the Marine Plastic Pollution Research and Control Act of 1987. This title applies the provisions of the international MARPOL, Annex V ban on disposal of plastics into all navigable ocean waters to all ships over which the U.S. has jurisdiction. This includes U.S. Navy vessels.

The Plastics Removal In the Marine Environment (PRIME) Program Office responsibilities focused on the reduction or elimination of plastic consumable commodities going aboard Navy ships. This involved a comprehensive review of the governing specifications and ordering data as well as investigations of the commercial marketplace for new materials, products, processes and ideas.

Pollution prevention has been the primary method used to manage plastic wastes. By controlling the nature of the items that go aboard ships, the PRIME Program successfully reduced plastics in ship's trash from roughly 7% of the total waste stream in 1987 to approximately 4.5% today. Examples of the program's success included the introduction of paper-based dunnage and cushioning at DLA and Navy supply depots to reduce the huge amount of plastic bubble wrap and foam that was difficult to manage aboard ships. A number of new products were developed by suppliers in response to the PRIME Program including non-plastic hot drink cups, biodegradable scrim toweling, and non-plastic trash bags.

PRIME evolved into the Waste Reduction Afloat Protects the Sea (WRAPS) Program as part of the Navy's overall pollution prevention strategy aimed at allowing U.S. Forces to operate unencumbered around the world in the face of often-conflicting international disposal requirements. The purpose of the WRAPS Program was to reduce solid waste aboard Navy ships, thereby reducing the workload aboard ship, improving quality of life, saving money, and protecting the marine

environment. The WRAPS Program Office is managing a variety of integrated solid waste reduction goals. These include promoting the use of non-polluting technologies and elevating awareness for waste reduction throughout the Navy and among its suppliers, vendors, and contractors. The WRAPS Program Office is expanding reuse and recycling of waste streams that can not be reduced and minimizing the cost of environmental compliance for afloat units.

Waste minimization efforts involve thoroughly investigating the major constituents of the waste stream and evaluating potential alternative products and technologies. Initiatives currently underway include analysis of reusable containers for supplying material to ships, reducing 'junk' mail, removing excess packaging materials from supplies, and incorporating solid waste awareness lessons into training for food service personnel.

STOCK READINESS. Another facet of DoD developing DoD 4140.1-R was that the long neglected Care of Supplies in Storage (COSIS) program was clearly recognized and from the regulation, DLA received the order to develop a new COSIS policy for the DoD Components. Concurrently, the General Accounting Office (GAO) was completing a significant study, (GAO/AFMD92-86, *Financial Management- Poor Internal Control Has led to Increased Maintenance Costs and Deterioration of Weapons and Equipment*). GAO sharply criticized DoD about how the Army was storing their equipment and supplies, and found that they had not performed any COSIS since Fiscal Year 1985. GAO also found that poor storage practices at four Army Depots had increased maintenance costs because personnel had not followed such procedures as covering repairables with protective wrapping while the equipment awaited induction into maintenance. This had allowed extensive corrosion which caused excessively high scrapage rates and maintenance costs. GAO's main example was diesel engines overhauled at the Tooele Army Depot in Tooele, Utah which had experienced 70% scrapage rates and additional maintenance costs of \$1.2 Million due to corrosion and rust of internal engine parts that should have been prevented by performing proper packaging and conducting proper COSIS. GAO reported that Army units had shipped these engines to Tooele without adequate packaging, and Tooele, in turn, stored them as received in an open 440 acre field that had been in use since the end of the Vietnam War. GAO found similar problems at the other three Army Depots they had visited.

DLA inherited all four of the former Army Depots that GAO had studied, and found that packaging and COSIS procedures were nearly non-existent. At the same time, the Army Aviation Support Command (AVSCOM) was becoming outraged at the losses they were sustaining with repairables awaiting maintenance at both the Corpus Christi Army Depot, and at several contractors' plants who were also supposed to perform maintenance. Added to both of these was the beginning of the DoD procurement holidays that lasted through the 1990s where the Military Services and DLA no longer had the funding to continue to replace worn out and damaged materiel and equipment, and DoD had the formula for disaster. AVSCOM and HQ DLA began a collaborative effort to review all the DDR and DD operations involving Army aircraft, and formulated the first jointly-developed COSIS instructions for the DDs with the DLA-MMLSD Policy Letter of December 5, 1995. That letter created the Stock Readiness Program to provide comprehensive attention to stored materiel and equipment from Receiving thru Storage to Issue. The letter promoted the idea that SR was an investment in existing materiel and equipment, meaning that owners needed to take good care of what they had; that DoD could no longer afford to replace all of it if it broke, rusted or went bad while DLA was storing it. It made sure that what the DDs held in storage was actually in the

condition being reported to the owners. It did so by addressing the need for continuing inspections - both during receiving operations and while in storage - as well as exercising equipment, proper packaging, and timely discrepancy reporting. As it was a policy letter, it could only remain in effect for a maximum of one year, so for the next six years, DLA revised the policy letter to fold in concerns from the DDs and customers alike. The SR program details stabilized enough by 1998 that DLA started developing a Joint Service Instruction aimed at institutionalizing the SR program and thereby replacing the individual DLA and Army regulations addressing COSIS already had on the books. After several rounds of coordinating the draft Joint Service Instruction, DLA successfully completed and issued the publication on January 6, 2003, titled, "*Stock Readiness*", DLAI 4145.4/AR 740-3/AFMAN 23-231(I)/NAVSUPINST 4400.100/MCO 4450.15.

IMPLEMENT MPSS I. The JPCG and DPPG had taken nearly six years to internally analyze military packaging, and participated in the concurrent GAO audit of military packaging practices, so that by 1992, it was now time to begin implementing the MPSS I recommendations. Policy was the first area to be worked, with the existing publications relating to the Container Design Retrieval System (50), Lead Activities for Testing Packaging Materials and Processes (51) and Coordinating Packaging Policies and Procedures (33) being folded into the principle packaging policy regulation (52) {AR 700-15/etc}. The publications for Packaging Testing Equipment (53) and Packaging Research and Exploratory Development (54) were found to have outlived their usefulness and were subsequently cancelled. A separate publication addressing hazardous materials Certifications of Equivalency (COEs) (55) was folded into a new Joint Service Regulation covering Hazardous Materials Packaging (56) which had been written in the early 1990s to implement United Nations performance packaging for hazardous materials in DoD. These actions were essentially completed when the Army completed the revision to AR 700-15 on 31 March 1998 (52).

The second MPSS area for attention was the procedural changes needed to the MIL-STD-2073 documents (57 and 58). The Naval Air Systems Command (NAVAIR) worked for several years to combine MIL-STD-2073-1B (57), MIL-STD-2073-2C (58), MIL-STD-1510B (59), and MIL-P-116J (60), and released its first consolidated document as MIL-STD-2073-1C (61) on 1 October 1996. That revision effectively eliminated nearly 200 packaging data codes that were found to be either never or rarely cited for preserving or packing materiel. That standard also proved to be the focus of personal sharp criticism from the Principal Deputy Under Secretary of Defense for Acquisition, Technology and Logistics who saw no need for military packaging requirements. This will be discussed later in more detail.

The third MPSS area for attention was to revamp the Military Services' automated data processing functions to change all packaging data into what was termed as sequential data code. In this concept, MIL-STD-2073-1 data codes would be universally replaced with individual, unique codes where a given code, such as "EA" would mean only one thing, and not be repeated for different parts of the string of packaging data. This would eliminate the need to insert zeros or other place holders, and minimize the number of coded requirements that would need to appear in contracts. This proved to be the biggest challenge to the DoD Packaging Community since there were several data systems in place whose data bases were configured to MIL-STD-2073-1 formats and which interacted with other computer systems. Each system was programmed with succinctly defined, matched data fields that allowed the packaging data to be recognized between the systems. As a result, none of the systems were ready for sequential data, none of the DoD Components'

procurement processes were able to handle sequential data, and few people even knew what sequential data entailed. Since the coordination of MIL-STD-2073-1C was a difficult process since it proposed to radically change codes and the process for developing packaging data, the DPPG recommended that NAVAIR defer developing the final sequential coding scheme until the next MIL-STD-2073-1 revision.

NGS WORK → ASTM D-10 COMMITTEE ON PACKAGING. DoD personnel first became involved with developing commercial or consensus standards for packaging testing starting with the Packaging Institute (PI) in 1955. The first commercial standard that DoD both helped develop and subsequently adopted was the 1955 edition of *Glossary of Packaging Terminology*.

DoD personnel also became involved with the D-10 Committee on Packaging of the American Society for Testing and Materials (now ASTM-International) starting in the 1950s. Their early work involved various material, tape and container test procedures that very nearly or exactly matched individual test methods cited in Federal Test Method Standard Numbers 101 and 147. This situation continued until the D-10 meeting in Philadelphia, PA in October 1972 when Messrs. Joseph Coletti, Thomas M. Bacon and Joseph C. Maloney, Jr. from the General Services Administration, Federal Supply Service - Packaging Branch proposed the idea of offering several Federal Standards to the D-10 Committee for conversion into commercial, consensus standards and practices. The D-10 Technical Steering Committee agreed to try working on Federal Standard Number 224A, *Closing, Sealing and Reinforcing Fiberboard Shipping Boxes, General Methods For*, on a trial basis and assigned the project to the D-10.14 Subcommittee, then chaired by Mr. Caryl Twitchell of the 3M Company. The Technical Steering Committee withheld any other approvals until they decided whether the process was worthwhile.

The first ballot of the draft of the proposed ASTM Recommended Practice produced comments from potential users it was inappropriate for a voluntary, consensus commercial standard to continue to cite various Federal and Military documents as references. This was especially true for the two specifications for strapping, QQ-S-781 which addressed steel strapping, and PPP-S-760, which covered three different types of non-metallic strapping. With the approval of the Technical Steering Committee, the D-10.14 Subcommittee set up a working group to develop ASTM standards aimed at replacing the two strapping specifications. Over time, D-10.14 set up additional working groups to develop commercial standards for tapes, and standard test methods for testing tapes. The original project to replace Fed. Std. No. 224A resulted in ASTM publishing Standard Practice D 1974, *Standard Practice for Methods of Closing, Sealing, and Reinforcing Fiberboard Boxes*, in 1991, as well as additional ASTM standards to replace federal specifications for flat strapping, pressure-sensitive packaging tapes and gummed paper packaging tape.

By the mid-1970s, more Government personnel had become involved with the ASTM D-10 Committee, and it was apparent that D-10 needed a better structure for dealing with Government-related packaging issues. The answer came from an informal discussion that took place between two D-10 members, Mr. Frank DePalma, the head of the packaging office at the Army's Communications-Electronic Command, and Mr. Caryl Twitchell, of the 3M Company. They felt that ASTM needed a better means of "identifying, examining, and actively encouraging development of non-Government standardization documents in the packaging area capable of satisfying DoD's, as well as industry's requirements. The upshot of this discussion was the attendance by the heads of military packaging

offices at the Fall 1977 D-10 meeting in Philadelphia, PA. This meeting resulted in a decision to organize a formal liaison group consisting of D-10 representatives and DoD packaging people.” (62) This group first met at Tobyhanna, PA on July 28-29, 1978, and involved representatives from various industries, along with the Army, Navy, Air Force, and DLA. The liaison group became the proponent for converting the two specifications for strapping, and ultimately they became the first two federal specifications for packaging to be replaced by ASTM standards.

Concurrently, the Office of Management and Budget (OMB) was completing its Circular A-119, *Federal Participation in the Development and Use of Voluntary Consensus Standards*, and it was apparent that OMB would soon begin to push the Executive Branch to eliminate many of its standards in favor of Non-Government Standards (NGS). The D-10 Committee was well poised to handle the OMB initiative since Government packaging people had already been doing this sort of work for many years. The Liaison Group flourished and its meetings attracted an increasing number of curious onlookers, some of whom were dubious of what the group was doing, but nonetheless recognized that “this was the wave of the future.” (63) From its beginnings with the two strapping specifications, the liaison group has expanded its work to a wide variety of packaging materials and containers, such as fiberboard sheet stock, fiberboard shipping boxes, the packaging tapes discussed earlier, wood boxes, and metal and wood crates. In 1989, the group was renamed the “ASTM/DoD/Federal Agencies Liaison Group on Packaging”, and in 2000, the group became subcommittee D-10.94.

ACQUISITION REFORM. This initiative came about in 1993 as the result of former Vice President Al Gore’s efforts to streamline Government and break with past rules and regulations deemed inappropriate for modern operations. DCMC had recently finished consolidating the contract administration functions which were previously handled by the Military Services and DCAS alike. The initial efforts focused on various commodities which the Clinton administration firmly believed should be purchased as commercial off-the shelf (COTS) small, local purchases rather than using competitive bidding that involved some sort of structured purchase descriptions. The Clinton administration also pushed such other initiatives as Government credit cards, electronic malls and long-term corporate contracts that empowered individual agencies to theoretically leverage their collective purchasing power to get the best prices for commercial goods. In many areas this worked quite well, and hundreds of Federal and Military Specifications were either cancelled or rendered inactive for any new design work. By 1995, agencies were sponsoring such events as “Acquisition Logistics Reform Day”, held on May 26, 1995 in which the full workforce was required various seminars where their key officials provided enthusiastic testimony about the virtues of the new way of doing business. With this background, it was inevitable that the acquisition reformers would soon see the opportunities that packaging would seemingly offer to readily shed itself of traditional approaches concerning design and performance standards in favor of commercial practices across-the board.

For military packaging, the first challenges came with the specification and standards that remained after the MPSS. The Principle Deputy Under Secretary of Defense for Acquisition, Technology and Logistics, Dr. David Oliver, had chartered the Defense Standards Improvement Council (DSIC) to review and eliminate those standards that were considered to be the principle obstacles to buying commercial. The DSIC surveyed selected industries and trade organizations for their views, and then tabulated the results. Within the top twenty documents were such packaging

standards as MIL-STD-2073-1, MIL-STD-2073-2, MIL-STD-129, MIL-P-116, MIL-STD-1367, and MIL-STD-1510. The DSIC invited each affected preparing activity to justify why each of these documents should remain in effect. In the event the preparing activity representative did not adequately justify their position in the eyes of the DSIC members, the DSIC unilaterally cancelled the document in question. NAVAIR was already revising MIL-STD-2073 to combine MIL-STD-2073-1, MIL-STD-2073-2, MIL-P-116, and MIL-STD-1510 into a consolidated standard. While this effort clearly met the DSIC's stated objectives, Dr. Oliver had decided that military packaging needed to be disbanded altogether, and pushed DSIC to eliminate packaging standards altogether. This happened as Dr. Oliver intended when the Air Force appeared before the DSIC in April 1995 to justify retaining MIL-STD-1367. Before the representatives from Air Force Materiel Command (AFMC) could speak, the USAF member of DSIC unilaterally directed that the standard be cancelled, which occurred May 31, 1995.

For MIL-STD-2073-1, several members of DPPG joined NAVAIR in January 1996 in arguing both the need for military packaging and the need to retain the consolidated standard. The DPPG members and NAVAIR prevailed with the stipulation from DSIC that Level C would be deleted altogether, and the MIL-STD-2073-1 decision logic for selecting contractual requirements would be revised to heavily favor the use of commercial packaging. The result was MIL-STD-2073-1C, dated 1 October 1996. As more of the referenced documents in MIL-STD-2073-1C changed to performance standards, or were eliminated altogether, NAVAIR attempted to issue a change notice to reflect this new information. In fact, because so many changes had occurred with the referenced documents, NAVAIR issued a full revision to the standard on December 15, 1999.

Also, in January 1996, the Army encountered problems from various DSIC members concerning MIL-STD-129 akin to what NAVAIR experienced with MIL-STD-2073-1. But, the questions about marking reached fundamentally into why packages should be marked at all, and why would anyone need to know anything about a package's contents. Some DSIC members proposed that buying activities spell out the marking needed in each contract and eliminate the standard altogether. Others took exception to specific marking requirements to minimize what contractors would be expected to provide. DPPG members pointed out that moving individual marking requirements into contractual language would anger contractors since no two buying activities would likely call out the same marking requirements. This would force contractors who dealt with more than one DoD buying activity to set up different marking templates to meet individual marking requirements. Hence, it was clear to most people that the standard was needed. In the end, DSIC directed the Army in April 1996, to revise MIL-STD-129 by splitting it into a new standard, which agencies could cite in contracts, and a handbook, which buying agencies could not cite in contracts. MIL-STD-129N and MIL-HDBK-129 were released on May 15, 1997, and came to be reviled by the DoD Components and contractors alike.

Beyond the specification reform initiatives, the acquisition reform program also started the Single Process Initiative concept where DCMC, later DCMA, promoted the idea with major contractors that, rather than comply with varying contract requirements for such things as welding or quality assurance testing, they should point out the inherent inefficiencies caused by those individual processes, and request that those processes be scrapped in favor of one process. The theory behind the Single Process Initiative was that the resultant process would foster more efficient production for the contractor, and would benefit the Government realized by lower costs charged by the contractor.

Early in the Single Process Initiative program, military packaging caught the attention of various military contractors who almost universally proposed that commercial packaging could be successfully substituted for various military requirements. Some proposals were accepted, but those that the buying activities rejected were elevated further up the organization chains to be decided among the DoD Components' Senior Acquisition Executives (SAEs). By the time these proposals reached that level, they were mostly accepted. A few were rejected based on such factors as history of poor contractor performance, or the lack of packaging engineering expertise to understand how to design packaging to meet the extreme conditions imposed by DoD distribution needs. However, the two proposals from the Allied Signal Corporation (A-S), and General Electric Aircraft Engines (GEAE) turned out quite differently.

Both A-S and GEAE proposed to scrap contractual military packaging requirements in favor of their commercial practices that were based upon Air Transport Association (ATA) Specification 300. None of the military services would agree to these proposals since ATA 300 packaging is generally designed for delivery to commercial airports which generally have an established support infrastructure in which the packaging will perform quite adequately. Each of the aviation arms of the military services has missions assigned that entail supporting air operations in less-than-ideal conditions which are beyond the design intent behind ATA 300. The Services' defense of this sort of mission lead to a stalemate which the SAEs could not resolve, and since neither A-S nor GEAE would back off their single process initiative proposals, the matter was elevated to the Office of the Principle Under Secretary of Defense for Acquisition, Dr. David Oliver. Dr. Oliver had the reputation as a no non-sense manager, both from his Navy career where he had reached the rank of Rear Admiral, and into his then-current political career. On September 10, 1998, Dr. Oliver initiated a Pilot Program related to the packaging of materiel sold to DoD. The purpose of the Pilot Program was threefold:

1. Test the feasibility of integrating the commercial and military packaging processes at selected contractors;
2. Evaluate commercial packaging methods for use with items that will enter the military distribution system; and
3. Develop lessons learned for application to Government packaging practices.

On October 7, 1998, Dr. Oliver's office selected GEAE and A-S to participate in the Pilot program. A formal Charter for the Pilot Program was signed by the Deputy Under Secretary of Defense (Acquisition Reform) and the Deputy Under Secretary of Defense (Logistics) on October 29, 1998. Even though they were directed to come into line with the GEAE and A-S proposals, the DoD Components continued to fight this effort as an illogical change in contracting practices where the Government would give up its right to define packaging requirements while assuming all the risk due to damage or loss of materiel from inadequate packaging.

After it became clear that none of the DoD Components would agree to this unilateral change, Dr. Oliver directed his staff and TASC, their supporting contractor, to find some acceptable means whereby GEAE and A-S could prove their theory. In March, 1999, Dr. Oliver's office formed a Rapid Improvement Team (RIT) lead by the Motorola Corp. and consisting of personnel from the

GEAE, A-S, the Military Services, DCMC, DLA, TASC and his staff. The RIT met for the first and only time on April 20-21, 1999. Motorola, as a disinterested third party, lead the RIT members through a series of teaming exercises to first identify what the various parties had in common, then use those characteristics as the base from which to isolate and resolve their ingrained differences. In the two day session, Motorola succeeded in leading the participants toward a compromise whereby the two companies would be allowed to use their “commercial packaging” in a limited manner, would warrant their packaging anywhere in DoD’s worldwide distribution for up to 42 months from the date of pack, and would comply with the marking requirements of MIL-STD-129. Both GEAE and A-S agreed to share their various packaging innovations with DoD with the hope that they would find new technologies in product protection that DoD had not adopted. In return, the DoD Components would continue to call out the appropriate packaging requirements, would monitor GEAE and A-S use of commercial packaging in only those instances where they had called for military packaging, and would promptly report any discrepant pilot test packaging using special project codes that would be marked on the test packages. The RIT developed a series of metrics against which they planned to monitor performance and cost data for the three year life of the pilot program. On May 3, 1999, the pilot test officially started, with various RIT members visiting the specific sites that GEAE and A-S selected to participate.

As the test continued for the next several months, the RIT had evolved into an Integrated Process Team (IPT) charged with evaluating how to employ more commercial packaging in DoD acquisitions. Implicit behind this evaluation was the task to determine how to declare the test a success or failure after its three year life. Both GEAE and A-S reported their respective metrics data each quarter, and reported various innovations that generally pleased the political appointees involved with the project. However, the reported initiatives were not anything that GEAE and A-S were prohibited from doing on their own with the customary military packaging requirements. A-S bought out the Honeywell Corporation, and adopted the name “Honeywell” as their corporate name. Dr. Oliver’s staff periodically called the IPT together to handle such routine tasks as determining what percentages of contracts called for commercial packaging, and determining how and where the pilot test could be expanded. During mid-2000, Honeywell proposed expanding the pilot test to two additional Honeywell divisions, but on meeting with the local Honeywell management staffs to discuss the proposed pilot test ground rules, neither division opted to participate. GEAE did not propose any expansion beyond the initial participants during the life of the test.

After the results of the national elections in November 2000, Dr. Oliver, as a political appointee, was slated to leave Government service after the January 2001 presidential inauguration. Instead, Dr. Oliver succeeded in staying on as part of the DoD transition team for the incoming political appointees. During the first six months, Dr. Oliver continued to press his views about commercial packaging, and on June 21, 2001, graduated GEAE and Honeywell from the pilot test, without any input from the IPT, and directed the DoD Components “to adopt these commercial practices in all contracts with GE and Honeywell. Defense Contract Management Agency administrative contracting officers or the cognizant contracting officers should apply these practices to all new contracts and modifications reflecting the attached interim authority, addressing consideration as appropriate. This provision will remain in effect until the other changes I have directed in my June 2001 memorandum, subject, ‘Revisions to department of Defense (DoD) Packaging Standards, Regulations and Guidance,’ institutionalize the revised packaging practices.” Since the IPT had not developed criteria on what would constitute a successful test, Dr. Oliver’s staff proposed changing

the Federal Acquisition Regulation to default to commercial packaging, and require SAE approval for each request to use military packaging.

Dr. Oliver had already taken his personal fight against military packaging beyond the pilot test when, in November 1999, he decided that a sure way to eliminate the discipline of military packaging would be to do away with its source of training, namely the School of Military Packaging Technology at Aberdeen Proving Ground, MD. In the DoD Planning, Programming, Budgeting and Scheduling (PPBS) process, Dr. Oliver's staff inserted the following provision in Program Budget Decision (PBD) #005 for Fiscal Year 2001:

“DoD Packaging School:

- *Disestablishes the DoD Packaging School beginning in FY 2001 per OUSD (A&T) early success of the pilot program which provided adequate justification to discontinue the teaching of the basic tenets of military packaging and to close the school.*
- *May still be a valid requirement to continue the school's mission in the teaching and certification of HAZMAT packaging.*
- *Alternative proposes to continue operation of the School of Military Packaging Technology through FY 2000 – allows DoD to systematically plan for the transfer of the SMPT HAZMAT training workload to the other three Service schools.”*

The DLA and the Military Service IPT members were immediately alerted by their Financial Operations counterparts about this idea when PBD 005 was released, and provided responses within the allotted one day review time to refute the OSD statements. In their responses, DLA and the Military Services pointed out that the OSD rationale fell especially flat since there was no early success from the pilot test upon which to draw the conclusion that commercial packaging worked successfully in all applications. When the DoD Comptroller signed the final PBD #005 on December 5, 1999, the SMPT issue no longer appeared anywhere, meaning that DoD no longer planned to close down SMPT and transfer its HAZMAT training mission to the other three schools.

The final initiative to eliminate military packaging was a subset of a broader initiative under the Federal Acquisition Regulation (FAR) Part 12 concerning purchases of commercial items. FAR Part 12 defines commercial items as follows:

“(1) Any item, other than real property, that is of a type customarily used by the general public or by non-governmental entities for purposes other than governmental purposes, and-

(i) Has been sold, leased, or licensed to the general public; or

(ii) Has been offered for sale, lease, or license to the general public;

(2) Any item that evolved from an item described in paragraph (1) of this definition through advances in technology or performance and that is not yet available in the commercial marketplace, but will be available in the commercial marketplace in time to satisfy the delivery requirements under a Government solicitation;

(3) Any item that would satisfy a criterion expressed in paragraphs (1) or (2) of this definition, but for-

(i) Modifications of a type customarily available in the commercial marketplace; or

(ii) Minor modifications of a type not customarily available in the commercial marketplace made to meet

Federal Government requirements.

Minor modifications means modifications that do not significantly alter the nongovernmental function or essential physical characteristics of an item or component, or change the purpose of a process. Factors to be considered in determining whether a modification is minor include the value and size of the modification and the comparative value and size of the final product. Dollar values and percentages may be used as guideposts,

but are not conclusive evidence that a modification is minor;

(4) Any combination of items meeting the requirements of paragraphs (1), (2), (3), or (5) of this definition that are of a type customarily combined and sold in combination to the general public;

(5) Installation services, maintenance services, repair services, training services, and other services if-

(i) Such services are procured for support of an item referred to in paragraph (1), (2), (3), or (4) of this definition, regardless of whether such services are provided by the same source or at the same time as the item; and

(ii) The source of such services provides similar services contemporaneously to the general public under terms and conditions similar to those offered to the Federal Government;

(6) Services of a type offered and sold competitively in substantial quantities in the commercial marketplace based on established catalog or market prices for specific tasks performed under standard commercial terms and conditions. This does not include services that are sold based on hourly rates without an established catalog or market price for a specific service performed. For purposes of these services-

(i) "Catalog price" means a price included in a catalog, price list, schedule, or other form that is regularly maintained by the manufacturer or vendor, is either published or otherwise available for inspection by customers, and states prices at which sales are currently, or were last, made to a significant number of buyers constituting the general public; and

(ii) "Market prices" means current prices that are established in the course of ordinary trade between buyers and sellers free to bargain and that can be substantiated through competition or from sources independent of the offerors.

(7) Any item, combination of items, or service referred to in paragraphs (1) through (6) of this definition, notwithstanding the fact that the item, combination of items, or service is transferred between or among separate divisions, subsidiaries, or affiliates of a contractor; or

(8) A nondevelopmental item, if the procuring agency determines the item was developed exclusively at private expense and sold in substantial quantities, on a competitive basis, to multiple State and local governments."

FAR Part 12 goes on to describe the processes used for purchasing commercial items. In the definition above, packaging is not cited, but Dr. Oliver's staff decided that it meant that FAR Part 12 purchases required commercial packaging, regardless of any other factor that might trigger the need for military packaging. Dr. Oliver's staff sidestepped the DoD Commercial Packaging IPT, and pressed their arguments on FAR Part 12 with the Defense Acquisition Regulations Council (DARC). DARC assigned the case as Holding File 2001-H013 - DoD Packaging Standards. DARC representatives began considering this proposal in July, 2001, and contacted some of the former members of the Commercial Packaging IPT. DLA nonconcurred with the proposal by memorandum dated August 22, 2001 which stated,

"The basis of the proposals rests on a series of recommendations from the former PDUSD (AT&L) to make "flexible commercial packaging practices" the default packaging practice within DoD. These recommendations stemmed from the packaging pilot test Involving General Electric Aircraft Engines and three divisions of Honeywell Aerospace that was supposed to run until May, 2002. The former PDUSD(AT&L) prematurely graduated the two companies from the test effective June 21, 2001.

The pilot test was supposed to prove or disprove the two companies' contentions that their packaging practices were as effective as military packaging requirements, and were less costly for a variety of reasons. With the graduation of the two companies, no final analysis was ever conducted to either support or refute those contentions, so we have no way of logically supporting the DUSD(AR) direction to use flexible commercial packaging as a comprehensive default for packaging materiel for worldwide logistical support.

The pilot test IPT members had seen several points about the test that concerned us, but which were dismissed by DUSD(AR) for various reasons. In supporting the graduation, DUSD(AR) asserted that many dollars had

been saved by these companies, when in fact, there was no documented savings realized by either the test companies nor the Government. Second, the companies' freedom to be creative in developing packaging initiatives showed that they only improved processes over which they had full control before the pilot test started. Likewise, the companies' sales pitch to approve this test involved claims of having to conform with many obsolete military specifications for packaging. In fact, the specifications that concerned the companies had already been either cancelled or replaced with Non-Government Standards developed in accordance with OMB Circular A-119, but this fact did not faze the former PDUSD(AT&L). After the pilot test started in May, 1999, General Electric claimed an initiative involving corrugated fiberboard boxes which DoD had adopted in 1994, some five years before the test started. When confronted with this fact, the DUSD(AR) office told us to back away and let them claim the initiative, even though it was clearly wrong to retain the initiative.

Underlying the pilot test were claims from the two companies that DoD default packaging was military packaging with no use of commercial packaging. During the term of the pilot test, DUSD(AR) twice checked the DoD components about their use of commercial packaging, and both time, found that the companies' claims were not correct, but DUSD(AR) continued the test regardless of the facts. For DLA, the Defense Supply Centers are calling for commercial packaging in more than 90 percent of the contracts let during CY 2000.

This test clearly showed that, to date, there is no clear basis for concluding that contractors only have the best interest of the Government in mind when developing packaging to meet the rigors of our worst distribution patterns. The test needed to be run to full term, and further adjustments made to the rules to begin to recoup the many dollars both contractors had claimed would be realized, and to hold both contractors more accountable for the initiatives they claimed to make to improve packaging processes.

Beyond the problems with the pilot test, there is no need for any default packaging, any more than there is a defined need for 'default supplies.' Packaging is specified based on the distribution needs of the customer being supported. That is true whether designing packaging for commercial applications or for tactical operations. DLA and the Military Services have repeatedly proven that industry claims about defaulting to military packaging are not true, and that we are relying much more on commercial packaging than military requirements.

We provided all of this information to the PDUSD(AT&L) in January, 2001, and despite their appreciation for the comments received, went ahead with their original ideas about default packaging."

Holding File 2001-H013 was subsequently put on hold indefinitely because there was still some uncertainty regarding the proposed language.

The last significant activity affecting packaging under the guise of acquisition reform occurred on March 7, 2002, when DCMA approved a pilot test of commercial packaging for the Raytheon Corporation. This pilot test expanded the original test beyond the limits of the March 5, 1999 approval from Dr. Oliver, to evaluate the suitability of commercial packaging from several divisions of Raytheon Corporation to meet military distribution needs. This test followed the same guidelines as were applied by the commercial packaging IPT to Honeywell and GEAE. The plan contained the details on how the contractors and affected DoD Inventory Control Points (ICPs) will mutually develop and revise packaging requirements. Additionally, it included metrics whereby customers identify test packages marked with Project Code 3AM and report any problems encountered to the affected ICP. This test is still underway at the time of writing this booklet.

SIGNIFICANCE: Government procurement practices sometimes reflect political influences which,

while being spun as improving efficiencies and economies in Government operations, may not necessarily be in the best interest of the military customer. While the third pilot test remains active, there may be some valid conclusions to be drawn from the test that was denied by the premature graduation of the two original participants.

CONTRACTOR LOGISTICS SUPPORT. The idea of using contractors for weapons systems supply support was another initiative that evolved from acquisition reform efforts. The Air Force was the first DoD component to embrace the idea where major weapons systems manufacturers or integrators, as the Original Equipment Manufacturer (OEM), would continue to provide varying degrees of logistical support after the weapon system had been fielded. The result was the Reformed Supply Support Program (RSSP) as the process to bring initial weapon system spares into the inventory. RSSP called for Government and industry to establish a partnership to manage initial spares more efficiently. While the government managed the common items, the contractor would provide and manage peculiar items until transition to a permanent inventory control point for sustainment. The five RSSP tenets were fundamental changes meant to provide how-to-implement guidance to contractors and program managers during weapon system or modification acquisition. The nine-step process outlined the flow of activities during the various acquisition phases. In the nine step process, the Air Force defined the Packaging, Handling, Storage and Transportability (PHS&T) subprocess as a shared responsibility between Logistics Centers and the OEM (64). In RSSP, the first step is to establish a Supply Support Integrated Product Team (SSIPT) (64). The Packaging Specialist was designated an SSIPT advisory member rather than a core member who would be called upon as needed.

“The SSIPT would evaluate potential system designs against existing packaging/handling methods/transportation modes and storage environments that are inherent to production, deployment, employment and sustainment of the weapon system, support equipment and components. Factors to consider are physical limitations of the transport system (e.g., rail, truck, ship, aircraft), the items inherent ability to be transported (e.g., item fragility, size, hazardous materials), and handling equipment available (e.g., forklifts, cranes, handles, tie down rings). All these factors must be taken into consideration when designing and planning the movement of material between the government and the contractor. The SSIPT shall (as a minimum):

- *Contact product center PHS&T specialists.*
- *Review the PHS&T and Transportability contractual requirements and planning documents (MNS, ORD, SAMP, etc.).*
- *Assure that the contractor is considering Transportability, Packaging, Handling, Storage, and Transportation while developing system concepts.*
- *Assure contractor is considering special handling/storage (e.g., shock and fragility limits, security classifications, size limitations, environmental limitations, etc.) requirements.*
- *Assure contractor’s PHS&T concepts will meet the operating environment of the weapon system and its support equipment.”*

While the instruction laid out an approach similar to the logistics support formerly handled by the Air Force Systems Command (AFSC), the result evolved into contractor logistics support with very little input from the Air Force packaging community. This was because the SSIPT rarely asked for advisory support in favor of allowing contractors to fully accommodate supply support, including packaging. One significant loss was the decline in requiring the use of reusable containers, either Fast Packs or Standard Packs, for repairable items, due to contractors wanting to hold down initial out-of-pocket expenses to the bare minimum. There was also no packaging data being developed to populate Air Force data systems which denied the Air Logistics Centers the opportunity to engineer more cost effective, reusable packaging designs to replace the expendable contractor-designed packaging.

BRAC/A-76/PERSONNEL LOSSES. For military packaging, the 1990s saw packaging specialists vanishing across-the-board among the DoD components. These losses occurred for several reasons. The first was the Clinton Administration's actions to reduce the size of the federal workforce by more than 350,000 people. The DoD components began offering a series of buyout actions starting in 1993 that enticed many civil servants to leave federal service earlier than originally planned, but those buyout actions came with the stipulation that the DoD components lost the Full Time Equivalent (FTE) and thus could not replace the packaging specialists who had left. Packaging specialists at HQ DLA, HQ Army Materiel Command, HQ Naval Supply Systems Command, and the Army Logistics Support Activity left federal service and were not replaced. Concurrently, the DoD Base Realignment and Closure (BRAC) Commission completed actions in 1988, 1991, 1993 and 1995 that either consolidated or eliminated various military logistics organizations, and in turn, eliminated more packaging specialist jobs. The effects of the BRAC actions were especially hard on the DLA distribution depots that were closed down at Letterkenny, PA Charleston, SC, Pensacola, FL, Tooele, UT, Ogden, UT, Memphis, TN, San Antonio, TX (Kelly AFB) and Sacramento, CA (McClelland AFB), or whose missions were significantly changed to storing slow moving stock, such as Columbus, OH, Lathrop, CA and Mechanicsburg, PA. Third, DoD kept up the pressure to contract out various non-core missions. OMB Circular A-76, "*Performance of Commercial Activities*" mandates feasibility studies for the conversion of various government activities from civil servants to contractor personnel. A-76 impacted and reduced more military packaging specialists at such logistics operations as the USAF Container Design Retrieval System (CDRS) Management Office at Eglin AFB, FL, and the Defense Distribution Depots that survived the BRAC processes.

PACKAGING BOARDS AND COMMUNICATIONS. Entering the 1990s, DLA and the Military Services, except USAF, operated individual service/agency packaging boards or committees. Those groups acted as a means to periodically bring the packaging specialists at their respective field operations and centers together to discuss mutual issues and concerns, and provide respective headquarters people with recommendations on needed packaging policy changes. By the mid-1990s, the Army and Navy had discontinued their respective packaging boards, and the USMC Packaging Committee scaled back the frequency of their meetings. The DLA Packaging Board operations, however, evolved extensively during the 1990s. DLA transformed itself from a supplier of consumable commodities from six supply depots, with a limited contract administration, to a world class supplier of goods and services provided by contractors and a worldwide network of distribution depots. The DLA Packaging Board had started operating in 1984, with participation from seven Defense Supply Centers/ Directorates (DSCs), the Defense Industrial Plant Equipment Center (DIPEC), and six depots. DCAS participated as an advisory member. By 1995, the DLA Packaging

Board had swelled to more than 75 participants from the four remaining DSCs, 3 distribution regional offices, 29 distribution sites, and 27 DCMC offices. This meeting, held in Denver, CO April 18-20, 1995, provided the participants the opportunity for a lot of communications, but it proved to be too unwieldy to conduct effectively. In 1996, DLA scaled back the packaging board to include only representatives from the primary field level activities and the headquarters staff, meaning 14 people. When DCMC left DLA to become DCMA in 2000, the packaging board structure settled at eight permanent members.

DCMA did not immediately establish a central packaging board, and, in fact, changed their packaging specialist network significantly. DCMA converted most of their packaging specialists to quality assurance specialists, supported by eight functional support representatives (FSR) to oversee contractual packaging management within Defense Contract Management District East in Boston, MA and Defense Contract Management District West in Los Angeles, CA. Both districts independently conducted video teleconferences among the FSRs in December 2001, and hoped to conduct a single meeting.

In January 1995, Air Force Materiel Command (AFMC) instituted a recurring video teleconference that included participation from the five Air Logistics Centers (ALCs), the three Product Centers, the Air Force Packaging Technology and Engineering Facility (AFPTEF), and HQ AFMC. This initiative started as a means to keep USAF packaging specialists current with meeting the challenges laid down by acquisition reform. In time, the video teleconference evolved into a periodic opportunity to exchange information.

Also in 1995, NAVSUP merged its two inventory control points into the Naval Inventory Control Point (NAVICP). In doing so, the two packaging departments became one, operating out of separate locations in Philadelphia, PA and Mechanicsburg, PA. With that action, NAVICP did not see any need to restore the former Navy Packaging Board. In 1998, NAVSUP and NAVAIR initiated a Packaging, Handling, Storage and Transportability (PHS&T) working group aimed at improving the condition of aviation depot level reparable (AVDLRs). This working group functioned much like the disbanded Navy Packaging Board, but also brought in expertise from the Navy Type Commands in changing how the Naval Aviation community prepared unserviceable assets for return to repair activities.

In 2001, the AMC LOGSA convinced the Army G-4 Logistics staff to resurrect a variation of the former Army Packaging Board as the Army Packaging Policy Working Group (APPWG). Unlike its predecessor which had been focused within the Army Materiel Command, the APPWG was chartered to encompass military packaging management affecting all Army commands as a permanent forum established to develop and recommend changes to policy, guidance, and standardization of packaging throughout the Army as it relates to the overall Federal and DoD distribution system. The APPWG was thus being geared toward providing a forum where items of interest to the total Army packaging community could be disseminated and discussed on a periodic basis(65).

The first meeting of the APPWG took place January 15-17, 2002 in Scranton, PA under the chairmanship of the HQ DA G-4 representative. U.S. AMC Logistics Support Activity Packaging, Storage, and Containerization Center (LOGSA PSCC) provided the deputy chair. The balance of the work group membership consisted of Army Major Command representatives, representatives from

the packaging training community, AMC senior packaging experts and commodity managers, and technical experts as required. A second meeting convened at Fort Drum, NY, November 5-7, 2002.

The group already has a HQ DA-approved interim charter that was incorporated into an Army-specific pamphlet being staffed by the Logistics Integration Agency. In response to the emerging and far-reaching Army initiative, the Army Transformation Campaign Plan, the APPWG reviewed the way items are currently being packaged and what changes would have to occur to support the Army Transformation mission. The result was a list of 20 progressive and innovative proposals, based in part on new technology and breakthroughs in packaging science. All directly support the goals for logistics transformation.

During its first year and a half, the APPWG established a DA web site (www.cascom.army.mil), maintained by TRADOC, to post DoD and Army packaging information and completed an initial cleansing of packaging data transmitted, through LOGSA, to the Defense Logistics Information System. The group was responsible also for the publication of HQ DA, G-4's packaging policy for implementing the European Community and United Nations International Plant Protection Commission measures for controlling the spread of invasive pests by using solid wood packaging material. The committee also directed that the Stock Readiness Program be expanded and supported an action to monitor that expansion at future meetings. Overall, APPWG collectively addresses packaging training and utilization of appropriate packaging equipment and supplies and provides support throughout the entire distribution process.

POSTSCRIPT. Historical aspects of military packaging arbitrarily end at the conclusion of the 2002 Raytheon pilot test startup and the restoration of an Army Packaging Board. 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 continues to undergo 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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THE HISTORY AND SIGNIFICANCE OF MILITARY PACKAGING

FORWARD

This work was commissioned by the Defense Packaging Policy Group, consisting of the senior packaging management officials from the four Military Services, the Defense Logistics Agency, the Defense Contract Management Agency, and the School of Military Packaging Technology. 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. When packaging worked in the past, few people ever notice, 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 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 the School of Military Packaging Technology's reason for existence. 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.

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

--George Santamaya--

THE HISTORY AND SIGNIFICANCE OF MILITARY PACKAGING

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