TECHNICAL MANUAL

STORAGE AND MAINTENANCE OF ARMY PREPOSITIONED STOCK MATERIEL

HEADQUARTERS, DEPARTMENT OF THE ARMY

Supersedes TM 38-470, dated 15 May 2003. **1 December 2004**

FORWARD

The Army Prepositioned Stock (APS) Program is part of the overall Army Strategic Mobility Program whereby the materiel required to support a variety of military actions worldwide is prepositioned afloat and at strategic locations worldwide. The objective of this program is to store and maintain materiel in a ready for use or issue condition. Electronic copies of this manual are available at the following web site address: https://www.logsa.army.mil/etms/welcom1.htm.

Users are encouraged to submit recommended changes or suggestions for improvement. Comments should be submitted on DA Form 2028 (Recommended Changes to Publications and Blank Forms). Comments and recommendations should be keyed to a specific page, paragraph, and line of text. Reasons should be provided to ensure understanding and complete evaluation. A point of contact should also be provided. Comments should be forwarded to Commander, U.S. Army Materiel Command Logistics Support Activity, Packaging, Storage, and Containerization Division, ATTN: AMXLS-TP, 11 Hap Arnold Boulevard, Tobyhanna, PA 18466-5097, or call DSN 795-7105 or (570) 895-7105 facsimile DSN 795-7175 or (570) 795-7175, or emailed to logsapt@logsa.redstone.army.mil .

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CHAPTER 1

INTRODUCTION

1-1. Purpose

a. This technical manual (TM) sets forth procedural requirements and guidance for preparation, maintenance, preservation of materiel for storage, care of supplies in storage (COSIS), and depreservation instructions that will be accomplished during maintenance cycles, while in storage, and at time of issue. The procedures herein will be used with equipment groups and activities assigned the mission for storage and maintenance of APS. This manual supersedes TM 38-470, dated 15 May 2003.

b. Equipment will be maintained in accordance with AR 750-1 maintenance standards.

c. These procedures will not be used for purposes other than stated herein except upon approval of Headquarters, Department of the Army (HQ DA), Deputy Chief of Staff for Logistics (DCSLOG).

1-2. Scope

a. This TM prescribes procedures for the storage, maintenance, inspection, preservation, and depreservation required to support the materiel and supplies designated for the APS stocks. These requirements can be used in the planning for funding, developing load plans, contractor support, manpower requirements, equipment and supplies usage, facility construction/modification, and for establishment of prepositioned materiel projects.

b. This TM sets forth storage care criteria to be used in maintaining and reporting the operational readiness of prepositioned materiel. The standards presented are the minimum acceptable for APS assets. When required by Headquarters, U.S. Army Materiel Command (HQ AMC) and the U.S. Army Field Support Command (AFSC), additional standards may be implemented.

1-3. Technical assistance and deviations

a. Users are also encouraged to request technical assistance relative to the contents of this TM from Headquarters, U.S. Army Field Support Command (AFSC), ATTN: SOSFS-CO, Rock Island, IL 61299-6500. Requests may be e-mailed to SOSFS-C@osc.army.mil or transmitted via facsimile to DSN 793-7087 or (309) 782-5087.

b. Deviations from the requirements contained in this manual must be approved prior to implementation. Minor deviations, as defined by Government Quality, can be approved locally. Copies of locally approved deviations shall be forwarded to the AFSC and appropriate Major Subordinate Command (MSC) APS office for their review. All major deviations shall be forwarded to the AFSC with copies to the appropriate MSC APS office and the Logistics Support Activity (LOGSA) Packaging, Storage, and Containerization Center (PSCC). Requests and subsequent approval or disapproval may be executed via electronic mail.

1-4. Explanation of terms

For purpose of interpretation and clarification, the following definitions are provided. In addition, abbreviations contained in AR 740-1, may be used.

a. Maintenance. Those testing, repairing, and modification actions performed to ensure that the materiel meets or exceeds TM -10/-20 requirements prior to the start of each new cycle, and is ready for use within the prescribed reaction time.

b. Preparation of equipment for storage (Phase I). Those actions necessary to ensure equipment meet TM -10/-20 maintenance standards and are preserved to prevent deterioration while in storage (figure 1-1).

c. Inspection/survey and exercising during storage (Phase II). Those actions related to the surveillance of materiel and exercising of the equipment/components while in storage to maintain equipment throughout the cycle (figure 1-1).

d. Issue from storage (Phase III). Those actions necessary to depreserve and provide equipment during handoff (figure 1-1).

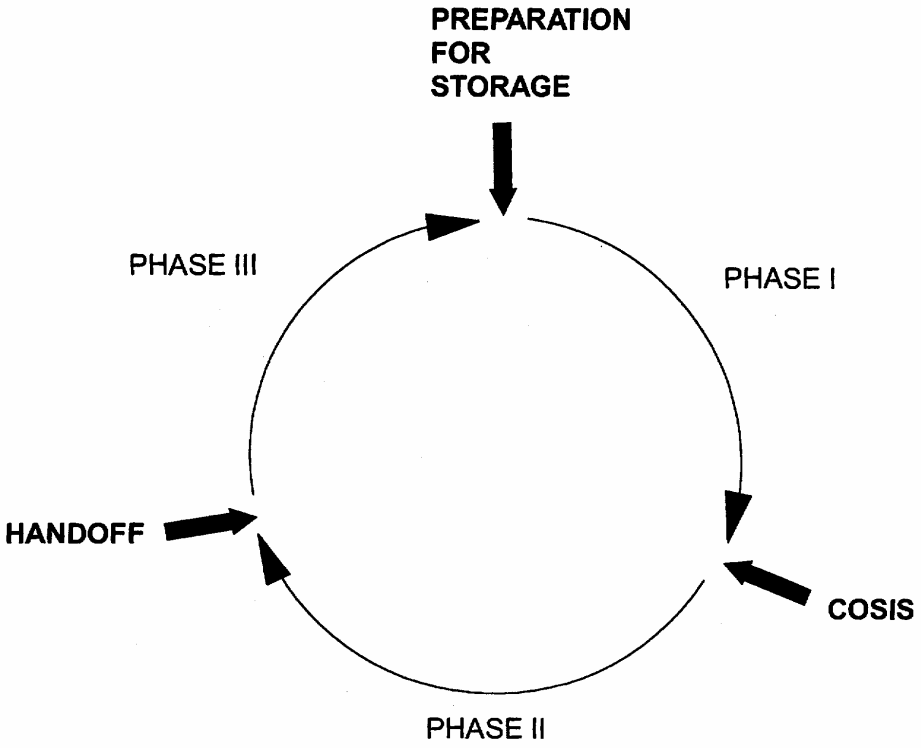

Figure 1-1. APS Phases

e. Physical security. That part of security concerned with measures to safeguard personnel; to prevent unauthorized access to facilities, equipment, material, and documents; and to safeguard against espionage, sabotage, hostile acts, vandalism, damage, and theft.

f. Military preservation. Application of protective measures to minimize deterioration including cleaning, drying, preservative materials, barrier materials, cushioning, and containers. Designed to protect an item during shipment, handling, indeterminate storage, and distribution to consignees worldwide.

g. Serviceability testing. Operation of mechanical, electrical, communication equipment, and electronic equipment for a sufficient period of time to ensure equipment is maintained.

h. Storage, controlled humidity (CH). An area wherein the environment's relative humidity (RH) is controlled and maintained by special equipment at a level that is above 30% and below 50%.

i. Storage, non-CH, enclosed. An area in which the temperature and RH are not controlled, however, it provides protection from direct entry of salt air, sun, rain, and wind.

j. Storage, open, open-deck loaded, without CH environment. An unenclosed location where materiel will be directly exposed to the elements (salt spray, deck wash, rain, and snow) while in storage.

k. Containerization. A type of transport equipment designed to move goods by one or more modes of transportation without intermediate handling of the contents. (This includes ISO containers.)

l. Shelf-life items.

(1) Type I. An item of supply, which is determined through an evaluation of technical test data and/or actual experience to be an item with a definite non-extendable period of shelf life.

(2) Type II. An item of supply having an assigned shelf-life time period that may be extended after completion of inspection, test, or restorative action.

m. Visual inspection. Visual examination of materiel in the storage location without disassembly, use of measurement devices, or performance testing.

n. Large Medium Speed Roll-on/roll-off (LSMR) vessels. These vessels are designed as primary vehicle transports. Cargoes include wheeled, tracked, self-propelled, and towed vehicles and equipment. Rapid cargo loading and discharge operations characterize these vessels. This is accomplished by using a series of external and internal ramps and cargo operations.

o. Preventive Maintenance Checks and Services (PMCS). Care, servicing, inspection, detection, and correction of minor faults before these faults cause serious damage, failure, or injury. Requirements are found in -10 and -20 equipment TMs and Lubrication Orders (LO).

p. Download. The discharge of prepositioned equipment.

q. TM -10/-20 Maintenance Standard. The condition of equipment when-

(1) The equipment is fully mission capable (FMC).

(2) All faults are identified using the "items to check" column of the applicable TM -10-series and TM -20-series PMCS table and:

(a) Corrective actions that are authorized to be accomplished at unit level, and for which required parts are available, are completed.

(b) Required parts are requisitioned for faults that require them to complete the corrective actions.

(c) Corrective actions that are authorized to be accomplished at a maintenance level above the unit are on a valid direct support maintenance request.

(3) Equipment services are performed within the scheduled service interval.

(4) All current, emergency, and urgent modification work orders are applied. Also, actions required by one-time safety-of-use messages and safety-of-flight messages are completed.

(5) All authorized basic issue items and components of end items are presented and serviceable or on valid requisition.

(6) All operational safety discrepancies are corrected (see AR 385-55, Section 2.7).

(7) One-time inspection and maintenance actions in safety-of-use messages have been accomplished.

(8) Current oil samples from engines, transmissions, etc., have been submitted to the Army Oil Analysis Program (AOAP) as specified herein.

r. Offload preparation party (OPP). A team, specially trained and equipped, who depreserve and activate prepositioned equipment prior to download/handoff at a contingency, exercise, or cyclic maintenance location.

s. Military levels of packing.

(1) Level A. Protection required to meet the most severe worldwide shipment, handling, and storage conditions. It must, in tandem with the applied preservation, be capable of protecting materiel from the effects of direct exposure to extremes of climate, terrain, and operational and transportation environments.

(2) Level B. Protection required to meet moderate worldwide shipment, handling, and storage conditions. A Level B pack must, in tandem with the applied preservation, be capable of protecting materiel not directly exposed to extremes of climate, terrain, and operational transportation environments.

t. Shed Storage. A single storage building with one or more sides unenclosed.

1-5. Environmental requirements

HQ AMC must comply with the requirements of AR 200-1, Environmental Protection and Enhancement when implementing this TM. When implementing outside the United States, host nation environmental quality laws and regulations, in accordance with DoD Instruction 4715.5, must also be incorporated.

1-6. Radioactive Material

Commodities and other items containing radioactive material are included in APS. Both Federal and Army regulations control these materials. In CONUS, U.S. Nuclear Regulatory Commission (NRC) licenses issued to AMC as well as Army Radiation Authorizations govern the receipt, storage, and issue of radioactive commodities. AR 11-9 provides DA policy on radioactive material control. Outside the U.S., Status of Forces Agreements will also apply. Refer to paragraph 3-2d(4) and Appendix I for more information.

CHAPTER 2

STORAGE OPERATIONS

SECTION I. POLICY

2-1. General

a. AR 740-1 sets forth and defines the policies, which apply to the storage of Army materiel. The policies covering prepositioning programs require that materiel activities be planned, managed, and operated as storage operations to the extent military missions permit.

b. APS assets will be configured aboard the vessels or in warehouses in accordance with U.S. Coast Guard (vessels only), HQ DA, and Office of The Surgeon General (OTSG) guidance. Equipment and containers on APS 3 vessels will be lashed to the decks to prevent movement and should be inspected daily and after every storm. Equipment exercising requirements must be considered when planning stowage/storage configurations.

c. CH storage is the authorized method for APS materiel.

(1) Items that do not tend to deteriorate can be excluded from this environment provided approval is given by the AFSC and the appropriate MSC APS office.

(2) Interiors of APS watercraft. Whether in dry or wet storage, will have a CH environment.

d. Open storage will only be used for materiel authorized for such storage. Materiel requiring CH storage, but placed in open storage, will need considerably more preservation to minimize deterioration, will require increased surveillance to ascertain materiel readiness, and increased COSIS.

e. Only materiel, which meets Army maintenance standards, will be considered ready for storage. NICPs will ensure that replacement equipment is sent to the APS location when materiel that requires maintenance is beyond the repair capabilities of the installation. Materiel that is less than Army maintenance standard will not be prepositioned unless authorized by Headquarters DA and AMC and the U.S. Army Component of the Combatant Commander. Materiel that is awaiting repair or disposition will be placed in CH storage (if space permits) to preclude deterioration. Equipment received without service records will be inspected and serviced in accordance with Army maintenance standards and this manual.

f. Even though reaction time is critical to the success of APS, inventory control and compliance with security regulations may require certain equipment to be separated from the end item. In such cases, standard storage requirements apply except for the additional requirement that the segregated equipment be identified with the appropriate unit set code. The Army organization or activity responsible for issuing the equipment will have the stow/storage and issue plans which allow for quick issue of such equipment. Also, the contractor shipboard COSIS team will have a copy of the stow plan to facilitate surveillance inspections and exercising requirements. AMC created the Logistics Support Element (LSE) to address the requirement for a unit that could be tailored to provide Reception, Staging, On-ward Movement, and Integration (RSO&I) support as outlined in FM 100-17-1/2/3. Personnel from various Army materiel commands staff the LSE, to include the U.S. Army Medical Materiel Agency Medical Logistics Support Team (USAMMA-MST). These personnel may be military, civilian, or contractor. See Appendix K for the complete explanation of the USAMMA MLST.

g. Security procedures for storage of items classified as sensitive or pilferable will be per AR 190-11.

h. Valuable storage space will be gained by secondary cargo loading (i.e., stacking of boxed materiel, electronic shelters, generators, and so forth, into the bed of trailers or vehicles. Equipment must be properly secured to eliminate the possibility of damage to the equipment and/or the trailers or vehicles. The load limits of the equipment must be observed to prevent overload of the system. Unit set integrity must be maintained at all times. Medical Equipment Sets and Medical Materiel Sets will not be placed as a secondary load in any vehicle or trailer. These assets will be placed in MILVANS or ISO-Shelters only.

i. Uploading and containerization will be utilized to the maximum extent possible to conserve storage space and decrease the time to issue equipment. Appropriate blocking and bracing will be accomplished. In conjunction with this, the following equipment should be uploaded or containerized:

(1) Communications and electronic equipment.

(2) Unit Prescribed load lists (PLL).

(3) Basic issue items (BII).

(4) Authorized stockage lists (ASL).

(5) Component of end items (COEI).

(6) Weapons mounts and designated fire control components.

(7) Common tool sets.

(8) Associated items of equipment (AIOE).

(9) Operational projects, as applicable.

(10) Other items as directed by HQs, DA, AMC, OTSG, USAMMA, AFSC and/or by the war fighter's representatives.

NOTE

At selected sites, storage plans may necessitate unique configurations to meet the mission of the site. These configurations are authorized; however the Combat Equipment Group commander must approve these deviations.

j. Weapons removed from vehicles and watercraft will be stored in accordance with the following:

(1) Open storage is prohibited for weapons and Supply Class V.

(2) Weapons will be stored in an arms room, or containers designated as an arms room, on wooden or metal racks to facilitate inspection of serial number, cleanliness, modification work order (MWO) status, and preservation, when available. Weapons may also be boxed and crated as in normal depot storage per procedural guidelines in AR 190-11.

(3) ISO containers may be used to store weapons when an arms room is not available. The container must be secured, locked, and inspected.

(4) Inspections shall be in accordance with requirements contained in 2-4 b below.

k. Tarpaulins will remain installed on trailers and trucks unless removal will enhance care of supplies in storage.

l. Towed equipment such as trailers, field kitchens, and so forth should be positioned directly behind a prime mover, whenever practical, to facilitate rapid issue and unloading.

m. Separate storage is authorized for materials that require special considerations (for example, hazardous materials, physical security regulations).

n. Wet storage moorings are normally used for larger watercraft (LCU/LT/BD) and dry storage cradles for smaller craft (LCM/ST). Interiors of watercraft are subject to preservation and dehumidification. Wet and dry stored watercraft require regular surveillance and COSIS to all exposed surfaces and items of deck mounted equipment Interiors of watercraft do not require regular surveillance or COSIS as this would broach the CH seal.

o. Sulfuric acid electrolyte aboard the APS 3 ships to support sustainment and unit basic load requirements will be removed when the ships return to port for their maintenance cycle.

p. Weather deck stowage for U.S. Army Tank-automotive and Armaments Command equipment is not authorized without approval of the Commander, TACOM, and the Commander, AFSC.

q. Whenever practical, items requiring calibration in accordance with TB 43-180 will be stored together.

SECTION II. CONTROLLED HUMIDITY (CH) STORAGE

2-2. Planning and Operation

a. Arrangement for servicing equipment in CH arrangements on APS 3 vessels is the responsibility of the Ship's Master. At land-based sites, servicing CH equipment is the responsibility of the facility administrator. CH storage, when properly planned and designed, requires minimum surveillance and maintenance. Humidity control systems are not maintenance free and therefore, require a moderate amount of inspection and preventive maintenance. A CH environment shall have a relative humidity (RH) level of 40 percent. Care shall be taken to prevent the RH from dropping below 30 percent or rising about 50 percent for extended periods of time. The best environment is one where the temperature is maintained between 60-80 degrees Fahrenheit. Equipment stored in these conditions does not require extensive preservation and exercising.

b. If vehicles are to be operated for issue or exercising, all hulls or warehouse doors should be opened and blowers, if equipped, used to remove exhaust gases. Safety personnel should be present to monitor the air quality and are authorized to discontinue exercising requirement until the air quality is at an acceptable level. The AFSC and the MSC APS Office must be notified of any specific model vehicle/equipment not being exercised and the reasons for not exercising.

c. Cargo doors, personnel hatches, and other accesses to storage areas will be kept closed and secured, except for essential entry/exit, while personnel are working. During scheduled vehicle engine exercising, humidity control equipment should be shut down if hulls are opened. If shut down, CH equipment should be returned to service immediately upon completion of the exercising. Cargo doors at both ends of a building will not be opened at the same time unless simultaneous withdrawal from both ends is required.

d. All materiel will be stored in a CH environment or packaged to military preservation and stowed in ISO-Shelters. The AFSC and appropriate War Reserve commodity manager must approve any materiel excluded from a CH environment.

e. Under no circumstances will medical containers (ISO- Shelters or MILVAN’s) be opened while aboard ship.

f. The majority of CH facilities are traditional storage warehouses constructed of concrete, cement blocks, or metal-clad panels, that have been vapor sealed, insofar as economically feasible. Depending on the building's height, floor dimensions and load bearing capacities, CH warehouses can provide a corrosion resistant environment for the storage of APS materiel and supplies. Nontraditional CH facilities, such as portable metal-clad shelters or flexible, water-vapor resistant material (i.e. PVC, urethane, etc.) bags or tunnels, provide corrosion resistant dry air systems that can be used when traditional CH warehouses are not available. These nontraditional CH shelters can be constructed so that they will provide a dry air environment to a specific weapon system (i.e., combat vehicles) or be constructed like a tunnel to hold various sized vehicles and other classes of APS stock. Both types of CH facilities provide a corrosion resistant environment. Storage of communications and electronics shelters in other than CH facilities shall be in accordance with provisions of Chapter 5, section 5-11.b.

g. At no time should internal combustion engines, other than clean burning diesel forklifts, be operated within a closed building, unless authorized by the site commander. Should operation be required, equipment must be moved outside, or a means of exhausting fumes to the outside provided. If vehicles are to be operated for issue, all building doors should be opened and blowers used to remove exhaust gases.

h. All CH facilities will have a site plan whereby the integrity of each CH system is periodically evaluated. Structural and dry air system inspections must be performed weekly in accordance with DA PAM 205-1, Energy Conservation, and RH and temperature data collected and retained for each facility.

i. The use of a tough, highly impermeable envelope or tunnel with either a static humidity controlled system, or a dynamically controlled dehumidification system requires frequent inspection to ensure the integrity of the system. One of the main disadvantages of a static system is the inability to control the dehumidification level. Equipment stored in very dry environments (e.g., under 20 percent RH) experiences problems, such as seals drying out, dry rotting, etc. These types of systems do offer a specific advantage: strategic deployment of the shelter. Any temporary storage system may require special equipment preparation not covered herein (e.g., a passive concept that evacuates the air and draws an envelop tight to the item requires extensive cushioning on projections to protect the cover).

j. Self-propelled vehicles on APS 3 vessels should be stored with their fuel tanks/cells not less than 3/4 full, except for the M1 tank fuel cells will be filled to 1/2 capacity. Non self-propelled equipment such as generators, heaters, and so forth can be stored with or without fuel. Residual diesel fuel will be treated as specified herein. Fueling operations should be conducted at the staging areas at the seaport of debarkation.

NOTE

Gasoline burning equipment will be stored without fuel.

k. Vehicles and other powered equipment at land-based sites can be stored with full fuel tanks, if local building codes and environmental laws permit. It is recommended that fueling operations for Phase 3 (Issue) be conducted directly outside the building if spill containment is available. If spill containment is not available, vehicles should be towed to a fuel point. In specific instances whereby spill containment is installed in a warehouse, fueling operations may be conducted in the building with the site-commanders authorization.

l. JP-8 is the preferred fuel for all APS equipment. No gasoline or Naphtha based fuels (i.e., gasoline, JP-4, aviation gasoline) will be stored with the equipment in storage. Where diesel fuel is used, it must be treated, see paragraph 5-9 e. (1) (b).

SECTION III. OPEN STORAGE

2-3. Planning and operations

a. The restrictions imposed on storage patterns in covered facilities do not apply to open storage. When space permits, materiel should be stored in a manner, which permits easy entry and movement of equipment. A variety of storage patterns are possible in open storage. Patterns shown in TM 38-400 are suggested but may be varied to suit conditions.

b. When materiel must be stored in the open, sufficient space will be left between rows to allow for removal of individual pieces of equipment without movement of other materiel. Planning must be given to provide sufficient space to permit the use of cranes or other materials handling equipment (MHE). Sufficient space will be provided on sides, front, and rear to permit inspection and performance of minor repairs such as paint touchup and so forth.

c. When materiel must be placed in open storage, roadways between rows will be of sufficient widths to permit removal of individual vehicles without the need for excessive backing and steering to maneuver the vehicle onto the roadway. Consideration must be given to providing sufficient space to permit the use of towing equipment and prime movers, plus semi trailers. When there are not overriding considerations, vehicular equipment can be most efficiently stored in relation to the roadway when placed at a moderate angle to the roadway. Sufficient space will be provided on the sides, front, and rear to permit inspection and performance of minor repairs such as flat tires, paint touch up, etc. Aisles are not necessary unless a double row of vehicles is stored back to back. When this storage arrangement is used, aisle space of at least 18 inches will be provided between the rows at the rear of the vehicles.

d. Materiel placed in open storage should be provided with some type of protection from rain, snow, wind, sand, etc., utilizing tarps, plastic sheeting or any other barrier material. If this protection is provided, vehicles and equipment shall have the vents, drain plugs, etc. open to permit maximum airflow through the equipment.

NOTE

Spacing should be provided between the covering and equipment to prevent condensation. A means should also be used to allow airflow through vehicles without allowing the elements to enter.

e. All vehicles should be stored on a level surface whenever possible. If a level surface is not available, care must be taken to ensure that the engine is higher than the fuel tank to prevent fuel or preservation oil from leaking down into the engine and causing a hydrostatic lock of the engine.

f. Vehicles and equipment stowed outside must have some type of spill containment material or device/process/inspection to prevent ground contamination and protect the environment.

g. Equipment on APS 3 vessels will be lashed to the deck to prevent movement. Containerized materiel will be stacked to the appropriate height and also lashed to the deck.

h. Materiel selected for open deck on APS 3 vessels will have special preservation requirements determined by HQ AMC major subordinate commands, USAMMA, or appropriate commodity manager. LOGSA PSCC, ATTN: AMXLS-TP, Tobyhanna, PA 18466-5097 should be contacted for appropriate requirements.

SECTION IV. PHYSICAL SECURITY

2-4. General

a. Planning and providing physical security against pilferage cannot be over emphasized. Pilfering of mirrors, windshield wiper blades, electrical components, and sensitive items can adversely affect deployment. The need for security extends to items in repair parts stockage as well as property book items.

b. Sensitive items, because of their vulnerability to theft, sabotage, espionage, damage, and potential use by terrorist groups require constant protection and control. Sensitive items are identified in the Army Master Data File (AMDF). Detailed physical security guidance for conventional arms ammunition, explosives, and communications security (COMSEC) are contained in DOD 5100.76-M, AR 190-11, AR 190-13, AR 190-51, AR 380-4, and AR 380-5. Guidance for controlled medical substances and other medically sensitive items is contained in AR 190-51. Inventory requirements for sensitive items are contained in AR 740-26, AMC R 740-17, and AMCL 8A.

c. Pilferable items are also identified in AMDF and are normally those items having an immediate resale value or potential for personal use.

d. Requirements of the Unique Item Tracking (UIT) Program shall be enforced in accordance with AR 710-3. The UIT Program is comprised of four subprograms: DoD Small Arms Serialization Program; Security Risk Category I Non-nuclear Missiles and Rockets; Radiation Testing and Tracking System; and the Controlled Cryptographic Items Serialization Program.

SECTION V. SEGREGATED ITEMS

2-5. Overview

a. APS ASL and PLL may be segregated from the major end item and stored by unit identifier code (UIC). The materials will be identified using the appropriate codes.

b. The site commander will determine the location of segregated materiel. In no case will the reassembling of segregated materiel with its end item delay the deployment of the equipment.

c. Dry cell and dry over pack battery stocks to support contingency issue will be stored on the same vessel or at the same APS storage site as the equipment.

d. Heat is a major factor in battery maintenance frequency. For every 18 deg F above 78 deg F the discharge rate approximately doubles.

(1) Valve regulated Lead Acid Batteries e.g. Absorbed Glass Mat (AGM) and activated flooded lead acid batteries will be maintained in accordance with AFSC Battery Maintenance Management Plan.

(2) When excessive quantities are on-hand e.g. field exercises, batteries should be redistributed to using units to avoid loss through deterioration.

e. All industrial gases such as oxygen, nitrogen, and acetylene will be stored in accordance with AR 700-68.

SECTION VI. INVENTORY PLANNING AND CONTROL

2-6. General

a. The physical inventory control program will meet the requirements of DOD 4000.25-2M, as amended, approved MILSTRAP Change Letter 8A, AR 740-26, AR 710-1, and AMC R 740-17.

(1) Supply Class VII APS authorizations are determined by U.S. Force Management Agency and are distributed by LOGSA on an electronic file called LOGTAADS, formerly known as the I25 report. APS sites receive the LOGTAADS file and can determine changes in equipment authorizations. For ASL/PLL and sustainment stocks, retention levels are calculated annually in the Army War Reserve Automated Process and are posted in the Commodity Command Standard System (CCSS). Authorizations for Operational Projects are maintained by LOGSA and are available on Total Asset Visibility (TAV).

(2) Location, condition, and MWO status of each item must be accurately recorded in the Army War Reserve Deployment System (AWRDS). AWRDS provides an Interface with the Standard Depot System (SDS) and the CCSS. Maintenance location information must be current for those MWOs identified for application.

(3) On-hand quantities must be known as well as materiel due in. Status of all requisitions must be visible.

(4) Inventories and location surveys must be performed as required by guidelines for SDS and wholesale stocks. These guidelines currently are DOD 4000.25-2M, AR 740-26, AMC R 740-17, and MILSTRAP Change Letter 8A (AMCL 8A), and AR 710-1. Results of these actions must be available as well as controls established to assure correction of discrepancies. Inventories will be planned and scheduled based on SDS outputs.

(5) AWRDS will provide the custodial records and SDS will provide the accountable records for storage sites.

b. The USAMMA database will be used for MES and MMS inventory down to component level.

SECTION VII. LOCATOR SYSTEM

2-7. Overview

a. Each APS site and APS 3 vessel will have a system to record the location of each piece of APS inventory. The location system and record forms will be uniform for all vessels and supply and maintenance sites. The requirements of TM 38-400 are to be used as guidance in the development of the location system. Whether or not a centralized stock locator record is maintained for projects having more than one location, each site or vessel will have, locally available, records of materiel locations.

b. A stow/storage plan of each storage area is required. In addition to showing the layout the plan can also be used to locate vehicles by applying serial numbers to the plan's display. Equipment positioning by UICs can also be depicted on plans.

c. Accountability will be maintained in the SDS and tracked by the automated AWRDS.

SECTION VIII. REPAIR PARTS AND SUPPLY STOCKAGE

2-8. General

The organization responsible for maintenance and care of supplies in storage of APS equipment will establish controls and procedures to ensure operation of an effective repair parts stockage program. Repair parts stockage will be in accordance with AR 710-2 and the AMC supplements.

SECTION IX. SHELF-LIFE MANAGEMENT

2-9. General

a. APS sites shall integrate shelf-life management into their receipt, storage, and issue operations in accordance with DOD 4140.27-M, Shelf-Life Management Manual, Chapters 1, 2, 4 (less 4-17), 6, 7, and 8.

b. APS requirements for storage of shelf-life items must be minimized by the Inventory Control Points (ICPs)/Service Item Control Centers (SICCs) to the greatest extent possible to reduce the resources necessary for the management of shelf-life items.

c. The Standard Depot System (SDS) must be used at all the APS sites to monitor shelf-life items and ensure they do not expire while in storage, and/or deteriorate to a lower condition code. The APS sites to perform quality assurance inspections and monitor the items' remaining shelf life must use the Cyclic Inspection Schedule Report (Q30M12), generated on a monthly basis by SDS. The ADSM 18-LOA-KEQ-ZZZ UM manual provides instructions on screen usage and the different output products available in SDS quality module.

d. APS sites shall review their inventories to identify all the items with shelf-life requirements and develop and implement procedures to replace these items and dispose of the materiel that is damaged, deteriorated, expired, or has a non-extendable shelf life. The APS sites shall be responsible for ordering and replacing shelf-life items prior to their expiration.

e. Type I (Non-extendable) shelf-life items must be downgraded from supply condition codes A to B to C to H in accordance with the timeframes specified in Appendix B of DOD 4140.27-M. ICPs/SICCs shall fill retail requisitions with materiel that is being downgraded at the site to minimize the disposal of expired shelf-life items and their associated costs. Once the item reaches its expiration date, the APS site shall process it through either DRMO or the local contractor IAW local procedures. If disposition instructions are needed, the APS site will contact the managing ICP/SICC.

f. APS sites shall inspect and test Type II (Extendable) shelf-life items IAW the Supply Storage Standards identified in AR 702-18. Also, the storage standards can be accessed through the Internet using the Shelf-Life Extension Program, Material Quality Control Storage Standards, located at the DOD Shelf-life Program web site http://www.shelflife.hq.dla.mil/. AR 702-18 provides quality assurance information to be used in determining the condition of the materiel during receiving, storage, and shipping. Also, it includes visual inspections, laboratory tests, or restorative actions that may be required to maintain and return the stocks back to ready-to-issue status.

g. Type II (Extendable) shelf-life items require a visual inspection and/or a laboratory test to determine if a shelf-life extension is warranted. If the material requires a visual inspection, it must be inspected 6 to 7 months prior to the inspection/test date to minimize materiel migrating to a lower condition code. If the material requires laboratory testing, 9 months prior to the inspect/test date, the APS site shall first check if the material has been extended by accessing via Internet the DOD Quality Status Listing (QSL) at the Defense Supply Center Richmond (DSCR) web site, http://www.dscr.dla.mil. If the QSL does not have any test results available, and the materiel requires laboratory test, the APS site shall request disposition instructions from the managing ICP/SICC. While the APS sites waits for the laboratory test results on a shelf-life item or the disposition instructions from the managing ICP/SICC, the item shall be downgraded from supply condition code A to B to C to J IAW timeframes specified in Appendix B of DOD 4140.27-M. When it is determined by the managing ICP/SICC that the supply condition code J asset will not be extended, the ICP/SICC shall check if the item can be used to fill retail requisitions. If not, the material shall be classified supply condition code H and processed for disposal thru either the DRMO or local contractor IAW local procedures. In accordance with DOD policy, materiel shall not remain in condition code J for longer than 90 days. Once the materiel passes the inspection/test, the APS site shall establish a new inspect/test date for the item and condition code and the materiel will be extended from the date it was inspected/tested and remarked with the revised inspect/test date.

h. A stock rotation plan is needed for those items that are going to be held in long-term storage; therefore, the ICPs/SICCs, in collaboration with the APS sites, must develop stock rotation plans for shelf-life items held in long term storage. First, the plans shall be coordinated with the U.S. Army Field Support Command and U.S. Army Materiel Command; then, they will be submitted to HQ DA for final approval.

i. Receiving, storage, and shipping personnel must be trained in shelf-life management. A DOD-wide Shelf-life training program is available for all the military services and information on the training can be obtained at the DOD Shelf-life Program web site (http://www.shelflife.hq.dla.mil/).

j. Class III (P) shelf-life management and testing requirements are specified in Chapter 3, Fuel Sampling, paragraphs 3-3.f., 3-3.g., and 3-3.h.

k. APS 3 Shelf-life Management.

(1) Shelf-life items shall not be uploaded aboard any vessel unless the items have shelf life remaining that is equal to or greater than the duration of time that the vessel is expected to be afloat, i.e. beginning with the time of vessel embarkation and ending when the vessel returns to port for cyclic maintenance, with the following four exceptions:

(a) Supply Class V materiel will undergo shelf-life surveillance in accordance with SB 742-1.

(b) Supply Class III (P) shelf-life management shall be performed in accordance with paragraph 3-3.f.(3)b of this manual.

(c) Chemical protective suits shall be inspected by first contacting the item manager to see if the lot numbers of the suits are still serviceable. If the lot numbers are still serviceable the chemical protective suits will have their unit package, i.e. bag, first inspected at Combat Equipment Group - Afloat (CEG-A) or the Defense Depot Albany, Georgia (DDAG). At this time, if inspection criteria are met, the suits will have their next inspection dates extended to the month and year the vessel scheduled to be uploaded with the materiel is due back in for a maintenance cycle, and will be remarked as such. Once aboard vessel, this materiel shall be stored in sealed shipping containers in the temperature and humidity controlled cargo hull of the vessel. Additionally, suit bags will be inspected 100 percent prior to handoff to the warfighters.

(2) No shelf-life inspection/testing for the purposes of extending shelf life will take place aboard the APS 3 vessels while the vessels are afloat. Once a vessel comes back to port to Charleston, SC, or MOTSU, NC for cyclic maintenance, the CEG-A contractor and DDAG respectively, shall be responsible for inspecting, testing, extending, and remarking shelf-life items.

(3) The AFSC will inform CEG-A and DDAG of any additional exceptions to those outlined in paragraph 2-9.k including outstanding waivers that have been approved.

SECTION X. RELEASE AND LOAN OF APS STOCK

2-10. General

a. All loans and issues of APS stock must be coordinated with and approved by HQDA (DALO-AMW). All APS loans will be in accordance with AR 710-1, Chapter 6.

b. In the event of war or major regional conflict, APS stocks will be released as directed by the Chairman, Joint Chiefs of Staff (CJCS) or the Chief of Staff, Army. Whenever possible, unit sets will be issued/released as an entity to the MACOM.

c. In the event of a contingency or military operations other than war (MOOTW), APS stock loans exceeding a 6-month period will be considered an issue. The MACOM should request APS assets through their supported Combatant Commander to HQDA (DALO-AMW). The supported CINC must validate all requests for APS stocks in support of a contingency or MOOTW.

d. HQ AMC and OTSG may authorize issue of secondary items (spares and repair parts) from CONUS APS assets (purpose codes B, C, and D) to fill emergency peacetime operational requirements (issue priority 01-03, not mission capable requisitions only). Before secondary items are released, the MACOM must provide a funded requisition and the item manager must assure APS stocks can be replenished within 120 days after issue.

CHAPTER 3

MAINTENANCE OPERATIONS

SECTION I. POLICY

3-1. General

a. Maintenance of APS materiel consists of those actions required to assure that materiel is in accordance with AR 750-1 and DA PAM 738-750. The objective is to maintain all supplies and equipment to Army maintenance standards at all points of the prepositioned materiel cycle with the use of minimum level maintenance while in storage and at time of handoff. Maintenance will be performed in the appropriate maintenance facility for the level of maintenance, as designated by the Maintenance Allocation Chart.

b. Equipment items will not be placed in APS storage unless they meet TM -10/-20 level or the equivalent standards, without the approval of HQDA, OTSG, and/or U.S. ARCENT. Where TM -10/-20 level standards are not available, use Government marine survey standards for watercraft or NICP approved commercial standards.

c. Upon receipt, materiel under warranty will be operated and inspected for serviceability. Warranty claims will be submitted in accordance with DA PAM 738-750.

d. Army Oil Analysis Program (AOAP). Oil analysis for ground equipment shall be performed in accordance with DA PAM 738-750 and current DA/AMC/AFSC guidance as follows:

(1) When establishing the baseline sample (enrollment into the AOAP) initial samples should be taken from the current oil in the component. The new preservation fluid and filter change will only be performed after you get positive/negative results back from the oil analysis lab.

(2) All equipment prior to being placed into storage shall have operational oil changed and new operational preservative oil installed.

(a) Equipment that normally operates on MIL-PRF-2104 oil will have the oil drained, filters changed, and will be filled with new operational preservative oil, MIL-PRF-21260, Lubricating Oil, Internal Combustion Engine, Operational and Preservative.

(b) Equipment that operates on synthetic turbine operational oil, MIL-PRF-23699, does not require changing unless indicated by AOAP analysis. Add one can, 8 ounces, of preservative additive (see paragraph 5-7a(2)) prior to being placed into storage and at each maintenance cycle interval.

(3) AOAP sampling requirements.

(a) Equipment in CH storage with new operational preservative oil will require AOAP sampling every maintenance cycle. The useful life of the preservative additives in MIL-PRF-21260 are as follows:

(1) 50 hours of operation while in a storage condition.

(2) 500 miles on equipment with no hour meter.

(3) Maximum time interval between oil changes is 3 maintenance cycles provided the AOAP does not indicate an oil change is required due to contamination (sand and water), high wear levels, 50 hours of operation, or 500 miles.

NOTE

Operational acceptability is based on AOAP.

(b) Equipment in Non-CH storage will be sampled every 12 months and will be subject to all the conditions in (5) above.

(4) Oil Analysis will be performed prior to issuing for an exercise and again at turn-in after use. If equipment has over 50 hours of operation, has been operated over 500 miles, has been on exercise for over 180 days, or fails AOAP the MIL-PRF-21260 operational preservative oil will be changed.

(a) Oil samples will not be taken from equipment during download when an AOAP laboratory is not available in theater.

(b) During handoff personnel will:

(1) Conduct checks during download to detect the two most common storage related oil problems; moisture and fuel contamination.

(2) Pull AOAP samples in accordance with DA PAM 738-750, Chapter 4-5 (b) 2 at the gaining unit commander's request when AOAP flyaway package is employed prior to download; before transfer of equipment.

(3) Continue to execute the program at both land and afloat sites in accordance with reference DA PAM 738-750 during normal maintenance cycles.

(5) Components enrolled in the AOAP. The useful life of these lubricants, fluids, and hydraulic oils shall be as specified in the applicable equipment TMs.

(a) CH Storage. Components will be evaluated at each maintenance cycle. If no time limit is specified it shall be changed every 3 maintenance cycles.

(b) Non-CH Storage. Components will be evaluated every 12 months. If no time limit is specified in the applicable TM, the fluids shall be changed every maintenance cycle.

NOTE

AOAP methodology primarily measures wear debris and in no way can measure the effectiveness of the preservative ingredients. MIL-PRF-21260 is internal combustion engine operational oil, which is subject to AOAP to determine when it needs to be changed under operational conditions.

e. The record procedures prescribed in DA Pam 738-750 will be used during all phases of maintenance. The records shall be maintained with equipment records while in storage.

f. Each APS site must possess or have immediate access to the following:

(1) Personnel with the military occupational specialties (MOSs) or civilian equivalents, able to perform authorized levels of maintenance and preservation on all equipment that is located at the APS site.

(2) TMs, test, measurement, and diagnostic equipment (TMDE), weapon system unique special tools and test sets, and shop tools required to perform the authorized level of maintenance and preservation.

(3) Adequate facilities must be made available to perform maintenance functions.

g. SOP 4500.9-R-AFSCG4-1 prescribes responsibilities and procedures for preparation, installation, and documentation of active data-rich RFID tags on prepositioned cargo and equipment.

SECTION II. MAINTENANCE GUIDANCE

3-2. Calibration, MWOs, equipment disposition, and equipment serviceability testing

a. Calibration.

(1) Each CEG/CEB will establish and maintain a Calibration Support Coordinator in accordance with AR 750-43 and TB 750-25.

(2) All APS stored TMDE, except items stored aboard APS-3 vessels, will be calibrated in accordance with intervals specified in TB 43-180. TMDE stored aboard APS-3 vessels will be calibrated during maintenance cycles.

(3) All APS stored TMDE will be scheduled in the normal cyclic maintenance program and will conform to the following requirements:

(a) PMCS will be accomplished in accordance with published procedures and regulations. Materiel will show ability to perform intended functions by evidence of exercising and testing prescribed in DA Pam 738-750.

(b) Materiel failing the above criteria will be submitted to the DS/GS maintenance facility in the normal manner for repair and return.

(c) Contingent upon deployment of TMDE, the designated APS Calibration Support Coordinator will be informed by the AMC LSE. The supporting LSE will provide calibration and repair in accordance with TB 43-180 and TB 750-25.

(4) The 180-day TOW subsystem verification will be performed once in conjunction with the vehicle maintenance cycle. See paragraph 3-4 for equipment cyclic maintenance requirements.

b. MWOs.

(1) Each CEG/CEB will establish and maintain an MWO Coordinator

(2) The AFSC CEG/CEB sites will update and verify the DA Modification Work Order Management Information System (MMIS) to provide a record and visibility of applied MWOs. Visibility of applied MWOs will also be maintained in AWRDS.

(3) For additional guidance on MWOs, see paragraph 6-4.

(4) Commodity Commands are responsible for MWO funding and will coordinate ordering and installation through the AFSC MWO Coordinator.

c. Equipment disposition. APS equipment not site reparable or that exceeds the maintenance expenditure limits will be reported to the commodity command for appropriate disposition.

d. Specific equipment.

(1) Fuel Tankers (M978s, M967s, M969s).

(a) Cleaning and purging of fuel. The preferred method for purging is to use a solvent wash, and then a hot water rinse. Immediately after the hot water rinse, the tanker must be drained of all water and dried with hot air. Prior to any tank maintenance, a vapor reading of 0.0 is required with an explosimeter. The American Petroleum Institute, Publication 2013, FM 10-67-1, and TB 43-0212 all contain guidance on how to safely vapor-free and clean mobile tanks used in the transportation of flammable liquids. TACOM Ground Precautionary Message, Control Number 94-02, Maintenance Advisory, provides proper guidance for purging fuel tankers using a biodegradable purging solution, NSN 7930-01-350-7034 or NSN 7930-01-350-7035.

(b) Inspection and testing for storage. In accordance with Department of Transportation, Code of Federal Regulations, Title 49, Paragraph 180.407, all cargo tanks constructed in accordance with a DOT specification must be inspected and tested prior to issue if in storage for longer than one year. It is necessary to conduct these inspections and testing every maintenance cycle using registered and qualified people. Use of the Pneumatic Leakage Test Kit, NSN 2590-01-438-8806, will satisfy the leakage and pressure test requirements necessary to ensure a compliant tanker.

(2) Fire Extinguishers/compressed gas cylinders.

(a) Fixed cylinders integral to a weapon system. The DOT regulations identify how long these cylinders can go between hydrostatic retests. However, these test intervals only apply to cylinders that are being recharged. They do not apply to fully charged cylinders. Therefore, no fully charged and installed cylinder need be removed from a vehicle for hydrostatic retest, even if the retest interval has expired, unless it does not pass the visual inspection requirements detailed in the respective weapon system TM. If the retest interval has expired, and the cylinder has been completely or partially discharged, then the cylinder must be hydrostatic tested before the cylinder is recharged.

(b) Portable cylinders (e.g. hand held). The standard hydrostatic retest interval for compressed gas cylinders is every five (5) years. This applies to fully charged extinguishers, as well as those being prepared for recharge. This is applicable to DOT 3A, 3AA, or 3AL cylinders containing carbon dioxide (CO2) used in weapon systems. However, if the extinguishers contain dry powder, Halon, or a hydro fluorocarbon (HFC) agent, the hydrostatic test interval for these cylinders is only every twelve (12) years. Likewise, the hydrostatic retest interval for DOT 3A, 3AA, and 3AL cylinders containing chlorofluorocarbon (CFC) used in weapon system air conditioning or refrigeration systems is every five (5) years. Portable fire extinguisher must undergo hydrostatic retest when the retest interval expires.

(c) Disposable, portable fire extinguishers (such as the Halon 1301 handheld in weapons systems) are not subject to evacuation or recharge. The hydrostatic test interval is therefore equivalent to t he service life of the extinguisher. These extinguishers shall be replaced at the intervals prescribed in the applicable technical manuals. All Halon 1301 handheld fire extinguishers removed from weapons systems due to visible damage or expiration of service life shall be turned in to the Army Ozone Depleting Substance (ODS) Reserve at the DSCR following the Army's turn-in procedure found at the Army Acquisition Pollution Prevention Support Office web site (www.aappso.com).

(d) Hydrostatic retest must be performed by a DOT-certified retest facility. The CONUS facilities are certified through one of the DOT Independent Inspection Agencies. The OCONUS facilities are certified through the Defense Logistics Agency (DLA). The ODS Reserve staff at DCSR continues to provide training concerning the safe storage and handling of compressed gas cylinders and Halon system cylinders to personnel in DLA, the military services and other Federal agencies. A safety guide for the decommissioning of Halon fire extinguishing systems was initiated by the ODS Reserve and was prepared in coordination with the Environmental Protection Agency, Halon Recycling Corporation, Halon Alternatives Research Corporation, Fire Suppression Systems Association, and Halon system manufactures. The guide provides personnel involved in the decommissioning of Halon cylinders with identification and safe handling procedures for the commonly used cylinders. It is planned for this document to be periodically updated. Because proper procedures are essential to the safe decommissioning of Halon systems the potential risks associated with decommissioning, to describe the Halon system configurations that might be encountered in the field or reclamation facilities, and to provide safe decommissioning guidelines. General, as well as specific, procedures for properly handing and operating the major Halon bank operators, Halon recyclers, and Halon service professionals are also provided. The guide is available electronically to the public on the web by accessing the Defense Environmental Network and Information Exchange (DENIX) at https://www.denix.osd.mil/, and retrieving the document, "Moving Towards a World Without Halon, Volume 2: Safety Guide for Decommissioning Halon Systems". Or use the following web address: https://www.denix.osd.mil/denix/Public/News/DLA/Halon/hal1.html. ODS turn-in and requisitioning guidance is provided as Appendices B and C to this retrospective. For special concerns involving ODS turn-in and requisition guidance contact the Reserve Policy Office at (804) 279-5203/4525 or DSN 695-5203/4525.

(3) Fuel Filtration Additive Unit.

(a) The U.S. Army has designed and fabricated a mobile system capable of cleaning hydrocarbon fuels and injecting additives where necessary. The system, designated the Fuel Filtration/Additive Unit (FFAU), is intended to refurbish fuel that is not otherwise usable and would normally be discarded. As such, the FFAU extends the effective shelf life of fuel, reduces disposal costs, and decreases the need to purchase new fuel.

(b) All APS fuel that is identified as "Not Suitable for Use" shall be processed through the FFAU or a filter separator. Equipment will be resampled as directed by the Army Petroleum Center.

(4) Radioactive Material.

(a) General.

1 Control of radioactive materiel is mandated by Federal regulation. Immediately report any suspected lost or damaged items to your Radiation Safety Officer (RSO). If your Radiation Safety Officer cannot be reached, contact the commodity command radiation safety office listed in Appendix I.

WARNING

All personnel that operate and/or maintain fire control equipment that uses adhesives, cleaning solvents, and sealing compounds must be in a well-ventilated area away from open flame. **Adhesives, cleaning solvents, and sealing compounds are harmful to skin and clothing and may give off harmful vapor.**

2 Refer to appropriate level technical manuals for proper handling of radioactive commodities. Additionally, the NRC license or Army Radiation Authorization covering the commodity may prescribe other handling requirements. Consult those documents for updated information. Copies of the NRC licenses and Army Radiation Authorizations may be obtained from the respective commodity command.

3 TB 43-0116, Identification of Radioactive Items in the Army, 1 Apr 98, identifies radioactive items in the Army supply system together with the major end items of equipment and components in which these radioactive items are utilized. This TB is used as a guide in determining proper safety procedures for procurement, use, storage, maintenance, transfer, and disposal of radioactive items.

4 HQ DA released a Radiation Protection Officer CD-ROM containing a library of information concerning the Army's Radiation Safety Program. The information on the CD-ROM may be obtained in the TACOM-RI web site or the CECOM web site listed in Appendix I.

5 DA PAM 700-48, Handling Procedures for Equipment Contaminated with Depleted Uranium and other Low Level Radioactive Commodities, contains guidance on dealing with radioactive commodity incidents.

6 APS sites are required to be posted with "Caution Radioactive Material" signs. Additionally, Chemical Agent Defense Equipment storage areas are required to be posted with the following:

- Copies of the NRC license (all sites).
- 10 CFR 19.11 a, b, and c.
- 10 CFR parts 19 and 20 (all sites).
- Copy of NRC Form 3 (notice to employees) (CONUS sites only). A copy of the NRC Form 3 and other NRC publications may be obtained on the NRC web site at http://www.nrc.gov .
- Copy of Section 206 of the Energy Reorganization Act (CONUS sites only).
- Radiation emergency points of contact (all sites).

NOTE

Posting of Caution signs is exempt in areas that the radiation level does not exceed 0.005 rem per hour at a distance of 30 centimeters from the surface of the source. The chemical detectors fall into this category and only require the NRC postings.

(b) TACOM-RI Commodities.

1 The radioactive materiel used in artillery fire control devices is tritium gas (H3) sealed in glass vials. These sources illuminate the instrumentation for night operations. Federal regulation prohibits tampering with or removal of the sources in the field. In the event there is no illumination, notify the Installation RSO or TACOM-RI RSO (DSN 793-2965/6228/2995).

2 Do not eat, drink, smoke, chew tobacco or gum or apply cosmetics when working in areas where tritium devices are stored or maintained.

3 Identification: Instruments containing radioactive self-luminous vials are identified by radioactive warning labels with the radiation symbol (☢). These labels should not be defaced or removed and should be replaced immediately when necessary. Refer to the local RSO or the TACOM-RIA RSO for instructions on handling, storage, or disposal.

4 Storage: Spare equipment must be stored in the shipping container, as received, until installed onto the

weapon. Storage of these items is recommended to be outdoor shed-type storage or unoccupied building.

5 Shipping: All radioactively illuminated instruments will be evacuated to the appropriate echelon for inspection and repair. Non-illuminated instruments will be turned over to the installation radiation safety officer for disposal as radioactive waste.

6 Emergency procedures: Contact installation Radiation Protection Officer. If a device is damaged or if a source breaks or is not illuminated:

- Warn nearby personnel of the situation and have them evacuate the area.

- If possible ventilate the area to the outdoors. Do not ventilate to adjacent enclosed areas.

- Shut off any ventilation system that is shared with other uncontaminated areas in the facility.

- Do not handle broken tritium devices with your bare hands. Use gloves (if available) or grasp the item through a plastic bag turned inside out.

- Quickly place item in a plastic bag and seal the bag with tape. Place this bag in a second plastic bag and seal with tape. Once the damaged device is contained in the plastic bags place it on a bench top and leave the area.

- Wash your hands after handling damaged or possibly contaminated tritium devices. Use none abrasive soap and cool water to minimize the chance of tritium penetrating your skin. If skin contact is made with any area contaminated with tritium, wash immediately with nonabrasive soap and cool water.

- Ensure that the TACOM-RI RSO is notified. See Appendix K for appropriate point of contact.

7 For additional requirements and information, consult TB 43-0197 https://www.logsa.army.mil/etms/welcom1.htm .

(c) CECOM Commodities.

1 CECOM manages thermal optics, some of which contains small amounts of radioactive thorium. These include night vision devices and the gunner's primary site.

2 Handling precautions: Care should be taken in the handling of these optical components to avoid inhalation and/or ingestion of any dust or flakes from lens that has been inadvertently chipped or scratched. Immediate first aid should be given to anyone receiving a cut caused by broken and/or chipped thorium fluoride (ThF4) coated lenses. Prompt cleansing of the wound to minimize entrance of thorium particles into the body is essential and the RSO must be notified at once. Wearing gloves to handle lenses provides protection from contaminated dust on chipped or broken thermal lenses. DO NOT vacuum, sweep, or use high-pressure air to clear ThF4 from the work area. Carefully clean or gently blot the surface to remove chipped particles. Maintenance personnel should wash their hands with mild soap and water after handling the thermal lens or window.

3 Consult the appropriate TM for additional guidance and to determine the level of authorized maintenance.

4 TB 43-0255, Disposition/Disposal Information for CECOM Radioactive Commodities, 1 Oct 98, provides basic disposition instructions and summarizes the requirements for the safe handling, disassembly and removal of radioactive components contained in CECOM-managed radioactive commodities.

5 TB 43-0137, Transportation Information for CECOM Radioactive Commodities, 1 Sept 98, summarizes the basic regulatory packaging and shipping requirements for transporting CECOM-managed radioactive commodities.

(d) SBCCOM Commodities.

1 SBCCOM manages chemical defense equipment, some of which contain radioactive sources. These include the M8A1Chemical Agent Alarm System with the M43A1 Chemical Agent Detector, Chemical Agent Monitor/Improved Chemical Agent Monitor (CAM/ICAM) and the GID-3/M22 Automatic Chemical Agent Alarm (ACADA).

2 In addition to posting requirements list above, the M43A1 Chemical Agent Detector, the CAM/ICAM, and ACADA must be leak tested annually. Items not leak tested annually will be classified NMC. For further information regarding leak testing contact the U.S. Army Tank-Automotive & Armament Command RSO listed in Appendix K.

3 If a chemical agent alarm detector or chemical agent monitor is damaged, don plastic gloves and place the item in a plastic bag. Immediately notify the RSO and the U.S. Army Tank-Automotive & Armament Command licensee point of contact listed in Appendix K.

(e) JMC Commodities – Depleted Uranium (DU) Ammunition.

1 There are several models of ammunition that contain a depleted uranium (DU) penetrator. All models fall into federal supply classes 1305-1315. Information on model numbers, department of defense identification codes (DODIC), and national stock numbers can be obtained from the U.S. Army Operations Support Command.

2 This ammunition as APS is to be handled in accordance with a standard ammunition and explosive guidance and precautions.

3 Although the primary hazard of DU ammunition is the explosive hazard of the propellant, radiation safety officers (RSO) must post storage locations with Caution Radioactive Material signs. Other requirements for the storage and handling of DU ammunition can be found in Nuclear Regulatory Commission license number SUC-1380 and by contacting the JMC RSO. DU ammunition storage facilities at land-based APS sites require annual radiation surveys. Consult the local RPO or the licensee listed in Appendix K for further information.

4 TB 9-1300-278, Guidelines for Safe Response to Handling, Storage, and Transportation Accidents Involving Army Tank Munitions or Armor Which Contain Depleted Uranium must be consulted for guidance in dealing with incidence involving depleted uranium ammunition.

(f) TACOM-Warren Commodities.

1 TACOM-Warren manages radioactive commodities in the M1-series tanks as well as the MC-1 soil moisture density tester used by engineer units. Commodities in the M1-series tank include depleted uranium heavy amour as well as the engine combustor liner. Additionally, TACOM-Warren has purview over vehicle gauges and dials containing Radium-226.

2 Abrams Tank, Heavy (Depleted Uranium) Armor. This item contains radioactive material, Depleted Uranium (DU). Chemical/Physical Form: Solid slabs sealed in stainless steel packages. The amount of DU in the armor is unlimited per the NRC License. It provides armor protection for the Abrams Tank. The Abrams Heavy Armor Tank can be identified by a turret number (serial number) ending in a "U". Also, the turret may be distinguished from a non-DU turret by using a radiacmeter. The tank is not otherwise marked with any radiation marking or symbol.

Storage and Handling: The DU in the Abrams Heavy Armour Tank requires no special handing procedures. Unless the armor is penetrated, then see TB 9-1300-278, AR 700-48, DA Pam 700-48, and the Abrams Security Classification Guide.

Shipping: Shipment of the Abrams Heavy Armor Tank requires no special procedures except for certification on documents of name of the consignor and consignee and the statement: “This package conforms to the conditions and limitations specified in 49 CFR 173.426 for radioactive material, excepted packaged articles manufactured from natural or depleted uranium or natural thorium, UN 2910.”

Emergency procedures: Immediately contact the installation RSO or the TACOM-Warren RSO if the armor is penetrated or ruptured, then follow the requirements outlined in TB 9-1300-278, AR & DA Pam 700-48 and the Security Classification Guide.

TB 9-1300-278, Guidelines for Safe Response to Handling, Storage, and Transportation Accidents Involving Army Tank Munitions or Armor Which Contain Depleted Uranium, and the Security Classification Guide for the Abrams Tank System, must be consulted for Abrams tanks with depleted uranium.

3 Abrams Tank Combustor Liner (NSN 2835-01-076-6092). This item contains radioactive material, thorium 232 (Th-232). The radioactive material is in magnesium metal. The amount of the radioactive material is 0.908 microcuries/lb. of alloy and the activity is .002 microcuries per gram. It provides a heat resistant liner for the engine of the M-1-series tank. TB 43-0216 and TB 43-0116 can identify the radioactive liner. Also, the liner containing thorium maybe distinguished from a liner without thorium by using a radiacmeter and by its NSN. The non-radioactive liner's NSN is 2815-01-422-9131. The radioactive liner is not marked with any radiation marking or symbol.

Storage and Handling: It is prohibited to repair liner combustors or to treat/process them physically, chemically, or metallurgically. Replacement is allowed only if the old liner is turned in. Repair, condemnation or disposal is not authorized below depot/specialized activity level. Combustor liners will be disposed of in accordance with AR 11-9.

Shipping: Shipment of the liner in the vehicle requires no special procedures. However, if the liner is removed, then shipment will be in accordance with 49 CFR and any other pertinent regulations.

Emergency procedures: See TB 43-0216 for emergency procedures. Immediately contact the installation RSO or the TACOM-Warren RSO in the event of loss, damage, or contamination of the liner.

4 Vehicle Radium Dials/Gauges. The dials/gauges may be on vehicles built prior to the 1970s. The radioactive dials/gauges contain radioactive material, Radium 226 (Ra-226). The chemical form is Radium 226 Sulfate. The physical form is Radium 226 luminous paint solid. The radioactivity ranges from 0.7 microcuries (uci) to 15 uci. The radium is on the dial/gauge numbers or indicators inside of a glass covered instrument. Using TB 43-0216, TB 43-0116 and a radiacmeter, you can identify the radioactive dials/gauges. Additionally, gauges with a model number ending in –1 most likely contain radium. The above should be used together to identify if vehicles contain radium dials/gauges. Some vehicles may not be listed in the TBs and have the radium dials/gauges. The dials/gauges are not marked with any radiation marking or symbol.

Storage and Handling: Storage of the vehicles containing the radioactive dials/gauges doesn't require any special procedures. However, the dials/gauges must be intact with the glass covering the face of the instrument intact. Otherwise, see the procedures in TB 43-0216. If the dials/gauges are separated from the vehicles, then follow TB 43-0216.

Shipping: Shipment of a vehicle with an intact radium dial/gauge requires no special procedures. However, if the dials/gauges are removed, then procedures outlined in TB 43-0216 must be followed. Radiation and contamination surveys in accordance with DOT regulations would be required for shipments of radium dials/gauges removed from vehicles. Shipping documents must identify the radium dials/gauges and have a certification statement.

Emergency procedures: Dials and gauges which have been damaged or which have had the glass shattered should be removed from the vehicle and disposed of in accordance with AR 11-9 and TB 43-0216. Notify the local RSO in the event broken dials or gauges are found.

5 MC-1 Tester, Density and Moisture, Nuclear Method (NSN 6635-01-030-6896). This item contains radioactive material, Cesium 137 (Cs-137) 3.70 E+08Bq (10 millicuries [mCi]) and Americium 241 (Am-241) 1.85 E+09 Bq (50 mCi). The radioactive material is in special form with the Cs-137 in ceramic and the Am-241 in ceramic with beryllium oxide. They are doubly encapsulated in stainless steel. They provide the density and moisture counts for soil being tested for determination of compaction requirements, which leads to roadway and runway construction. Federal regulation prohibits tampering with or removal of the sources.

Safety precautions: Radiation dosimeters are required for personnel entering the tester storage area or when handling the tester. Do not eat, drink, smoke, chew tobacco or gum or apply cosmetics when working in areas where the tester is handled or maintained. The MC-1 Tester is identified by radioactive warning labels with the radiation symbol and will have two DOT Yellow II Labels on the DOT-7A transport box containing the tester. These labels will not be defaced or removed and should be replaced immediately.

Storage and Handling: Storage of the tester to includes its handling will be in accordance with TM 5-6635-386-12&P and the NRC license 21-01222-05. Radiation surveys are required quarterly for all tester storage sites. Also, see the TACOM web site for updated information.

Leak Testing: The MC-1 tester requires a leak test of the radioactive source every 6-months. This applies to testers in storage as well as items in an operational status. For further information on leak testing contact the TACOM-Warren RSO listed in Appendix K.

Shipping: Retain the original Type A DOT-7A metal casing, packaging and foam pack received. The tester shall be in its type A DOT-7A package, which is padlocked. If a fiberboard over pack is used, the words "Type A DOT 7A Container Within" shall be placed of the over pack with all other required markings. Two Yellow II labels and a Cargo Aircraft Only label (if applicable) must be on the tester package. Labels must not be on the top or bottom of the tester package. The labels require a radiation reading called Transport Index. The package needs to be marked "Export" if applicable. Package marking needs to be: "Type A DOT-7A Radioactive Material, Special Form, n.o.s., UN2974, RQ (markings shall be at least 1/2 inch in height), name & address of owning organization". Only one tester may be shipped per package. Radiation and contamination survey is required prior to shipment. Vehicle placarding is not required. Only Cargo aircraft shipment is authorized. Shipping documents require certification in accordance with 49 CFR and IAEA (export), to include a description of the tester and its sources, and a 24 hour emergency response phone number. Notification of the MC-1 Tester Item Manager is required within 24 hours upon shipping and receiving tester shipments, and receiving organizations will be notified within the 24 hours of the shipment.

Emergency procedures: Immediately contact the installation Radiation Safety Officer (RSO) or the TACOM-Warren RSO. See tester TM 5-6635-386-12&P for emergency procedures in handling damaged, leaking, or lost testers. Also, see the TM for procedures for personnel over exposure.

WARNING

Damaged MC-1 testers may create a hazardous condition due to elevated radiation levels. In the event that an MC-1 tester is damaged move away from the item and warn others to stay at least 25-50 meters away until emergency personnel secure the area.

6 TB 43-0216, Safety and Hazard Warnings for Operation and Maintenance of TACOM Equipment, covers vehicle radium dials/gauges, Abrams tank combustor liner and the MC-1 soil density tester. Also, for the tester TM 5-6635-386-12&P, Unit Maintenance Manual for Tester, Density and Moisture [Soil and Asphalt], Nuclear Method, Campbell Pacific Model [MC-1], NSN 6635-01-030-6896, should be consulted.

SECTION III. FUEL SAMPLING

3-3. Sampling of Supply Class III.

a. Class III quality surveillance of APS includes the actions required to monitor and maintain liquid fuels, packaged petroleum, and chemical specialty products. Quality surveillance of Class III items in this plan includes fuel in equipment fuel tanks, fuel cells, and tank vehicle bulk storage compartments, bulk issuing storage tanks, and also packaged products stored in containers. Product deterioration could cause such problems as filter plugging, nozzle sticking/fouling, transfer pump plugging, microbiological growth, fuel starvation, corrosion of fuel-wetted surfaces and could seriously affect operational readiness of prepositioned rolling stock. This plan is intended to ensure that Class III products are properly monitored and maintained in a state of combat readiness.

b. This plan provides general guidance for implementing Army prepositioned petroleum quality surveillance (Q/S) procedures for liquid fuels, packaged petroleum, and chemical specialty products.

c. Responsibilities for APS Petroleum Quality Surveillance are as follows:

(1) AMC is responsible for ensuring an adequate Class III quality surveillance program is maintained within the Command.

(2) AFSC, Combat Equipment Group/Battalion is responsible for-

(a) Coordinating implementation of the quality surveillance program and monitoring contract compliance.

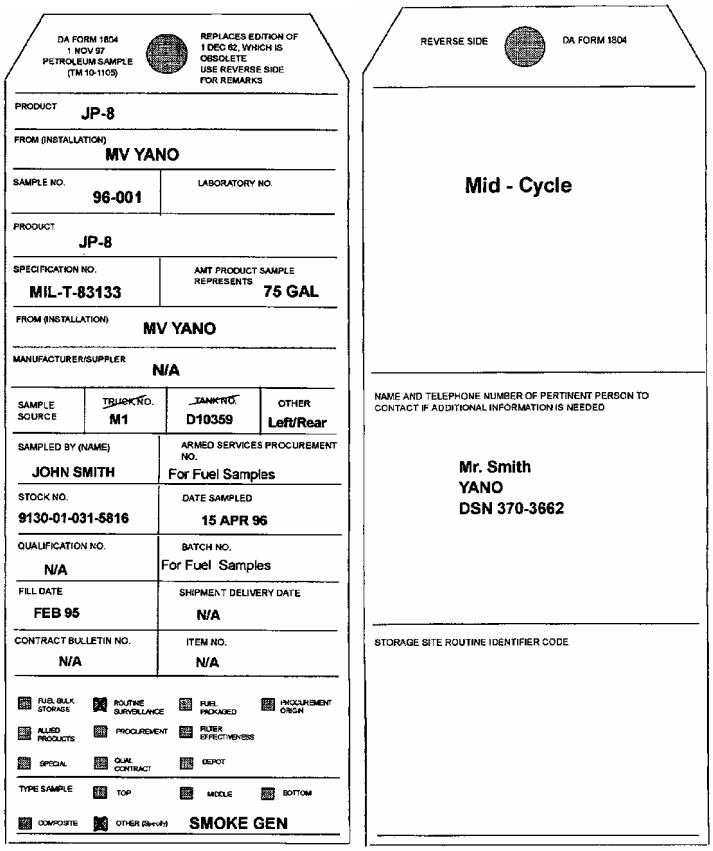

Figure 3-1, DA Form 1804 (Petroleum Sample Tag)

(b) Providing guidance to contract personnel on corrective action for off-specification product.

(c) Conducting Class III sampling in accordance with guidance contained herein.

(d) Submission of Class III samples for analysis to a USAPC designated testing site.

(e) Performing remedial action on equipment containing off-specification product as directed by AFSC.

(f) Monitoring shelf-life management of package petroleum products for all land based APS.

(g) Containerization and shipment of expired or off-specification Class III (P) items.

(3) U.S. Army Petroleum Center (USAPC) is responsible for-

(a) Monitoring analysis results of Supply Class III products submitted.

(b) Providing test results and disposition guidance to AFSC, Combat Equipment Groups/Battalions and designated Government activities.

(c) Providing training and technical assistance on matters relating to the quality Supply Class III surveillance program.

(d) Providing recommended action to the responsible engineering support activity on changes to Supply Class III (P) military performance specifications, which affect usability of APS stocks.

(4) AFSC, Materiel Management Center, Material Management Team is responsible for-

(a) Asset Management of Wholesale Supply Class III (P) war reserve stocks (excluding fuel in tankers).

(b) Coordinating action to upgrade Supply Class III (P) items with updated military performance specification requirements for all prepositioned package petroleum products.

(c) Coordinating Supply Class III (P) samplings schedules.

(d) Coordinating movement of Supply Class Ill (P) to APS 3 storage and for disposition when moved from APS 3 storage due to off-specification condition.

d. Safety.

(1) Sampling-Personnel responsible for sampling must ensure safety precautions are observed to prevent accidents or possible injury. The following safety precautions should be followed when sampling petroleum products.

(a) No Smoking-Strictly enforce NO SMOKING rules.

(b) Fuel vapors-Avoid exposure to fuel vapors for long periods.

(c) Bonding-Ensure rope on weighted beakers remains in contact with the edge of the manhole cover or gage hatch when lowering or raising the sampler.

(d) Nylon clothing-Never wear nylon clothing when sampling or handling petroleum products.

(e) Protective clothing-Wear leather or rubber gloves.

(f) Fire Extinguishes-Ensure fire extinguishers are within easy reach but where they will be safe from a fire.

(2) Spill prevention and countermeasures-Spill prevention and countermeasures must comply with AR 200-1 (Environmental Protection and Enhancement) to ensure safety and protection of the environment. The following spill prevention and countermeasures should be followed when sampling and handling petroleum products:

(a) Avoid spills-Fill sample containers carefully and avoid overfilling.

(b) Spill clean-up-Ensure spill clean-up materials are on hand and that personnel are familiar with their use.

(c) Spill prevention control and countermeasures plan (SPCCP)-Ensure personnel are familiar with the installation SPCCP and know the proper procedures for reacting to fuel spills.

e. Fuel sampling requirements. Fuel sample will be performed in accordance with this section and ANSI Z 1.4, Sampling Procedures and Tables for Inspection by Attributes; ASTM-D4057, American Society for Testing and Materials, Vol. 05.03, Standard Practice for Manual Sampling of Petroleum and Petroleum Products; FM 10-67-1, Concepts and Equipment of Petroleum Operations; FM 10-67-2, Petroleum Laboratory Testing and Operations; MIL-STD-3004, Quality Surveillance Handbook for Fuels, Lubricants, and Related Products.

(1) General-Liquid fuel samples taken from rolling stock provide critical information on the operational readiness of equipment. Personnel responsible for sampling must ensure procedures detailed in this document are followed so that valid test results can be obtained.

(2) APS 3 sample scheduling.

(a) Before APS 3 cycle-sampling conducted prior to uploading before the APS 3 cycle establishes a base line for monitoring fuel quality of rolling stock. Liquid samples must be drawn from fixed storage tanks, refueling vehicles used to top off prepositioned equipment, and the individual pieces of equipment. Equipment identified for sampling should have product drawn from fuel tanks/cells prior to the vessel uploading process to simplify access to equipment.

(b) Equipment American Petroleum Institute (API) gravity screening-All equipment identified for sampling prior to initial upload must be screened for API Gravity. Equipment failing the screening tests should not have samples submitted for laboratory testing. Fuel tanks/cells on equipment failing the screening test should be drained and replaced with JP 8. Refer to Appendix D for API Gravity screening procedures.

(c) Fuel cleanliness-Equipment fuel tanks/ cells must be clean before being loaded aboard APS vessels to help ensure operational readiness. Visual sediment or water observed during sampling should be removed through filtration before upload (see Para 3-2d(3)). The Fuel Filtration/Additive Unit (FAU) will be used to remove sludge, deposits, water bottoms, and microbiological debris from fuel tank environments. If visual sediment or water is observed, the initial samples should be discarded and a second sample taken after cleaning the fuel tank/cell with the FAU (see above).

(d) End of APS 3 Cycle-Sampling and testing conducted at the end of the APS 3 cycle provides data used to determine the disposition of fuel during the scheduled maintenance period. Samples will be taken from bulk fuel compartments of petroleum tank vehicles and individual equipment not later than 3 months prior to scheduled maintenance cycle off-loading of the APS 3 vessel. This will allow adequate time for laboratory tests to be completed and disposition guidance to be provided on the equipment.

(3) Reference for scheduling-Sampling activities should refer to Table 3-1 to determine each specific fuel source, which requires sampling, when the fuel source is to be sampled, and the type of sample to be taken.

(4) Equipment and procedures-Sampling equipment will vary based on the type of sample taken and accessibility to the fuel source. Appendix D provides a list of necessary equipment for each sampling method. Sampling procedures will differ depending on the type of device used to draw fuel. Appendix D provides individual procedures for each different sampling method. APS 3 equipment identified for sampling will be selected randomly during the before-cycle quality surveillance. End of cycle samples should be 90 percent random and 10 percent duplicates taken from the same source during the pre-cycle sampling. Duplicate samples at the end of cycle will be used to provide data on storage stability of the fuel aboard the ship. Duplicate samples will be selected from historical data in AWRDS.

(5) Determining number of fuel samples to be taken-Sampling of equipment must be large enough to provide confidence that the results are representative of the complete vessel, but not so large that quality surveillance is cost prohibitive. Activities responsible for taking samples must determine the proper number of samples based on the quantity and type of rolling stock on board. Equipment should be grouped into five different categories as outlined in Table 3-2. Total quantities are calculated using the AWRDS Inventory Report. Refer to Steps 1-2 outlined in Tables 3-2 and 3-3 to determine the quantity of samples required for each category of equipment.

(6) Land-based APS sample scheduling:

(a) Equipment sampling should be performed during the COSIS exercise required in Chapter 6, Section III. Frequency of sampling, however, will be performed in accordance with Table 3-1. Refer to either Table 3-1 or 3-4 to determine the type of sample required.

(b) Sampling of fixed storage tanks used to refuel rolling stock will be performed every 2 years. Refer to Table 3-1 for sampling requirements.

TABLE 3-1. FUEL SAMPLING AND TESTING REQUIREMENTS

Location of Fuel	Type of Storage	When Sampled	Type of Sample	Type of Test Required (MIL-STD-3004)
Defense fuel support point or preposition site	Bulk storage tank	(a) Before APS3 cycle prior to issue into refueling vehicles	All level	A
		(b) 24 months (prepo site only)	All level	B-2
Combat equipment base-afloat or repositioning site	Petroleum tank vehicle bulk storage compartment	(a) Before APS3 Cycle	All level	A
		(b) 90 days prior To end of APS 3 cycle	All level	B-2
		(c) 24 months for land-based	All level	B-2
Combat equipment base-afloat or prepositioning site	Tactical vehicle or generator fuel tank	(a) Before AWR 3 cycle	Bottom sample	B-2*
		(b) 90 days prior To end of APS3 cycle	Bottom sample	B-2*
		(c) 48 months for land based	Bottom sample	B-2*
Combat equipment base-afloat or prepositioning site	Combat tracked vehicle	(a) Before APS3 cycle	Bottom sample, smoke generator inlet	B-2*
		(b) 90 days prior To end of APS3 cycle		B-2*
		(c) 24 months for land based		

Legend:
Type "A" Test - Complete specification inspection tests.
Type "B-2" Test - Partial analysis to verify characteristics susceptible to deterioration because of age and determine adequate quality for equipment function. Listed below are the specification requirements for ground mobility fuel in APS rolling stock:

Gravity, API @ 60º F, Min	37.0
Appearance, Visual	Report
Color, Visual	Report
Water Content % Vol., Visual	None
Fuel System Icing Inhibitor, vol. %	0.05-0.20
Distillation: ºC IBP	Report
10% Rec, Max	205
50% Rec,	Report
90%, Rec, Max	338
Final Boiling Point	370
% Residue	3.0
Flash Point, ºC, Min	38
Cloud Point, ºC, Max	-15
Particulate Matter, mg/L, Max	10

* - Indicates specification-testing requirements modified on fuel used for ground mobility purposes only.

SAMPLE NUMBER	DATE SAMPLED	SAMPLED BY	SAMPLE SOURCE	TYPE OF SAMPLE	RESULTS	REMARKS
96-001	15 Apr 96	Mr. Smith	M-1, D10359 Left/Rear	Smoke Gen	OG	
96002	15 Apr 96	Mr. Jones	M-113, 22502MU Rear/Right	Bottom	NSFU	R/R fuel tank Cleaned and Resampled #96-029
96-054	15 Oct 97	Mr. Smith	USAU0642886	3 QTs	SFU	NSN 9150-01-191-2272, MIL-PRF-2104 LOT P-2100

RESULTS - OG (ON GRADE), SFU (SUITABLE FOR USE), NSFU (NOT SUITABLE FOR USE)

Figure 3-2, Petroleum Sampling Log

(7) Identification of Samples-DA Form 1804 (Petroleum Sample Tag) (Figure 3-1) must be completed for each sample taken and should be attached to the sample container. Sample tags must be filled out completely to ensure proper laboratory testing and documentation.

NOTE

Submitting activities should ensure that the sample tag is as complete as possible, including a complete mailing address the first time. An activity code will be provided to the submitting activity based on the address provided. Samples sent after the initial submission should thereafter indicate the activity code in the FROM block along with the organization title and vessel name. Refer to FM 10-67-2 for further guidance on completing the Petroleum Sample Tag.

TABLE 3-2. EQUIPMENT CLASSIFICATION AND SAMPLING LEVEL

Equipment Category	Sampling Level
Wheeled vehicles under 2½ ton and over generators	S-3
Wheeled vehicles 2½ ton and over, material handling equipment	S-3
Petroleum tank vehicles containing bulk fuel and fixed bulk storage tanks	G-1
M1 tanks, M88 recovery vehicles, Bradley, APC's, M109A6, M992	G-1
All other tracked vehicles	S-3

Calculating number of samples for each equipment category.
Step 1 - Categorize all equipment from data obtained in the AWRDS inventory report
Step 2 - Calculate total for each equipment category.

TABLE 3-3. SAMPLE QUANTITIES BY EQUIPMENT CATEGORY

Equipment Total by Category			Number of Samples in S-3 Level*	Number of Samples in G-1 Level*
2	TO	8	3	3
9	TO	15	3	3
16	TO	25	3	3
26	TO	50	3	5
51	TO	90	5	5
91	TO	150	5	13
151	TO	280	13	13
281	TO	500	13	20

Step 1 - Locate appropriate range in "Equipment Total by Category" column that applies to figure obtained in Step 2.
Step 2 - Read across from the range obtained in Step 3 and match the sample level in Table 3-4 to the sampling level across from the "Equipment Category" in Table 3-3.
*Note: S-3 and G-1 levels are extracted from ANSI Z 1.4. Number of samples is calculated from Single Sampling Plan for Normal Inspection using an AQL of 4.0.

TABLE 3-4. TYPE OF SAMPLE FOR TRACKED VEHICLES

Type of Vehicle	Location of Fuel Cell	Type of Sample
M1	Left or right front	Bottom
M1	Left rear	Smoke generator pump outlet
Bradley	Lower	Before fuel filter unit
M109A6/M992	Left	Bottom
M113	Left or right rear	Bottom

(8) Sample Log-A log must be maintained to record each sample taken. The Petroleum Sample Log assists personnel in tracking fuel quality to the sample source (i.e., storage tank, vehicle, package product lot/batch). Figure 3-2 shows an example for completing the sample log.

(9) Shipping-Samples taken under the APS petroleum quality surveillance program are considered hazardous material and must be shipped in accordance with international and Federal regulations. Only UN/1A1 approved containers of the type identified in Appendix D should be used to ship fuel samples. Sampling activities should contact their installation shipping office for instructions on required packaging and marking of containers for package products since requirements vary depending on the type of item. Samples should be mailed to the USAPC or a laboratory designated by the USAPC.

ATTN: AMSTA-LC-CJPT (Bldg. 85-3)
Petroleum Test Facility
US Army Petroleum Center
New Cumberland, PA 17070-5005
Phone: DSN 977-6511/8177, (717) 770-6511/8177
email: lsmith@usapc-emh1.army.mil

f. Supply Class III (P) Shelf-life Requirements.

(1) Shelf-life Types – Supply Class III (P) items are classified as either Type I or Type II. Product shelf-life information for any item can be obtained from the FEDLOG under the columnar heading of SLC. Type I items are identified with an alpha character. Once the shelf life has been reached, the product is turned in for disposal. Items identified with a numeric character under the SLC column are Type II items. Type II items have a limited shelf life as identified by the SLC number; however, they can be extended through testing.

(2) Shelf-life limits - Maximum limits for shelf life of Supply Class III (P), Type II items, have been set to provide assurances that the products will perform as required, minimize costs associated with rotating stock, and reduce hazardous material disposal costs.

(3) Shelf-life management requirements for Supply Class III (P), Type II items are as follows.

(a) Land Based Management-

1 Product age is not to exceed 5 years from date of manufacture when initially stored.

Items received into storage should be in condition code A regardless of shelf life remaining.

2 Product age shall not exceed 10 years from date of manufacture.

3 Shelf-life management shall be performed IAW AR 710-2, App C and DA PAM 710-2-1, Chap 12.

(b) Afloat Management-

1 Product will be issued out of DLA, DSCR stocks as directed by AFSC, MMT for each scheduled vessel upload.

2 Items with a shelf life of 24 months shall have a minimum 21 months remaining, beginning with the time of vessel upload.

3 Items with a shelf life of 36 months shall have a minimum of 30 months remaining, beginning with the time of vessel upload.

4 Upon completion of each APS 3 cycle, product will be disposed of through the DRMO or returned to DSCR for restocking. AFSC, MMT will determine the course of action on disposal or return of items based on the most cost effective solution.

g. Packaged petroleum sampling.

(1) General-Sampling and testing of packaged Supply Class III items provides critical information on the condition of the oils and lubricants which could cause mechanical failure of equipment. Additionally, sampling and shelf-life testing enables Supply Class III (P) items to be extended for use, saving resources and reducing hazardous material disposal costs.

(2) Sampling procedures-In order to ensure product integrity and prevent possible contamination, packaged products should be submitted in their original containers, with the exception of 55 gallon drums. Refer to Appendix D for sampling procedures.

(3) Determining number of packaged samples to be taken-Prepositioned stocks are frequently held in large enough quantities so that in many cases a like product will be containerized in several different sizes. Additionally, each particular size of a specific product may be made up of several different lots/batches. Each lot/batch must be sampled individually since the products are frequently made by different manufacturers and can be made under different production runs even by the same manufacturer. Procedures for calculating the required number of samples per lot/batch are contained in Appendix F.

(4) Required product quantities for samples-Minimum sample quantities are required to allow proper analysis of Supply Class III items. Some products will require several containers from a single lot/batch to make up one sample. Refer to Appendix E for required product sample quantities.

h. Sample analysis.

(1) Liquid fuel testing-Samples submitted to a laboratory for testing will be expedited to ensure results are provided in a timely manner. Testing of fuel samples for land-based APS will be performed in accordance with requirements established in MIL-STD-3004. The type of analysis conducted on APS 3 samples will be in accordance with requirements detailed in Table 3-1. Testing requirements for consuming end items using ground mobility fuels reflect potential mixtures of diesel and JP-8, and are tested using a synthesis of the two specifications. Specification limits on fuel used in ground mobility equipment are for determining fuel suitability for its intended use. Additionally, all samples exhibiting the presence of trace water (i.e., failing the Clear and Bright Rating as determined by ASTM-D4176 or -D4860) will be tested for the presence of microbial contamination.

(2) Supply Class III (P) testing-Packaged Supply Class III samples will be tested at the B-2 level IAW MIL-STD-3004. APS and depot stocks tested under the DoD Directive 4140.27M, which fail shelf-life testing and are of the same as a lot/batch in APS 3 storage should be considered failures for APS 3 stock also.

(3) Results reporting-Sample test data will be recorded on USAPC FL 701-E (Petroleum Laboratory Analysis Report) or equivalent form, for each sample submitted. Analysis reports will be provided to the designated Government representative of the submitting activity. Test results for liquid fuels will be maintained by the USAPC a minimum of 3 years.

i. Corrective action for failed samples.

(1) Random failures-The USAPC will provide disposition guidance and recommended corrective action for random sample failures to the responsible designated government representative.

(2) Systemic failures-In addition to normal reporting requirements, the USAPC will report sample test results on systemic failures immediately to HQ AMC.

SECTION IV. CYCLIC MAINTENANCE

3-4. Overview

a. A complete unit set will be scheduled through maintenance on a cyclic basis. A unit set includes all equipment of a UIC as listed on the APS authorization document.

b. CEG/CEB commanders will program the annual workload for each APS site or vessels, as appropriate.

c. Equipment on LMSR and container ships will be scheduled for maintenance every 30 months. Deviations from this maintenance cycle must be granted by HQDA. Watercraft forward stored in wet or dry storage will be scheduled every 36 months if mechanized and every 48 months if non-mechanized.

d. Tactical equipment stored in a CH environment at land-based sites will be scheduled for maintenance every 48 months. Tactical equipment that is not stored under CH conditions will be scheduled for maintenance every 24 months. Combat equipment stored in a CH environment will be scheduled for limited maintenance/PMCS every 30 months. Combat equipment will not be stored in open storage without approval of AFSC and will require more frequent maintenance cycles as well as special covers and extensive preservation.

e. At the end of each cycle all organizational and direct support maintenance, exercising, and PMCS will be accomplished with the following exceptions:

(a) For stored Combat Equipment, if equipment meets all of the following criteria:

1 Equipment had all PMCS maintenance completed at time equipment was put into storage.

2 Equipment meets all TM -10/-20 standards complete.

3 Equipment is stored in a Controlled Humidity Environment with the RH maintained between 30-50% at all times.

4 Equipment has not been removed from CH storage during the cycle.

5 AOAP sampling is accomplished every cycle on engine, transmission final drive, etc., as applicable.

6 Every cycle the engine health check is accomplished as specified in the TM's and vehicles are exercised (road tested). STE/M1 1600 and 1800 test are required to be performed at each cycle to verify the operational condition of the Fire Control/Fire Suppression systems. If the tank fails either one of these tests the vehicle is Not Mission Capable. For 1800 test see item 6 page 2-15 TM 9-2350-264-20-2-1 and for 1600 test see item 35, page 2-68 TM 9-2350-264-20-1-1. These test are used to validate the serviceability of these systems.

Then at the 30 month storage maintenance cycle when a complete PMCS is required the following maintenance actions may be waived:

SEMI-ANNUAL

- Inspect for metal fragments on the chip detectors (M1 unique).
- Clean engine compartment.
- Inspect, clean, and service the air induction system.
- Inspect the Hull Networks Box for cracks, brakes, missing hardware, and loose electrical cables (M1 unique).
- Operate Drivers Night Vision Viewer.
- Ground hop power pack (M1 unique).
- Inspect track assembly for conformance to condition code in accordance with applicable vehicle TM.
- Service Main Gun Elevation Mechanism Disk Filter (M1 unique).
- Replace hydraulic fluid filters.
- Inspect and clean crosswind sensor (M1 unique).
- Inspect Breech Ring Contact Group.
- Check Smoke Grenade Launchers.

ANNUAL

- Inspect and replace, as necessary, plenum-to-engine seal, engine air inlet screen and adhesive (M1 unique).
- Inspect Engine Oil Filter Element.
- Replace Personnel Heater Fuel Water Separator Filter, (if equipped).
- Reverse track assemblies, sprocket wheels, and final drive hubs.
- Inspect sprockets and road wheels for wear.
- Inspect stowage shelves and projectile racks (M992 unique).

(b) M939/M809/M35/M977/M984/M998 tactical vehicles and M1000/M871/M872/M1022/M105/M101/M967/ M969/M1061 trailers will only have wheel service performed every third cycle or when any one of the following conditions exist:

- Visual inspection of wheels indicates seepage around inner seal.
- The correct gear hub hardware in accordance with SOUMs #00-014/00-017 has not been installed.
- Evidence indicates contamination of gear hub oil.
- Vehicle or trailer has been removed from controlled humidity storage and used in an exercise or contingency.
- Vehicle or trailer has more than 500 miles since the last service.
- If any of the mileage is at high speed or off road.

f. Physical inventories will be conducted, property records reconciled, excess equipment turned in, and issue of new equipment accomplished.

g. Other equipment requiring maintenance effort, but not belonging to a scheduled unit set, will be integrated into the fiscal year (FY) maintenance program but referred to a non-cyclic maintenance (NCM).

h. All medical items are maintained by medical logistics personnel and are reconstituted every 5 years or after use. At this time, all non-hospital assemblages will be upgraded to the most recent UAL. DEPMEDS hospitals will be reconstituted every 30 months and will receive any ship-short packages due out. Every 5 years the DEPMEDS hospitals will be reconstituted/upgraded per established fielding schedules.

i. All material will be inspected to assure serviceability (PMCS) requirements of item TM -10/-20 maintenance requirements are met. Additionally, tires will be inspected for serviceability during cyclic maintenance.

j. Maintenance operations for ammunition and munitions will be performed per the PREPO Maintenance Cycle Surveillance Inspection Plan. Technical assistance for this plan is Commander, TACOM- ARDEC, ATTN: AMSMC-MAP-Q, Rock Island, IL 61299-7300. A statement of work for inspection/maintenance of missiles will be prepared by HQ AMCOM and approved by HQ AMC. Periodic inspection and maintenance will be performed during the maintenance cycle. If maintenance is not conducted at the port facility or land-base site, these items will be loaded directly on railcars or trucks for shipment to AMC depots for maintenance. These items may be returned via rail or highway in time for reloading of the ship or replaced.

k. Operational projects and sustainment equipment requiring maintenance will be integrated into the fiscal year (FY) maintenance program.

l. Materiel should be checked for deterioration per Table 3-5.

TABLE 3-5. INSPECTION FREQUENCY OF SUPPLY CLASS IX MATERIEL WITHOUT SPECIFIC SHELF LIFE ASSIGNED

Type Storage	Inspection Frequency
Controlled humidity	60 months
Containers	30 months
Open deck	12 months

This requirement shall be performed during cyclic maintenance and time of issue.

m. During maintenance cycles, shelf-life materiel shall be monitored to ensure materiel does not degrade to an unusable level. The following should be used to identify appropriate condition code changes, if the item is approaching or has passed its next test date:

Type I		*Type II*	
> 6 months	C/C A	> 6 months	C/C A
3-6 months	C/C B	3-3 months	C/C B
0-3 months	C/C C	0-3 months	C/C C
past expiration	C/C H	past expiration	C/C J

n. Chemical or radioactive equipment and materials shall be inspected in accordance with SB 740-94 Series (1 through 13) and SB 3-30-2.

o. Vehicles equipped with thermal imaging systems will power up the thermal unit and time the cool down. If cool down is not attained in 15 minutes, (a cool down light will come on once cool down is completed), a DA Form 2407 should be submitted to maintenance indicating thermal system failure.

p. During maintenance cycles, if equipment must be stored on terrain without adequate drainage, some means will be provided to improve the surface. If unable to improve the surface, refer to TM 38-400 for applications to prevent the equipment from settling into the soil (landing mats, planks, stone, gravel fill, etc.).

q. All sulfuric acid electrolyte (in one gallon plastic bottles) needed to fill dry batteries for operational projects, ground support equipment, or that has not been previously identified will be swapped out during every maintenance cycle. No replacement sulfuric acid containers will be loaded aboard the vessel if, before the next maintenance cycle, the packaging could become more than 5 years old from the date of manufacture.

r. Dry lead-acid batteries with sulfuric acid electrolyte in an overpack will be swapped out during every maintenance cycle.

s. Replacement of extractor parts for the M249 gun, per TM 9-1005-201-23&P, is not required if the gun has not been fired in the last three years.

t. RF tag lithium batteries will be replaced when interrogator indicates low battery.

SECTION V. MAINTENANCE FUNCTIONS FOR WATERCRAFT

3-5. Functions

a. Watercraft will require testing, sea trial, marine condition survey, and dry-docking where practicable. Each item of watercraft will be repaired to –10/-20 maintenance standards/full mission capability, dependent upon current TM availability. Other end-items will be repaired to TM -10/-20 maintenance standards. Exercising will be accomplished during this maintenance period.

b. APS watercraft and associated secondary items (BII, COEI, OBSL, etc.) will be scheduled for cyclic maintenance and represervation every 36 months.

c. Maintenance functions, for watercraft, during the maintenance cycle and during preparation for storage include-

(1) Initial survey, depreservation, in-process survey, and final survey to include trials if necessary.
(2) Function testing of all operational systems to include all safety systems.
(3) Correction of all defects to conform with –10/-20/FMC requirements
(4) Accomplishment of PMCS.
(5) AOAP samples taken for analysis.
(6) Painting.
(7) Equipment servicing.
(8) Preservation for storage.
(9) Arrangement for depot level support, if required work exceeds the site's capabilities.

(10) All equipment improvements including normal MWO application.
(11) Assurance that equipment records are current.
(12) Necessary exercising/dock or sea trials.
(13) Load testing per TB 43-0142.
(14) Inspection of secondary items.
(15) Repackaging of secondary items to include replacement of damaged or obsolete items.

d. Maintenance functions while forward stored include-

(1) Surveillance inspections for COSIS applications.
(2) Conduct COSIS.
(3) Urgent and limited urgent MWO applications, as practical.
(4) Installation of deferred maintenance parts and components, as practical.
(5) Upload of items not requiring maintenance effort.
(6) Check of all shelf-life items and replacement as appropriate.

e. Maintenance functions to be performed by the OPP during issue include-
(1) Required depreservation.
(2) Battery checks, installation, and services.
(3) Fueling.
(4) Activation of all operational systems.
(5) Preoperational PMCS.
(6) Calibration.
(7) AOAP samples taken.
(8) Conduct of serviceability/operational testing.

CHAPTER 4

QUALITY ASSURANCE

SECTION I. POLICY

4-1. General.

a. This chapter addresses Quality Assurance (QA) requirements for APS storage and maintenance operations.

b. Each APS site will have an identifiable QA program in accordance with contractual requirements.

c. ISO 9002 or ISO 9001-2000 are the preferred quality program to be implemented on APS contracts and at APS sites.

d. A QA element at each APS site will be designated as having responsibility for ensuring the quality of materiel maintained, repaired, or stored at that site.

e. QA staffing must be adequate to ensure the requirements of this manual are fulfilled.

f. The QA specialist/representative will be organizationally independent of quality control, maintenance, and storage personnel.

SECTION II. PROOFING THE PROCESS

4-2. Process proofing requirements.

a. The purpose of process proofing is to ensure the adequacy of a process to consistently produce conforming products and to identify opportunities for process improvements.

b. QA personnel will proof the adequacy of the site operator's processes at least annually in the various commodity shops (e.g., wheeled, tracked, communications-electronics, preservation, etc.) prior to normal cyclic maintenance activities or prior to repair activities not associated with cyclic inspections. Proofing the process entails determining whether the inputs (people, methods, tooling, equipment, and materials) being employed at each stage of a process are adequate to achieve the desired outcome. Skill levels are assessed against the process needs; work instructions are examined for adequacy, measuring and test equipment is examined for proper type and calibration status; other maintenance equipment is examined for capability to meet specified tolerances and requirements; purchased materials are examined for proper type and shelf-life; and the process outcome measured against the specified parameters. The results of such process proofing will be documented in a convenient format.

c. Process proofing will provide confidence in those established practices, which are in place, and provide an opportunity for early identification of problems.

Section III. Quality Audits

4-3. The audit function

a. Quality audits will serve as a preventive tool designed to evaluate systems and processes. These audits will be performed by QA specialists/representatives on a scheduled basis to verify whether operational maintenance and supply activities comply with planned procedures.

b. QA system audits will be conducted at least annually. Audit frequency will be increased on an indication of a process or system breakdown. Checklist questions will be developed using the quality directives, policy guidance, this manual, and equipment technical manuals, as applicable.

c. Product audits will be performed by the QA staff to verify decisions made by personnel performing the QC function. Product audits will be performed on a regular basis and can serve as a basis for QA acceptance in lieu of one hundred percent inspection of each and every item. Product audits and procedural reviews shall be conducted on an interval determined by the QA staff at each site. Intervals will be adjusted as necessary to provide confidence that product quality meets established requirements.

Section IV. Procedures Review and Evaluation

4-4. General

a. Procedures will be evaluated prior to and/or during cyclic inspections and subsequent maintenance activities to ensure adequate coverage of the QA program.

b. Written quality and operations procedures will be evaluated to determine if-

(1) All required instructions are available, clear, complete, adequate, and current.

(2) Procedures outline or make reference to specific instructions for initial, in-process, and final or acceptance inspections as required by technical specifications.

(3) Procedures specify responsibilities of operating element.

(4) All applicable references are listed for each procedure.

(5) New procedures were staffed through the QA organization.

c. Reports. Procedure reviews and evaluations will be documented for the commander of the activity surveyed. This report will give findings and recommendations for each area reviewed.

Section V. Internal Quality Data

4-5. Data collection and use

a. Internal quality data feedback includes all reports prepared incident to inspection required by this TM.

b. Maintenance quality data collection activities will extract data from DA Form 2404 (Equipment Inspection and Maintenance Work sheet) as prescribed in DA Pam 738-750. Data will be collected using automated systems and/or official forms or locally developed forms.

Section VI. External Quality Data

4-6. General

a. External quality data feedback includes all formal and informal reports forwarded or received by an organization, which identify existing or potential quality problems.

(1) Feedback data received is mainly generated from receiving activities incident to quality problems relating to the mechanical/physical condition of items, inadequate preservation/packing, and/or incomplete or missing documentation.

(2) Informal quality data feedback such as telephonic notifications will be included in the program evaluation process.

b. SF 368, Product Quality Deficiency Report (PQDR).

(1) An SF 368 will be prepared and distributed as required by DA Pam 738-750 to report:

(a) Quality deficiencies in equipment.

(b) Deficiencies due to design, manufacturing, overhaul, or maintenance.

(c) Suggested ideas or recommendations for improvements to equipment.

(2) Specific conditions requiring an SF 368 are-

(a) A condition in or with equipment that is dangerous to personnel, other equipment, or missions.

(b) An item or equipment that does not work properly or last as long as it should due to bad design or materials.

(c) Items that are not within the size, material, hardness, finish, or performance limits of the approved equipment specifications.

(d) Low-quality workmanship.

(e) Dangerous situations due to incorrect or missing data.

(f) Maintenance problems.

(g) Conditions that prevent personnel from using the equipment.

(h) Repeated problems that require an excessive amount of time to solve.

(i) Problems asked to be reported by the National Maintenance Point. When such requests are made, the SF 368 is used to identify the problem and its nature.

c. SF 364, Supply Discrepancy Report (SDR)-Shipping.

(1) SDRs must be prepared within 15 calendar days of receipt of materiel from DOD activities and General Services Administration (GSA) supply distribution facilities per AR 735-11-2 whenever.

(a) Identity or condition of materiel received is found to be other than shown on the shipping document.

(b) In-checking reveals shortages or overages in excess of $100 per line item. A No dollar limitation exists on sensitive or classified materiel.

(c) Supply documentation is missing or is found to be improperly completed.

(d) Materiel is misrouted or shipped to the wrong activity.

(e) Any of the other conditions stipulated by AR 735-11-2 are discovered.

(2) Activities receiving SDRs will investigate their files and/or operation to determine the validity of the alleged discrepancy. Action will be taken to correct or to prevent recurrence of shortcomings validated during the investigation. The complainant should, in each case, be advised within 75 calendar days, in writing, of the results of the investigation.

d. SF 364, Supply Discrepancy Report (SDR)-Packaging. Packaging discrepancy reports will be prepared and distributed in accordance with AR 735-11-2 to report generally unsatisfactory conditions including item damage or loss, resulting from improper packaging when the estimated or actual cost of correcting the deficiencies exceeds $50. In addition, a packaging discrepancy will be reported when any of the following deficiencies exist, regardless of the cost of correction:

(1) Improper identification of containers or items that requires opening the container or results in improper storage of the material.

(2) Improper identification marking of items, packages, or containers, including dangerous/hazardous material.

(3) Any deficiencies in packaging involving dangerous/hazardous material.

(4) Repetitive packaging deficiencies which impose a significant burden on receiving, storage, or transshipping activities or any other deficiencies cited in AR 735-11-2.

e. SF 361, Transportation Discrepancy Report(DISREP). Quality personnel will provide technical support to the local transportation officer (TO) to enable the preparation of DISREPs, whenever suspected transportation-type discrepancies are discovered (e.g., concealed damage). Technical support will consist of furnishing data not normally available to the TO such as inspection reports, pricing data, repair costs, references to specification, etc.

Section VII. Data Evaluation

4-7. Review and Analysis of Quality Data

a. Quality data will be compiled and analyzed on a monthly basis unless apparent problems require more frequent analysis. Analysis will be made of data collected from internal feedback such as quality control inspections results/reports, product and quality system audit, process proofing, and procedures review. External data such as customer complaints will also be included in the monthly quality data review and analysis.

b. When a problem area is identified, the QA specialist will notify the responsible activity in writing. If the data indicates a need, the QA specialist/representative will perform the appropriate review or audit included in this chapter to identify and isolate the problem.

c. The analysis of data will be made to identify repetitive defects, excessive variations in product quality, rework costs, etc. Corrective actions and root cause analysis will be pursued and technical assistance will be offered to prevent and eliminate repetitive problems.

d. QA managers will perform a formal, regular, and thorough analysis of quality information covering as a minimum-

(1) Favorable and unfavorable trends.

(2) Comparison data with past performance for significant deviations.

(3) New and/or recurring problems.

(4) Dollar value or other expenditure involved.

(5) Information regarding type of defects/deficiencies.

(6) Corrective actions initiated/taken.

(7) Root causes of defects/discrepancies/ deficiencies.

(8) Significant contributors for favorable/unfavorable performance shown.

e. Adjustment of inspection effort will be accomplished as warranted by results of quality data analysis.

CHAPTER 5

PREPARING EQUIPMENT FOR STORAGE, (PHASE I)

SECTION I. POLICY

5-1. General

a. Preparation of equipment involves those actions necessary to ensure equipment allocated to APS is properly prepared and ready prior to placement in storage. These requirements may include disassembly and/or removal of certain components for processing and segregated storage (see chap 2, sec V), and performance of preservation tasks. This chapter contains instructions for these actions.

b. The preservation instructions herein are for equipment, which will be stored in a CH or non-CH storage environment. CH includes CH flexible covers, containers with dehumidification equipment, or other structures or conveyances, which will provide CH environment. For equipment/vehicle systems not specifically identified herein or elsewhere in this document, reference that item's applicable technical manual containing Administrative Storage requirements for information on preparation for storage.

c. Equipment and supplies that will be containerized will have military preservation and will be packed to Level A or B as required by the engineering design activity.

SECTION II. INSPECTION

5-2. Inspection requirements

a. All APS receipts will be subjected to a quality system that satisfies program objects and meets requirements of ISO 9002, ISO 9001-2000, or equivalent quality system model and includes testing, exercising, and maintenance.

b. All APS equipment will be subjected to an initial receipt inspection in accordance with the equipment's TM -10/-20 level technical manuals. Inspections shall include checks for MWO application, safety of use message inspections, AOAP results, calibration, and load testing. The Army Modification Management Information System (MMIS) database will be checked for accuracy based on these inspections and corrected as necessary.

c. All inter-modal containers will be inspected per MIL-HDBK-138B. All containers must be certified under the provisions of the International Convention for Safe Containers (CSC). All ISO containers that move in the DTS must be certified to meet 49 CFR and CSC/46 U.S.C. app. 1503 standards. Activities possessing DOD container(s) that transit the DTS will inspect, reinspect, and perform organization (user) level maintenance on containers, as needed. Inspectors qualified to certify that containers meet 49 CFR and CSC/46 U.S.C. app. 1503 standards will visually inspect containers for damage and/or serviceability before stuffing to ensure safe movement. Loaded containers will be visually inspected at each transit node. In accordance with AR 56-4, receipt, certification, repair, and movement of all inter-modal containers will be reported to LOGSA PSCC Army Intermodal and Distribution Platform Management Office (AIDPMO), 11 Hap Arnold Boulevard, Tobyhanna, PA 18466-5097, email- aidpmo@logsa.redstone.army.mil, FAX DSN 795-6678, Commercial 570-895-6678.

d. Preservation inspection for all APS materiel will be accomplished in accordance with MIL-STD-2073-1, Appendix G, Table G1 and as specified herein.

e. Reference Table 3-5 for inspection criteria for Supply Class IX items without shelf-life.

f. Mounted track, roadwheels, and sprockets will have a minimum of 50% of original thickness remaining. Unmounted track will be a minimum supply condition code B (Serviceable) in accordance with TM 9-2530-200-24, Standards for Inspection and Classification of Tracks, Track Components, and Solid-Rubber Tires.

g. Howitzer and M-1 Main Gun tubes will have a minimum of 500 rounds of effective full charge remaining.

h. Combat identification panels, weapon mounts, and radio installation kits will be installed/mounted on end items.

i. Tires will be replaced with less than 75% of the tread life or with any visible sidewall damage.

SECTION III. SPECIAL PROVISIONS

5-3. General

a. When vehicles are to be placed in outdoor storage, electronic gear such as radios, telephones, etc., should be removed by qualified personnel and stored in a warehouse.

b. Components separated from major end items by removal or disassembly will be tagged or marked with the identification of the component(s) and the identification and storage location of the major end item. The end item will also be marked or tagged showing the storage location of the removed component(s).

c. Vehicles being staged for loading on APS 3 vessels in outdoor storage for longer than 45 days will have electronic gear removed and stored in a warehouse. If materiel is to be stored outdoors for longer than 120 days waiting to be loaded on APS 3 vessels, the site must contact the appropriate MSC APS office for special preservation, exercising, and maintenance requirements.

d. Pneumatic tires.

(1) All pneumatic tires will be maintained at operating pressure. Tires left flat for an extended time period will be replaced.

NOTE

Tires will be inspected for serviceability during cyclic maintenance and during scheduled warehouse/ship surveillance inspections.

Take special precautions during fueling to avoid spills and ensure tires exposed to fuel are immediately cleaned.

(2) Tires will be replaced based on condition using the guidelines contained in TM 9-2610-200-14, Standards for Inspection and Classification of Tracks, Track Components and Solid-Rubber Tires; TM 9-2530-200-24, Operator's Unit, Direct Support, and General Support Maintenance Manual for Care, Maintenance, Repair, and Inspection of Pneumatic Tires and Inner Tubes; and end item TM -10/-20 operating manuals.

(3) Retread tires can be used, except where restricted in AR 750-1.

(a) Buses will not be operated with retread tires on the front wheels.

(b) M911, M916, M920, M915, and M915A1, heavy hauler truck trailer vehicles will not be operated with retread tires on steering axles.

(c) Do not use retread tires on any vehicle equipped with a Central Tire Inflation System.

(d) Patriot Missile Trailer or any large missile system and its prime mover will not use retread tires.

(e) Do not use retread, bias ply, non-directional cross-country tires on any vehicle.

(4) The following is a guide to reading the date of manufacture for off-road tires sold by our major suppliers: (Armstrong, Goodyear, Bridgestone/Firestone, Cooper, General and Michelin):

(a) Each manufacturer, with the exception of Michelin, has molded a serial number into the sidewall of each tire. However, there are some differences among them, which are noted below.

(b) Bridgestone/Firestone: Bridgestone/ Firestone serial numbers are normally 9 characters in length and usually begin with a letter (often the letter Y). The second position of this number indicates the year of manufacture, e.g., serial number Y61234567, would indicate a tire manufactured in 1996.

(c) Goodyear. Each Goodyear off-road tire has a serial number beginning with the letters MJ or MC. The last three numbers of which indicate the week and year of manufacture, e.g., a tire with serial number MJ1234567236, was manufactured during the 23rd week of 1996.

(d) Cooper. Cooper brand off-road tires, have a ten-digit serial number. The last three digits of the serial number indicate the week and year of manufacture, e.g., a Cooper tire with the serial number 1234567205, was manufactured during the 20th week of 1995.

(e) General: General uses a 9 position alphanumeric code, with the last three characters representing the month and year of manufacture. General is different from the other manufacturers, in that the seventh character, representing the month of manufacture, is a letter, rather than a number. Using this code, the first letter of the alphabet represents the first month of the year and the second letter of the alphabet represents the second month, etc. The last two characters are numbers representing the year of manufacture. For example, a code readiig-01479BK96, indicates a tire manufactured in the 11lth month, since the letter K is the 11th letter of the alphabet, and the year of manufacture is 1996.

(f) Michelin: Michelin has no serial numbers on its off-road tires that would indicate the date of manufacture. Look for a DOT Code. All highway type tires sold in the United States must have a DOT (Department of Transportation) Code molded into their sidewalls. The DOT Code has 13 characters and always begins with the letters DOT. The last three positions of this code indicate the week and year of manufacture, e.g., a tire with the DOT Code, DOT CH EV HU4 501, was manufactured during the 50th week of 1991.

(g) Armstrong: Assuming these tires do not have DOT codes, look for a 6 character code, which begins with the letter C. The last 3 characters of this code indicate the week and year of manufacture, e.g., CFX526 = the 52nd week of 1996.

NOTE

Tires identified as manufactured by United Tire shall be removed and destroyed.

NOTE

Fuel contamination on tires will cause a problem. Sidewalls will appear swollen, soft and spongy. In extreme cases, sidewalls may be undulated or distorted. Petroleum odor may be evident. If contamination is slight, use soap and water immediately after exposed to the contamination. This may help, but once the sidewall becomes spongy it cannot be restored by cleaning. If there is a difference in stiffness or distortion in one sidewall when compared with the other, scrap the tire. The "damage" is in changes to the chemical properties of the rubber and the bonding between rubber and non-rubber components.

e. Fire control systems will be purged and charged per applicable TMs. Prior to placing in storage complete fire control systems serviceability checks will be performed in accordance with applicable TMs. Additionally, synchronization and alignment will be performed.

CAUTION

Check to assure that cylinder pressure does not exceed capacity of the pressure regulator. Disconnect nitrogen cylinder and place caps on right- and left-hand valves.

f. Lifting devices will be inspected for damage, leaks, or other deterioration during cyclic maintenance and will be tested per OSHA standards and TB 43-0142.

g. Padlocks in open storage will have their interiors coated with MIL-PRF-32033.

h. Vehicle batteries. All APS-3 equipment will use AGM or gel batteries to the maximum extent possible. All ground mobility equipment in APS-3 that contain flooded lead acid batteries, e.g. 6TMF, will have batteries replaced every maintenance cycle with the latest configuration military battery.

i. Bulk Fuel Tankers (M967,M969, & M978). If the fuel tanker has residual JP-8, and there has been no contamination of the system and no tank maintenance is required, there should be no need to clean or purge the tanker. Guidance on fuel reuse, disposal, recycling, etc., will be provided by the Army Petroleum Center. Every maintenance cycle all fuel tankers must be inspected and TM -10/-20 maintenance performed following all safety requirements of the appropriate TMs, PMCS accomplished, leak tested following requirements for test and inspection in CFR Title 49, Para 180.407 utilizing Vapor Integrity Test Kit Procedures. The tank must then have the same fuel that the tanker will be filled with, flushed thru the tanker system to verify that there are no leaks in the seals, fittings, valves, pumps, etc.. Load JP-8 fuel in accordance with appropriate vehicle TM (the amount of fuel is 150 gallons for the 960 Series tankers and 313 gallons for the M978s). Drain system completely by opening all valves, drain cocks, lift/incline front/rear of vehicle, etc.. Remove filters, fuses, etc. prior to preservation. Install unused filters, fuses, etc. after preservation. Close all drains, valves, and install all caps on piping to prevent contamination. Close and secure hatches.

j. When Bradley Fighting Vehicles are placed in outdoor storage, cover the top of the vehicle with a tarpaulin to keep water from entering which could damage the electronics in the TOW 2 Subsystem.

k. Modular Causeway Systems (MCS). Refer to the Preparation for Storage and Shipment TMs for the sub-systems of the MCS. Contact US Army TACOM, War Reserve Office, AMSTA-LC-CIPRW, Warren, MI 48397-6571, for specific manual needed.

SECTION IV. CLEANING PROCEDURES

5-4. Cleaning Procedures

a. Cleaning mobile equipment Exterior and interior surfaces, including hulls, turrets, cabs, and bodies will be free of dirt, grease, and other contaminants Contamination removal will be accomplished by any method which will not damage equipment. Wash off mud and dirt and remove stones and debris from suspension, wheels, tracks, and so forth.

CAUTION

Do not direct stream of water or steam under pressure against exterior mounted air cleaner, the opening between the hull and turret, grilles, exhaust deflectors, fire control devices, armament systems, communications equipment, and surfaces protected with rust proofing materials.

b. Cleaning material other than mobile equipment.

(1) Cleaning will be accomplished by any method not determined detrimental to the item. It will not be necessary to remove discoloration or etching that, in some cases, will be evident after rust and corrosion removal.

(2) Cleaning items or surfaces to be preserved with an oil- or grease-type preservative will be accomplished by use of MIL-PRF-680 petroleum solvent.

NOTE

A list of commercially available substitute cleaners/degreasers is included at the end of this section.

(3) Clean leather goods with saddle soap and clean warm water. Clean metal components such as rivetsand buckles with a wire brush. Protect adjacent leather from scratching by using a sheet metal guard. Allow leather to become thoroughly dry. Apply a light coat of neat's-foot oil.

(4) Optics will be cleaned using the following:

Materials and Equipment	*Specification*	*Materials and Equipment*	*Specification*
Alcohol, ethyl (ethanol)		Cloth, absorbent	
Brush, camel hair		Paper, lens tissue	A-A-50177
Cloth, cotton cheesecloth	CCC-C-440	Syringe, rubber	
Cloth, cotton batiste	A-A-50185	Sticks, orange (tongue depressor) or equal	

(a) Remove loose particles of dust from the optic surface with a camel hair brush.

(b) Wipe the optical surface in a circular motion using lens paper or cheesecloth saturated with alcohol.

CAUTION

Only lens tissue or batiste cloth is to be used for plastic optic lens components. Surface will be dried by wiping with clean cotton or lens paper.

(c) Fabricate a swab by wrapping one piece of lens tissue around the end of an orange stick and add two drops of alcohol. The swabbing operation will begin at the center of the polished surface with a light downward pressure and circular motion. Gradually increase the radius being cleaned until the entire surface has been swabbed. Repeat until all traces of dirt, lint, or smears have disappeared.

(d) A rubber syringe may be used as a bellows to remove residual dust or lint from cleaned surfaces.

(e) Immediately after cleaning, cover optics with A-A-50177 lens paper, and secure with tape or NAS833 or NAS836 plastic caps where applicable.

CAUTION

Failure to remove surface dust from optical elements before cleaning with solvent will cause scratches on the surfaces. All fingerprints and smudges shall be removed upon discovery to prevent optical etching by body acids.

(f) If surface contamination cannot be removed by using ethyl alcohol, cleaning shall be accomplished by using a solution consisting of 2 ounces detergent and one gallon of distilled water. Using a swab made of lens tissue conforming to A-A-50177, wash the optical glass surfaces with the cleaning agent described above. Washing shall be repeated, using a clean swab each time, until the surfaces are free of dirt, grime, or foreign materials. Cleaning shall be accomplished with a minimum of pressure and rubbing, without the use of cloth or rubbing materials, to prevent damage to lens coatings.

NOTE

Clean, talc-free, surgical finger cots shall be worn when handling optical elements.

(5) Electronic and other similar devices which might be damaged by cleaning solvents will be cleaned by dusting (that is, wiping with clean rag, using soft brush, or blowing with low pressure compressed dry air).
If additional cleaning is required, the cleaning materials referenced in TB 43-0135 shall be utilized.

(6) Communications and electronics shelters and electronics vans or semi trailers will be cleaned with a vacuum cleaner.

(7) Items exposed to burned powder residues will be cleaned by using MIL-PRF-680, Type III, petroleum solvent, scrubbed with a nonmetallic bristle brush saturated with a MIL-PRF-372 bore cleaner, rinsed in a clear petroleum solvent, and then drained.

WARNING

Some cleaning solvents have a 100 degree F. flash point. There should be no smoking in the area where solvents are used or stored. Goggles or face shields should always be used to protect the workers' eyes. Do not handle cleaned items with bare hands. Proper ventilation must be present when using cleaning solvents.

c. Cleaning of fuel tankers. Many different fuel tanker cleaning methods exist. Commonly used methods are water displacement, pressure washing, steaming, ventilation, and chemical. Within these broad categories there are many variations. The type of cleaning required may vary depending on the product carried by the tanker, the type of tank (e.g., stainless steel, Teflon-coated steel), and the purpose for cleaning. For long-term storage/preservation the following methods are recommended:

(1) Stainless steel tanks. For stainless steel tankers the steam cleaning process is the preferred method as specified in FM 10-67-1, Concepts and Equipment of Petroleum Operations. TM 9-2330-356-14, Operator's Unit, Direct Support and General Support Maintenance Manual for Semi trailer, Tank: 5000 Gallon Bulk Haul, Self-Load/Unload M967, M967A1; Fuel Dispensing, Automotive M969, M969A1; Fuel Dispensing, Under/Overawing Aircraft M970, M970A1, contains an acceptable alternative method for steam cleaning stainless steel tanks.

(2) Teflon-coated tanks. Steam cleaning this type of tank with water exceeding 140 degrees F is not authorized. Pressure washing is the preferred method that will be used. Use a high-pressure solution of heated water and solvent for maximum effectiveness. As an alternative, the chemical method contained in TB 43-0212, Purging, Cleaning and Coating Interior Ferrous and Terne Sheet; Vehicle Fuel Tanks, is authorized.

NOTE

Other processes are used by commercial cleaning companies, but should only be used after careful consideration. The use of water washes with detergent or other cleaning compounds have been used, however, it should be used with care because of potential adverse effects on the filter elements and tank linings. Care is also needed to ensure that cleaning products are not left in the valves, outlet pipes, and other parts of the interior of the tanker.

d. Purging of fuel tankers. The preferred method of purging is to use a solvent wash, and then a hot water rinse. Immediately after the hot water rinse, the tanker must be drained of all water and dried with hot air. Prior to any tank maintenance, a vapor reading of 0.0 is required. The American Petroleum Institute, Publication 2013, FM 10-67-1, and TB 43-0212 all contain guidance on how to safely vapor-free and clean mobile tanks used in the transportation of flammable liquids. TACOM Ground Precautionary Message, Control Number 94-02, Maintenance Advisory, provides proper guidance for purging fuel tankers using a biodegradable purging solution, NSN 7930-01-350-7034 or NSN 7930-01350-7035.

e. Cleaning of battery cables and battery box. Remove batteries from equipment and clean batteries, clamps, supports, retainers, and battery box using A-A-289 acid swabbing brush or equivalent and a solution of one-half pound of ASTM-D928, sodium bicarbonate, to one gallon of water. Flush with clean water and dry. See guidance in TM 9-6140-200-14.

SECTION V. DRYING

5-5. Drying methods

Immediately after cleaning, item(s) will be thoroughly dried. Drying will be accomplished by one or more of the following procedures, which will not be harmful to the items:

a. Application of prepared dry and clean compressed air to items.

CAUTION

Use an oil/water separator compressed air supply lines. Separator should be located as near as possible to the air outlets, but in no case more than 50 feet away. Separator should be drained frequently.

b. Wiping the items with clean, dry, lint-free cloths or specially prepared wiping papers.

c. Application of heat using ovens, infrared lamps, or portable duct heaters.

SECTION VI. MILITARY PACKAGING

5-6. Military preservation and packing

Preservation of secondary items shall be in accordance with MIL-STD-2073-1 and the Special Packaging Instructions for that item. Packing shall be Level A or B. Commercial packaging in accordance with ASTM-D3951 may be used if it will satisfy the mission requirements.

SECTION VIII. LUBRICATION

5-7. General requirements

a. Equipment will be lubricated per the applicable lubrication order (LO), with the following exceptions:

(1) In lieu of operational oils as specified in LOs, use preservative oils of the same viscosity. If the operational oil specified in any component is MIL-PRF-2104, the oil should be changed to a comparable grade of preservative oil conforming to MIL-PRF-21260.

(2) Turbine engines will utilize the corrosion inhibited type oil under MIL-PRF-23699. The NSNs for this are as follows:

Container	*NSN*
- 8 OZ	9150-00-180-6266
- 1 QT	9150-00-985-7099
- 55 GL	9150-00-681-5999

b. Commercial off the Shelf (COTS) products may be substituted, only when approved through the waiver/deviation process, for specification preservatives.

SECTION VIII. MINOR REWORK

5-8. General requirements

a. Prior to spot painting, stage I, II, and III corrosion will be removed by approved mechanical or chemical means. Stage IV corrosion is not considered minor rework and applicable equipment technical manuals should be consulted.

b. Chemical agent resistant coating (CARC) spot painting will be performed in accordance with guidance in MIL-DTL-53072, CARC System Application Procedures and Quality Control Inspection, TB 43-0242, CARC Spot Painting, and TM 43-0139, Painting Instructions for Army Materiel, and environmental regulations. Communication-Electronics equipment shall not be painted CARC unless specified in the individual equipment TM.

c. When spot painting camouflaged equipment, the color of the original pattern will be used.

d. Determination to fully repaint equipment will be based on DALO-AMZ message dated 060808Z March 2000, Subject: New Policy for the Determination of When to Repaint a Vehicle with Chemical Agent Resistant Coating (CARC).

NOTE

Unless specifically stated, the CH storage requirements in Section 5-9 through 5-15 below will be accomplished for all equipment in controlled temperature and relative humidity storage. Equipment stored in other than controlled temperature and relative humidity conditions will use the non-CH storage requirements. When there is only one requirement identified, it is to be used for both storage environments.

e. The paint color for APS-3 (Prepo Afloat)/Army Regional Flotilla (ARF) equipment stationed in Diego Garcia (ARF-3) and APS-5 is tan. The paint color for APS-3 equipment stationed in the Pacific (Guam/Saipan (ARF-1), the Mediterranean (ARF-2), and APS-4 is camouflage woodland.

f. Equipment will be marked with UIC identification. UIC will appear on both the front and rear of each vehicle. Suitable surfaces include bumperette, tailgates, fenders, etc. and may be used provided the UIC marking does not conflict with location and legibility of other markings. Locate markings on the right side of the front and rear of the vehicle, centered vertically on a suitable surface. The markings will be uniform letters and numerals of the largest size practical, but not to exceed four inches in height as directed by the TB. Equipment currently marked with correct UIC will not be remarked until a change in UIC or repairs occur which obscure the current markings.

SECTION IX. TANK/AUTOMOTIVE

5-9. Detailed preservation requirements

The procedures in this section are in addition to the general preservation instructions in paragraphs 5-3 through 5-8. Storage of the material as prepared in this section is restricted to a Controlled Humidity (CH) environment unless approved for non-CH storage by the AFSC. All TACOM equipment, supply class VII items, in a non-CH environment shall be packaged in accordance with Preservation, Packaging, Packing, and Marking Plans; Special Packaging Instructions; or unique NSN specific requirements tailored to the storage site and mission needs. These instructions shall be obtained from TACOM, War Reserve Office, AMSTA-LC-CIPRW, Warren, MI. 48397-5000, DSN 786-6571.

a. Miscellaneous vehicle components.

(1) CH and Non-CH Storage.

(a) All exterior, unpainted surfaces including steering assemblies, tie rods, adjusting rods, springs, pintle assemblies, fifth wheel plates, kingpins, trailer landing gear, stabilizing jacks, and drawbar surfaces exposed by disassembly will be coated with MIL-PRF-16173, GR 4 preservative, or MIL-PRF-10924, as appropriate. Winch cables will be coated with MIL-PRF-16173, GR 1 for non-CH storage. For CH storage, coat winch cables with MIL-PRF-10924 or MIL-PRF-18458. Surfaces or areas that require lubrication per the TM do not require additional protection.

(b) All exposed oil lubrication points such as, but not limited to, levers, locking bars, strikers, hinges, hinge pins, locking pins, pintle pins, locking levers, wing nuts, linkage, and threaded ends of yokes and related clevis pins will be lubricated with oil conforming to MIL-PRF-21260, grade PE 15-40, MIL-PRF-32033, or COTS approved preservatives (see paragraph 5-7b). Working mechanism of padlocks, latches, door locks, hand operated locking knobs, and other working mechanism will be lubricated with MIL-PRF-21260, grade PE 15-40, MIL-PRF-32033 or the COTS approved preservatives. Surface or areas that require lubrication per the TM do not require additional protection.

(2) Where practical and the storage plan allows, store hydraulic cylinders in the fully retracted position that is the normal locked and stored position for the equipment. Hydraulic systems will be filled to operating level with operational fluid as specified in the LO. Exposed surfaces of the hydraulic ram will be coated with MIL-PRF-10924 (GAA) grease. Wrap MIL-PRF-121, and secure the wrap with tape. Where the ram will be exercised during the cycle, affix a tag on the hydraulic ram to have the grease cleaned off the exposed surface of the ram prior to exercising. This is necessary to prevent the ram seal from being damaged by contaminated grease or grease that has hardened.

CAUTION

MIL-PRF-32033 will not be used when preservative may come in contact with diesel fuel (e.g., fuel caps). Corrosion inhibitors in this preservative oil, when mixed with diesel fuel, can generate corrosion problems. MIL-PRF-21260 will not be used on silver surfaces for the same reason.

b. BII/OVE/COEI: Each vehicle shall contain the authorized equipment for operation, maintenance, safety, and the welfare of the crew. All BII, OVE, & COEI will be inventoried, inspected for serviceability, replenished, represerved, and repackaged. The equipment will be stored in the vehicle storage locations where the parts can be secured and will not damage the item or the vehicle. Loose components that are not stored in the normal storage location will be packaged and packed to protect the contents. BII will be separate from OVE and COEI and will normally be over packed in wood boxes and secured in or on the vehicle to prevent damage. All vehicle TMs, lube orders, support publications, operating logs, and other required records shall be inventoried, replenished, packaged, and stowed in the vehicle. Wherever possible, stow in map compartment or toolbox.

c. Cooling Systems. Vehicles basically have two types of cooling systems-liquid and air. Air-cooled engines require no special preservation procedure. Cooling systems will be protected as specified below.

(1) In 1997, CID A-A-52624 was adopted to replace Military Specifications MIL-A-46153 entitled Single Package, Heavy Duty, Inhibited Ethylene Glycol Antifreeze and MIL-A-11755 entitled Arctic-Type Antifreeze. If your system currently uses either of the MIL spec antifreezes listed above, the antifreeze should be flushed out of the system and replaced with CID A-A-52624 equivalent antifreeze. Detailed instructions for draining, cleaning, and flushing cooling systems are given in TM 750-254 (Cooling Systems: Tactical Vehicles).

(2) The following requirements apply to either a 60/40 or 50/50 antifreeze solution consisting of either Ethylene glycol and water or Propylene glycol and water meeting CID A-A-52624, Antifreeze Multi Engine Type. The 60/40 solutions are recommended for Arctic conditions while the 50/50 solution is a viable, less expensive solution for most other conditions. These solutions (A-A-52624) may be retained in engine cooling systems for an extended period of time provided the coolant meets the following requirements:

(a) Type I (ethylene glycol-green) - Freeze Point -62°F (-52°C) and the Nitrite level requirements minimum of 1200-1400ppm.

(b) Type II (propylene glycol-purple) - Freeze Point -56°F (-49°C) and the Nitrite level requirements minimum of 1200-1400ppm.

(c) Testing antifreeze. Antifreeze shall be checked during the scheduled maintenance cycle. Testing of the system coolant shall include the following:

1. Test the Antifreeze Nitrite concentration by using antifreeze test strip that meets the requirements of CID A-A-51461C (TEST KIT, TEST STRIPS AND COLOR CHART, ANTIFREEZE, FREEZE POINT AND NITRITE CONCENTRATION) TYPE II Ideal Nitrite concentration is between 1200 and 1400 PPM

NOTE

Corrosion protection characteristics of CID A-A-52624 antifreeze cannot be tested with reserve alkalinity test strip. Coolant supplied under CID A-A-52624 must be tested for nitrite concentration rather than reserve alkalinity

2. An Antifreeze and Battery Tester, NSN 6630-00-105-1418 can be used only for freeze point test.

3. The Antifreeze Freeze Point and Corrosion Test Kit (NSN 6630-01-011-5039) will still provide reliable results when testing either antifreeze solution. Alternatively, an Antifreeze Coolant and Battery Tester (NSN 6630-01-105-1418) will also work.

4. Visual inspection for coolant cleanliness, including excessive rust, foreign particles, and/or sediment.

(3). **All antifreeze solutions must be premixed before adding into cooling system.** Never top off cooling systems for vehicles in war reserve storage with 100% antifreeze or with 100% water. 100% antifreeze is highly corrosive. 100% water will reduce freeze point protection, degrade corrosion inhibitor protection, and reduce nitrite concentration. However, 60-40 pre-mixed antifreeze is available through DLA that does not require mixing with water.

(a) Antifreeze meeting MIL-A-46153 is compatible with antifreeze meeting A-A-52624 however, it is not recommended because at some point the antifreeze will not pass either the alkalinity test or the nitrite test.

(b) Antifreeze must be changed and recycled when it fails the testing. Commercial test strips are available and can be used for nitrite level testing. Sources of commercial nitrite test strips include Penray “2-Way Glycol and Nitrite Test Strips for Heavy Duty Engines,” Part Number TS-100; Fleetguard “3-Way Test Strip,” Part Number CC2602; and Detroit Diesel Corp. PowerTrac “3-Way coolant Test,” Part Number 23522774. Other brands may be used provided that the strip tests for nitrite level in engine coolant.

(c) National Stock Numbers (NSNs). NSNs for virgin and recycled antifreeze are shown on tables 5-1 and 5-2.

Table 5-1: Virgin/New Antifreeze

CID Type	Glycol Type	Container Size	NSN
I	EGAF 100%	1 Gal	6850-01-441-3218
I	EGAF 100%	5 Gal Co	6850-01-441-3221
I	EGAF 100%	55 Gal Dr	6850-01-441-3223
I	EGAF 100%	1 Quart	6850-00-664-1399
IP	EGAF 60%	1 Gal	6850-01-441-3234
IP	EGAF 60%	5 Gal Co	6850-01-441-3240
IP	EGAF 60%	55 Gal Dr	6850-01-441-3248
II	PGAF 100%	1 Gal	6850-01-383-4068
II	PGAF 100%	5 Gal Co	6850-01-441-3257
II	PGAF 100%	55 Gal Dr	6850-01-383-3918
II	PGAF 100%	Box/6 1gal Co	6850-01-383-4244

Table 5-2: Recycled Antifreeze

CID Type	Glycol Type	Container Size	NSN
I	EGAF 100%	1 Gal	6850-01-464-9125
I	EGAF 100%	5 Gal	6850-01-464-9137
I	EGAF 100%	55 Gal Dr	6850-01-464-9152
IP	EGAF 60%	1 Gal	6850-01-464-9266
IP	EGAF 60%	5 Gal Co	6850-01-464-9263
IP	EGAF 60%	55 Gal Dr	6850-01-464-9096
II	PGAF 100%	1 Gal	6850-01-464-9131
II	PGAF 100%	5 Gal Co	6850-01-464-9107
II	PGAF 100%	55 Gal Dr	6850-01-464-9124
50/50	EGAF 50%	1 Gal	6850-01-471-6530
50/50	EGAF 50%	5 Gal Co	6850-01-471-6534
50/50	EGAF 50%	55 Gal Dr	6850-01-471-6521

(d) All the NSNs above that are for the 100% Propylene Glycol must be diluted to either a 60/40 or a 50/50 solution before being added into any vehicle cooling system. Only the prediluted solutions can be added directly into the cooling system.

NOTE

Recycle all antifreeze in accordance with TACOM Publication "Antifreeze Recycling Users guide.

d. Oxygen acetylene cylinders, and other compressed gas cylinders. Oxygen and acetylene cylinders normally supplied empty as part of the BII/OVE, shall be filled to capacity and placed in a rack or crate constructed so as to support the bottles in an upright position. For reasons for safety, the oxygen and acetylene storage racks shall be separated as directed by ship's captain or site commander. These cylinders shall be inspected (see Para 5-3h. above)/replaced at every cyclic maintenance.

e. Fuel tanks.

(1) non-CH Storage.

(a) Non-self-propelled equipment. Fuel tank preservation depends upon the type of fuel tank and type of engine used in the vehicle or powered equipment being processed. Fuel tanks on non self-propelled equipment (e.g., generators, APUs, heaters) will normally be drained of fuel to the maximum extent possible without disassembly. After draining, fuel tank will be preserved by one of the following methods, as applicable.

1 Steel fuel tanks. Fill Fuel tanks to maximum capacity with MIL-PRF-21260, grade PE-10. Completely drain the preservative oil from the tanks. Filler neck screen and cap will be coated with the same preservative oil. Replace fuel tank drain plugs and tighten properly.

2 Other than steel tanks. Certain types of fuel tanks (aluminum, fiberglass, and tanks with a synthetic rubber liner) require no preservation other than draining.

NOTE

Any fuel tank containing gasoline must be drained and the tank flushed with preservative.

(b) Self-propelled equipment. As stated previously (Para 2-2j. and 2-2k) equipment will be stored with fuel to facilitate rapid deployment when building codes allow. JP-8 is the authorized fuel. If only diesel fuel is available, the diesel fuel stabilizer additive must be used per paragraph 2-2l. This additive contains both a biocide and a multifunctional antioxidant-metal deactivator-corrosion inhibit or detergent dispersant component. The stabilizer additive is available as a single package or a two-part package. Both are acceptable. The mixture ratio for these additives should be determined by reading the application instructions on the package because different manufacturers have different ratios. Additive must be applied prior to loading, agitated, and engine run for a minimum of 15 minutes.

(2) CH Storage. If building codes or local laws do not allow fuel to be left in fuel tanks/cells of self-propelled equipment, fuel tanks/cells shall be drained and processed as specified in 5-9 e. (1) a. 1 or 2 above).

f. Gasoline engine processing (non-self propelled). For fuel system processing, a portable container with two compartments (as shown in MIL-STD-3003) will be positioned to provide gravity feed to the engine. One compartment is filled with gasoline specified for engine operation, the other with oil conforming to MIL-PRF-21260, grade PE 15-40. The engine fuel supply line is disconnected at the most convenient point nearest the fuel tank and the flexible line from the portable container connected to the disconnected fuel supply line leading to the engine. Then, turn the container selector valve to the fuel position. Start the engine and operate at fast idle speed, without load, until running smoothly, but not for more than 4 minutes. The engine should then be accelerated to two-thirds maximum revolutions per minute (rpm), and, with engine still operating, switch selector valve on the portable container to the oil position. The instant the oil reaches the combustion chambers (This will be noted by loss of engine rpm or excessive smoke emitting from exhaust pipe.) turn ignition off. Disconnect line from portable container and reconnect engine fuel line. After processing the fuel system, engine should be cooled to ensure that the cylinder head temperature, measured at spark plug gasket surfaces of all cylinders, is not more than 100 degrees F. Cooling will be accomplished by induced air currents, circulation of engine coolant (for liquid-cooled engines), or by waiting the period of time required to arrive at the above specified temperature. When ambient temperature exceeds 100 degrees F, the engine should be cooled to a temperature equivalent to the ambient. After engine has been cooled to the required temperature, processing through combustion chamber will be started and completed with minimum delay. Remove spark plugs. As the engine is cranked with the starting motor, preservative oil conforming to MIL-PRF-21260, grade PE-10, shall be atomized sprayed through each spark plug opening into the combustion chamber with low air pressure, maximum 25 PSI. The amount of oil sprayed into the combustion chamber will be one half ounce per cylinder for piston displacement up to 25 cubic inches, 1 ounce up to 50 cubic inches, 1 1/2 ounces up to 75 cubic inches, and 2 ounces over 75 cubic inches. After completion of the above and without cranking the engine, the amount of oil specified above will be atomized and sprayed into each combustion chamber. The spark plugs will be cleaned with a wire brush to ensure electrode tip is carbon or corrosion-free, regaped, and installed. Equipment shown in figures 3 and 4 of MIL-STD-3003 is satisfactory for engine preservation. Fuel filters and sediment bowls will be drained. Carburetor float bowls equipped with drain · plugs will also be drained.

CAUTION

Special precautions will be taken to ensure that the amount of oil specified above will not result in a hydrostatic lock Prior to processing additional engines, the first engine will be processed as specified above and allowed to stand 12 hours. The engine will then be manually rotated, or rotated by the starter if manual turning is not possible, to ensure that the amount of oil sprayed into combustion chambers allows free rotation of the engine.

g. APUs, generators, and other small diesel engines.

(1) Non-CH Storage.

(a) Remove filter can and drain fuel prior to processing the engine, it will be cooled to ensure that cylinder head temperature measured at injector nozzle flange surface of all cylinders is not more than 100 degrees. Cooling will be accomplished by induced air currents, circulation of engine coolant, or by waiting the period of time required to arrive at the above specified temperature. When ambient temperature exceeds 100 degrees F, the engine will be cooled to a temperature equivalent to the ambient. After the engine has been cooled, the fuel supply system from the fuel tank will be shut off. A portable container will be positioned to provide gravity feed to the engine compartment filled with MIL-PRF-21260, PE 15-40 preservative oil. Disconnect the fuel line between the primary fuel filter and fuel pump at the primary fuel filter outlet. Drain the residual diesel fuel from the secondary fuel filter. If equipment is not equipped with a secondary fuel filter, disregard all requirements concerning the secondary fuel filter.

(b) Remove filter can and drain fuel. Fill filter can with MIL-PRF-21260, PE 15-40 preservative oil. Disconnect residual vehicle fuel return line at quick disconnect coupling. Connect a transparent plastic fuel line to the engine end of the disconnected fuel return line. Insert the other end of the plastic fuel line into a recovery container to collect the residual returned oil. Fabricate an air restrictor plate of plywood, slightly larger than the air intake, and attach a 5/16-inch-thick rubber (same size as plywood) with MMM-A-260 adhesive. Start engine and run for 5 minutes on MIL-PRF-21260, PE 15-40, preservative oil. The throttle will be placed in half-open position and the engine choked by placing fabricated air restriction plate over the air intake until the engine stops. The valve on the auxiliary fuel container will be turned to the OFF position. Disconnect transparent fuel line and reconnect fuel return line. Disconnect portable fuel line and reconnect fuel line. Drain fuel cans and install new filters.

(2) CH Storage. Engines operated on JP-8 or JP-5 fuel do not require further preservation provided the engines are exercised every 180 days.

h. Crankcase and crankcase openings.

(1) Engine crankcase will be filled to operating level with preservative/operational oil conforming to MIL-PRF-21260, grade PE 15-40, or the grade specified in the vehicle TM.

(2) Turbine engines are not designed to use MIL-PRF-21260 oil. The operational, but corrosion inhibited type, described by MIL-PRF-23699 will be used in the M-1s. If the NSNs identified in Section VII above are not used, four (8 oz) cans of oil additive, NSN 6850-00-142-9582, will be added to each engine. Every cycle, add one can of oil additive and change when required by AOAP.

NOTE

The hours will be manually recorded on DA Form 2408-20 (Army Oil Change Log). This form will remain with the item. Hours recorded will include time expended performing COSIS, installing MWOs, PMCS, and travel between port location and maintenance operations.

NOTE

Operations personnel are required to recycle oil.

i. Air cleaners (oil bath-type).

(1) Non-CH Storage. Fill air cleaner (oil bath-type) to operating level with same preservative oil used in crankcase. Interior of air cleaner, above oil level, will be sprayed with MIL-PRF-21260, PE 15-40, and element reinstated. Oil bath and dry-type air cleaner openings will be sealed with tape conforming to type IV, ASTM-D5486 tape or covered with 6-mil polyethylene conforming to A-A-3174, secured with type IV, ASTM-D5486 tape.

(2) CH Storage. Fill to operating level with same preservative oil used in crankcase.

j. Transmissions. Transmissions that operate on MIL-PRF-2104 type lubricating oil will be filled to operating level with preservative oil conforming to MIL-PRF-21260, grade PE-10 or PE 15-40, as specified in the applicable LO.

Transmissions that do not normally operate on MIL-PRF-2104 type oil will be filled to operating level with operational oil, as specified in the applicable LO. Operate through all ranges for a minimum of 1 minute at a sufficient speed to assure lubricant coverage of all interior parts and surfaces. CAUTION-Transfer case must be in neutral position on some vehicles prior to operating transmission manually through all gearshift ranges. Check TMs for procedures. If not otherwise specified or dictated by AOAP, change every 90 months.

NOTE

Transmissions will be stored in neutral position.

k. Differentials, transfer assemblies, and power takeoff assemblies. Differentials, transfer assemblies, power takeoff assemblies, and other gear-driven units, except those lubricated by the unit to which they are attached, will be filled to the operating level with the applicable grade of new operational oil as specified in the LOs. If not otherwise specified or dictated by AOAP, change every 90 months.

l. Brake system.

(1) Non-CH Storage. Exterior, unpainted, or threaded surfaces such as cables, clevises, and linkage of service and parking brakes will be coated with MIL-PRF-16173, grade 4 preservative. All brake drums and clutch plate assemblies will have a primer coating of A-A-52465, applied prior to going into this type of storage. For hydraulic brakes, the system will be filled with operational hydraulic fluid as specified in the applicable drawing, specification, or LO. Compressor air outlet will be disconnected. Compressor equipment with air cleaner will have the cleaners removed and air inlet sealed with tape or covered with plastic A-A-3174, 6 mil, polyethylene and sealed with tape. Compressor equipment with air strainers will have the strainers removed and coated with MIL-PRF-21260, grade PE-10, preservative oil. While the compressor is being operated (e.g. during engine preservation) one-half ounce of MIL-PRF-21260, grade PE-10, will be atomized sprayed into compressor air intake until oil appears at outlet. Air outlet will be disconnected and air cleaner or air strainer reinstalled. Air reservoirs will be drained of all condensate and interior surfaces atomized sprayed with oil conforming to MIL-PRF-21260, grade PE-10. Warning tags shall be prepared indicating any area sealed and shall be securely attached in the driver's compartment in a conspicuous location. When applicable, brakes shall be caged to prevent galvanic corrosion from contact.

NOTE

Acceptable alternative process for the air compressor preservation can be accomplished by removing air cleaner or air hose from compressor. Open compressor tank drain plug. Run compressor at normal operating speed for 2 minutes. This forces all water out of system. Slowly spray 8 ounces of MIL-PRF-21260, grade PE-10, preservative oil into compressor intake using an oil spray gun or can. Turn off compressor when all 8 ounces of oil are sprayed into compressor. Drain valves will be closed. Exposed ends of service air lines and dummy couplings will be covered with tape. Air line filters will be drained and closed. Exhaust ports of relay emergency quick release and relay valves not equipped with exhaust check valves will be closed by inserting plastic plugs conforming to NAS833 OR NAS836 or sealed with tape.

(2) CH Storage. Drain air tank and leave valve open. Fill with operational (MIL-PRF-46176) hydraulic brake fluid to operating level. Either NAS833 OR NAS836 caps or ASTM-D5486, Type IV, tape, will cover dummy couplings. Place warning tag on any brake valve left open to ensure valve is closed prior to use.

m. Tarpaulins.

(1) Non-CH Storage. Tarpaulins such as soft top cab, grill cover, cargo body cover, etc., requiring repair and treating will be removed, repaired, and treated, as necessary. Tarpaulins will be stored in covered storage.

(2) CH storage. Above applies, except that tarpaulins may be installed on equipment.

n. Air compressors. Where the lubricating system is separate from the associated power unit, the air compressor crankcase will contain preservative oil conforming to MIL-PRF-21260, PE 15-40, as specified in the LO, filled to operating level. Compressor air outlet will be disconnected. Compressor equipment with air cleaner will have the cleaners removed and processed as specified in paragraph i above. Compressors equipped with air strainers will have the strainers removed and coated with MIL-PRF-21260 preservative oil. While compressor is being operated during engine preservation (see paragraphs f and g above, as applicable), one-half ounce of the same grade of preservative oil will be atomized and sprayed into compressor air intake until oil appears at outlet. Air outlet will be reconnected and air cleaner or air strainer reinstalled.

o. Cabs.

(1) Non-CH Storage. Door hinges, latches, and operating mechanisms will be lubricated with MIL-PRF-21260, grade PE 15-40, preservative oil. Operating mechanism of locks will be lubricated with MIL-PRF-21260, grade PE 15-40 preservative oil, MIL-PRF-32033, or COTS approved preservatives. Vehicles shall not be rust proofed. Rubber molding not directly exposed to the elements, wherein metal-to-molding or molding-to-molding contact is involved (that is, around doors, windows, and vents), will be dusted with talc, technical T1 of A-A-59303. Drain holes will remain open. Windows and air vents will be closed and secured.

(2) CH Storage. All of the above is required except windows will be left open for ventilation and access once the equipment is placed in storage. All cab air vents will be left in open position.

p. Bodies. Secure body drains in the open position. Hydraulic systems will be filled to operating level with operational hydraulic fluid as specified in the applicable LO. Exposed surfaces of the hydraulic ram will be coated with MIL-PRF-10924 automotive and artillery grease, wrapped with barrier material conforming to type II, grade A, class 2 of MIL-PRF-121, and secured with tape conforming to ASTM-D5486, Type IV, tape. Body drains and ventilators will be placed in an open position to provide all possible ventilation. Door hinges, latches, and operating mechanisms will be lubricated with MIL-PRF-21260, grade PE 15-40, MIL-PRF-32033, or COTS approved preservative oil Doors will be closed. Doors may be removed to facilitate access during storage and secured in vehicle.

q. Special purpose vehicles and vehicles with special preservation requirements.

(1) Water tank.

(a) Non-CH Storage.

1 Clean metal water tank body in accordance with applicable TM using a cleaning compound conforming to A-A-59133 (steam cleaning). After cleaning, drains and lower outlets will be left in open position and openings covered with fine mesh aluminum screen, secured in place with tape conforming to ASTM-D5486, Type IV, tape. Drain plugs will be removed. Metallic drain plugs will be coated with MIL-C-10382 preservative and packaged in a bag. Bag will be closed by heat sealing or taping with ASTM-D5486, Type IV, tape and secured to a faucet or within equipment compartment. Rubber seals of hatches and top openings will be coated with talc, technical T1, A-A-59303, and forward outlet, hatches, and top openings closed and secured. Equipment compartment drains will be secured in open position and compartment doors closed and secured to prevent pilferage or damage. For steel tanks, other than stainless or pre-coated, all interior surfaces will be coated with MIL-C-10382 preservative. The pump will be operated allowing the preservative to drain through outlet nozzle and introduce a sufficient amount of MIL-C-10382 preservative to ensure complete coverage of areas within the pumping system from intake to outlet. After completion of application of preservative, drain plug will be removed and the system completely drained. Drain and top plug will be reinstalled.

NOTE

MIL-C-10382 must be applied at or near room temperature. Application below 65 degrees F may cause clotting or clogging of piping and fixtures. Do not substitute any type of preservative for MIL-C-10382 on any food handling or potable water dispensing systems.

2 Fiberglass tanks will be cleaned with nontoxic detergent and warm water, followed by a clean water rinse. Remove drain plug and drain interior of tank Interior piping, other than stainless steel or plastic, will be coated with MIL-C-10382 preservative. Drain plug will be reinstalled. On water pumping systems, drain plug on bottom of water pump will be removed and pump completely drained. Drain plug will be reinstalled. The 1/4-inch plug will be removed from the tee on top of pump and the pump filled with MIL-C-10382 preservative.

NOTE

A warning tag bearing the following information will be attached to the water tanker preserved with MIL-C-10382: "Before placing into service, flush system with hot water, minimum 160 degrees, and drain to maximum extent."

(b) CH Storage. Same as for non-CH storage except tank openings and doors will be open to maximize air circulation.

(2) Dolly Sets.

(a) Non-CH Storage. The Equipment Preservation Data Sheet (EPDS), Preparation for Shipment and Storage, shall be used as the implementing document for MIL-STD-3003 when preparing Dolly Sets for storage. EPDSs are available from CDR, TACOM, ATTN: AMSTA-TR-E/MEPS, Warren, MI 48397-5000. Dolly sets will be stored with lift cylinders fully retracted. Drain condensation from air brake system valves by opening drain cocks or removing drain plugs. Place tags on valves as reminder to replace drain plugs and close drain cocks when equipment is activated.

(b) CH Storage. No special preservation requirements are necessary; follow guidance in applicable TMs and general guidance herein. When practical, dolly sets will be stored with lift cylinders fully retracted. Drain condensation from air brake system valves by opening drain cocks.

(3) M1000, Semi trailer, 70 Ton. During PMCS ensure all steering cylinders, gooseneck cylinders, rear ramp cylinders, rear slave cylinders, and suspension cylinders (10) are greased with MIL-PRF-10924 on exposed surfaces of the rods. Secure each ramp to the ISO bracket mounting holes on the platform using steel strapping, ASTM-D3953, 1-1/4 x 0.031. Route strap through two ISO bracket mount holes in platform and crimp binding clip to strap. Route opposite end of strap around top cross bar on ramp, tighten strap as tight as possible and secure with binding clip. Use corner protectors between strap and ISO bracket mounting holes and between strap and the top cross bar. Strap chocks in place using 4 X .0035 steel strapping. Open cover of rear support legs, lower rear legs, apply grease to outside surfaces, and return to up position and close cover. Apply preservative, MIL-PRF-16173, Grade 4, to all unpainted, bare metal surfaces on trailer deck F pins, cables, and ISO brackets. Drain all air reservoirs of condensate. Spring loaded drain valves are located under air tanks, and operated by pulling a lanyard. Ensure air flow stops when lanyard is released. It is not necessary to spray any preservative into interiors of the tanks. Drain all air line filters and close.

CAUTION

The M1000 is certified for crane lift with a payload weight not to exceed 50,000 lbs (25 ton).

(4) M1074, truck, PLS. The following applies in addition to normal preservation specified above. Air brakes reservoirs are corrosion resistant and do not require preservation. The air dryer desiccant shall be replaced every cycle.

(5) Fuel Tankers Preservation. Fuel tankers shall be fogged using MIL-PRF-21260 oil provided the tanker is not contaminated with water or any chemical cleaners.

(a) Procedure to fog the M969A1 tanker is as follows:

NOTE

All fuel should be drained from tanker. Prior to start close all valves and drain holes.

Step 1: Remove pump strainer and plug by oil/water separator. Open valves B,G, and H. Insert nozzle and hose at valve B. Push the nozzle towards the area of valve G and H start spray and let run for @ 5 minutes. Check the area of the removed strainer fog should be seen.

Step 2: Block off the opening at the pump strainer. Open up Valve A creating a chimney effect into the tank. Spray for @ 5-10 minutes. During this operation check the bottom of tank from the top and ensure spray is getting to the bottom of the tank. After 5-10 minutes close Valve A and remove nozzle from Valve B.

Step 3: Place the nozzle in the pump strainer area. Push the nozzle past the bend in the pipe and start spray. Spray for @ 5 minutes. Check the opening a Valve B to ensure fog is coming from there. After 5 minutes move the nozzle to the pipe opening of the pump spray for @ 2 minutes. Remove nozzle from strainer area and place into top opening of the pump spray the housing area of the pump moving the nozzle up and down for @ 2 minutes. Remove nozzle from pump spray strainer and place back into pipe tighten clamp. Close all valves.

Step 4: Open Valves B and F and remove fill plug on pump. Place nozzle in opening at Valve B and spray for @ 5 minutes. Check the opening at fill plug on pump to ensure fog is coming from the opening. Replace the fill plug and remove nozzle from Valve B opening.

Step 5: Push open the bottom load stop with blunt instrument and keep open. Place nozzle into opening and spray for @ 2-5 minutes. Close Valve F and open Valve A again spray for @ 2-5 minutes. Close Valve A and remove nozzle from bottom load stop. (M969 Models spray Valve B and cap area then go to step 7.)

Step 6: Open Valve K and remove drain plug on one of the flow meters. Insert nozzle at opening at Valve B and spray for @ 5-10 minutes. Check drain plug on meter to ensure oil is getting there. Replace drain plug in the first flow meter and remove drain plug from second flow meter. Keep spraying for another 5-10 minutes. Take nozzle out and spray into the drain plug of meters coating the housing of the flow meters (do both meters). Replace drain plugs. Spray Valve B and cap area and then close.

Step 7: Using a long pipe pump @ 5 gallons of oil into the dump valve area of tanker. Open Valve A and Valve J to drain oil from the tank. Once all oil is drained close Valve A and J.

(b) Procedure for the M978 HEMTT Fuel Tankers is as follows:

Remove the drain plug from the primary pump, insert the wand and fog the pump. Replace the drain in the pump. Fog the interior of the tank then place the wand near the V1 valve in the bottom of the tank to get preservative into the pipes below the tank. Close the manhole. Open the filter separator and remove the filters and canisters and fog the interior of the filter separator. Open receptacles A, B, C, and D at the back of the tank and fog the internal piping, then cap the receptacles. If the tanker is equipped with a Vapor recovery system, open the VR receptacle at the back of the tanker module and insert the wand to fog the pipes, then recap the receptacle.

(c) Fuel tankers that have been contaminated with hot water, steam, solvent wash, or chemical, must be flushed with preservative oil, MIL-PRF-21260. Fill and flush following the same procedures for filling tankers with fuel in the appropriate TMs and operate all equipment to ensure all contaminates are removed and surfaces coated with the preservative oil. Flushing is necessary to remove the water/chemical contamination. Emptied preservative oil may be reused for processing other fuel tanks, provided not more than 10 percent (%) of the fluid is contaminated, see ASTM-D287.

(6) Fifth Wheel Towing Device Preservation. Fifth wheel towing devices shall be preserved in accordance with TM 9-2510-247-13&P. Optimum storage configuration is for the fifth wheel towing device to be attached to the prime mover.

(7) Load Handling System, HEMTT, Preservation. Load Handling Systems, HEMTT shall be preserved in accordance with TM 9-2320-279-20.

r. Trailers.

(1) Non-CH Storage. The EPDS shall be used as the implementing document when preparing trailers for storage. Coat unpainted or bare metal surfaces with MIL-PRF-16173, GR 4 preservative. Preserve hinges, latches, and operating mechanisms with MIL-PRF-21260, PE 15-40 preservative oil. Store in a manner that will allow drainage. Small trailers can be positioned on end to conserve storage space using dunnage and a barrier between ground and metal surfaces. Position the trailer so that hydraulic brake fluid reservoirs are above the level of the wheel cylinders. Use solid filler plugs to prevent fluid leakage. Trailer bed decking (wood) will deteriorate in open storage. Ensure all replacement decking meets the technical requirements for replacement decking. Wood will be pressure treated, sealed with a commercial wood sealer, and CARC painted in accordance with MIL-DTL-53072 and TM 43-0139. For long-term storage of the M870A3 semi-trailer, use the BII chains and binders to chain the gooseneck to the deck in the retracted position. Follow vehicle TM for instructions.

NOTE

Replace master cylinder breather valve, install a plug, and seal the breather valve in a plastic bag and secure to the trailer tongue. Place a tag to replace the breather valve prior to issue or operation.

(2) CH Storage. Same as for non-CH storage except that the MIL-PRF-16173 does not need to be applied.

s. Winch and Derrick Assemblies.

(1) Non-CH Storage. Winch gear and other gear-driven units will be filled to operating level with MIL-PRF-2105 grade GO 80-90 or MIL-PRF-21260, grade PE-30, as specified in the LOs. Unwind cable (except coated winch cable), and preserve entire cable with MIL-PRF-16173, Grade 1.

CAUTION

Place gear box shift levers in the neutral position. Exposed, unpainted metal surfaces of cable drums, sheaves, snatch blocks, boom block, A-frame, crane, derrick boom controls, and linkage should be coated with the same type preservative. Coat exposed surfaces of hydraulic position rod with MIL-PRF-10924 preservative; wrap with barrier materiel conforming to type II, grade A, class 2 of MIL-PRF-121; secure with tape conforming to ASTM-D5486, type IV, tape. Paint the cover from the winch automatic brake assembly of brake disc and brake band with synthetic primer. Coat adjusting pin, string, and related hardware with MIL-PRF-16173, grade 4. All disassembled items will be reassembled.

(2) CH Storage. Winch gear and other gear driven units will be filled to operating level with MIL-PRF-2105 or MIL-PRF-21260, grade as specified in lube order. Unwind cable (except coated winch cable) and preserve with MIL-PRF-10924.

t. Gear chain drive. Coat unpainted exposed gears and non-precision drive chains with MIL-PRF-21260, PE 15-40, preservative oil to ensure penetration to inner surfaces of rollers, pins, and bushings. Drain excess MIL-PRF-21260, PE 15-40, preservative oil.

u. Batteries, cables, and battery box. Remove batteries from equipment. Clean as specified in paragraph 5-4f. Preserve battery cable clamps with grease (GAA), petrolatum (VV-P-236), or silicone fluid conforming to MIL-PRF-46146, Type I, Group II (NSN for an 8-ounce tube is 8040-01-009-1562). TM 9-6140-200-14 is the Operator's Unit, Direct Support, and General Support Maintenance Manual for Lead-Acid Storage Batteries. Follow TB 43-0134 for Battery Disposition and Disposal. Use epoxy paint in accordance with MIL-PRF-22750 to paint the battery box. This is a high solids CARC type paint and if used on the complete interior surfaces of the box there is no need to use a preservative. If only a few spots need additional protection and the interior of the box does not require repainting, use either MIL-PRF-16173, Grade 1, or MIL-C-450. These preservatives are hard drying black preservatives. If the epoxy paint is used, epoxy pre-treat (MIL-PRF-85582 or MIL-PRF-23377) the surface, and neutralize the box in all cases. Valve Regulated Lead Acid Batteries. Absorbed Glass Mat (AGM) and activated flooded lead acid batteries will be maintained in accordance with AFSC Battery Maintenance Management Plan..

WARNING

Charging batteries produce hydrogen gas, which is explosive. Charge batteries only in well ventilated areas (e.g. battery rooms) and don't smoke or allow open flames or sparks anywhere near the battery. Always turn off the battery charger before connecting it or disconnecting it from the battery. Never attempt to charge a frozen battery because it might explode. Allow it to warm to 60-degrees F before hooking up the charger.

CAUTION

If vehicle is equipped with computer, always disconnect the battery when charging to ensure the computer is not damaged. Chargers include their own instructions. Always follow these instructions to the letter. Never disregard the safeguards and procedures provided by the manufacturer. Generally, slow charging is best, since there is little chance of damaging the battery by overcharging (one of the major causes of battery failure).

v. Inter-vehicular jumper cable, air lines, and safety chains. The inter-vehicular jumper cable will be secured to the vehicle with tape conforming to ASTM-D5486, Type IV or SAE AS33671 tie-down strap. Tape will completely encircle the adjacent vehicle member and overlap approximately 6 inches. Connectors at end of air lines will be secured in dummy couplings provided. Loose portions of air lines and safety chain will be secured to the vehicle as specified for inter-vehicular jumper cable. Cables and air lines will have a bend of not less than a 24-inch diameter when secured to the vehicle. In cases where the tractor is connected to the trailer, all lines, cables, and chains may remain connected.

w. Heaters, fuel operated.

(1) Non-CH Storage. Heaters with separate fuel supply will have their fuel tanks processed as specified in paragraph e above. Personnel and engine heaters installed in multifuel engine vehicles will have the fuel supply shutoff valve, located at the inlet side of fuel filters, turned to the OFF position. On gasoline engine vehicles, the personnel heater shutoff valve located at the heater fuel line tee on the vehicle fuel pump and the engine heater shutoff valve located in the rear of the battery compartment will be turned to the OFF position. The main fuel line supplying fuel to the heaters will be disconnected at a point closest to the shutoff valves, and fuel from fuel lines will be allowed to drain. Reconnect fuel lines. Seal exhaust stacks with ASTM-D5486, type IV, tape.

(2) CH Storage.CH storage is the same as for non-CH storage except sealing the exhaust stacks is not required.

x. Diesel and Multifuel Engines.

(1) Non-CH Storage. Prior to processing, the engine will be cooled to assure that the cylinder head temperature measured at injector nozzle flange surface of all cylinders is not more than 100 degrees F. When ambient temperature exceeds 100 degrees F, the engine will be cooled to a temperature equivalent to the ambient. After the engine has been cooled, the fuel supply system from the fuel tank shall be shut off and the fuel tank and lines up to shut off valve drained and flushed with preservative oil. The fuel system and combustion chamber will be processed in an uninterrupted manner.

(a) Fuel System. A portable container or a supply line shall be positioned to provide preservative oil to the engine. The engine fuel supply line shall be disconnected at the most convenient point nearest the fuel tank, and a

flexible line containing the preservative oil supply connected to the disconnected fuel supply line leading to the engine. Drain diesel fuel from the fuel filters and fill with preservative oil. The engine shall be started and operated at fast idle until running smoothly, but for not more than 4 minutes. Accelerate to 1/2 throttle and run for 3 minutes and then shutdown by conventional methods.

(b) Combustion Chamber Processing. The engine shall be cooled to 100 degrees F (see above). After the engine has been cooled, an air restrictor plate shall be installed at the nearest and most convenient place to cut off the air supply to the engine. With the fuel system filled with preservative oil, MIL-PRF-21260, Grade PE 10-1, the engine will be cranked for 10 seconds. Remove the preservative oil supply line and reconnect the fuel supply lines and open the fuel shut off valves. Drain filters, remove filter elements and replace with new elements and gaskets. Level A vehicle processing requirements for each vehicle model contain unique engine/vehicle processing requirements and should be reviewed prior to processing engines for outside storage.

(2) CH Storage. Engines will be preserved as in (1) above or, as an alternate, may be stored fueled as long as the fuel is JP-8. Fuel quality must be monitored, and combat vehicles exercised ever 24 months and tactical vehicles exercised every 48 months (see chap 6).

y. Combat Equipment.

(1) Non-CH Storage. Combat equipment should not be stored in open storage. When absolutely necessary, and storage time will exceed 90 days, process equipment to Level A requirements provided by the appropriate Major Subordinate Command and paragraph a through x above as appropriate.

(2) CH Storage. Process combat equipment as follows:

(a) As appropriate, the guidance of paragraph a through w above applies.

(b) Vehicles will be clean, including battery supports and retainers, seats, gun, and fire control, periscopes, vision blocks, etc. The cleaning process shall not permit liquid to enter interior compartments and cause damage or deterioration.

(c) Any vehicle surface susceptible to corrosion or deterioration shall be preserved. Preservatives selected must be sufficient and safe when used for the intended purposes.

(d) All combat vehicles have unique vehicle processing specifications for shipment and storage that detail unique requirements and these should be used for specific guidance.

(e) Quadrant, periscope, telescope, etc. After cleaning, per paragraph 5-4b(4), optics shall be covered with lens tissue, A-A-50177, and secured with tape.

CAUTION

Tape shall not be allowed to contact lens. The tape will damage the coating on the lens.

(f) Exterior hatches and doors. Rubber seals around hatches and doors will be dusted with talc. Where practical and stow permits, doors and hatches shall be open to allow for air circulation during stowage.

(g) Drains/Vents. Secure in open position during stored. Install screens in drains.

(h) When necessary for meeting clearance requirements on the ships, items such as radio antennas may be removed and stowed in the vehicle. Additional disassembly requirements must be in accordance with the vehicles transportability guidance technical manual. Any other disassembly must be approved by the AFSC.

z. Special requirements for CH storage on APS 3 vessels as defined below apply for the M1 tank:

(1) Reference ATPD-2240 for details on processing (Reference Level B for CH Storage).

(2) Bryaco 599 oil preservative is incorporated into the engine oil, MIL-PRF-23699. Run the engine until normal operating temperature is reached. During each scheduled maintenance cycle, add one can (eight (8) fluid ounces) of Bryaco 599 if the vehicle has over 5 hours of operational time since last cycle. If the vehicle has operated less than 5 hours the adding of the can of Bryaco 599 is not required.

(3) Fuel, JP-8, will be in the tanks in quantities of at least 1/4 full to a maximum of 1/2 full. Drain unpreserved fuel (other than JP-5 and JP-8) from all tanks, put new preserved fuel in front tanks, operate personnel heater for 15 minutes, pump fuel to the rear, operate engine for at least 5 minutes. Turn the smoke generator "On" and run the engine through a "False Start" cycle for approximately 5 seconds to induce the preserved fuel into the smoke generator pump.

(4) Attach a radioactive substance WARNING tag to the gunner's thermal sight. The antireflective coating on the outside right window of the sight head is slightly radioactive. Fragments of this material constitute a health hazard if swallowed, inhaled, or allowed to enter the bloodstream through an open wound. If a broken window is encountered, notify responsible personnel for disposal of broken parts.

NOTE

Cushion wrap gunners thermal site.

CAUTION

Ensure exhaust port is venting.

(5) Remove radio antenna and secure in vehicle.

(6) Relieve hydraulic pressure in the turret.

(7) Open driver's drain valves and secure in open position with safety wire.

(8) Install screens at drain valve openings, tape in place.

(9) Place tag in driver's compartment to ID screens, and open drains.

(10) The hull and turret ammo doors can be left open; the hydraulics for the turret doors must be locked when in the open position.

(11) The loader's machine gun mount can be stored in place in the locked position at the position marked stow. Otherwise, remove the mount and stow securely in the vehicle's storage box. Apply preservative oil MIL-PRF-21260 to bare metal surfaces of both machine gun mounts.

(12) Loader's seat back shall be folded down on the seat bottom and loader seat post preserved with MIL-PRF-10924 grease.

(13) Breech lever shall be stored in breech level stowage box.

(14) Driver's periscope washer reservoir shall be empty.

(15) Hatches will have rubber seals covered with talc.

(16) The hatches shall be opened after stow in CH environment.

(17) Remove all fabric cargo straps and stow in vehicle stowage box.

(18) Ensure that the stowage box is closed and secured.

(19) Preserve, pack, and stow BII on the BII rails (see TACOM ATPD 2240). Select BII/OVE may be stowed in the normal operational location provided it can be secured to prevent damage to itself or other tank components. BII box size for MIA1 is 64 x 40 x 14 with 3 skids each placed so there is 48-1/2 inches plus or minus 4 inch inside two outside skids. Band box to rails with 1-1/4 inch steel strapping x 0.031 inches.

(20) Coil radio cables and secure on top of radio mounting bracket with tape. Preserve cable connectors by spraying with MIL-C-81309, type 3, class 2, NSN 8030-00-546-8637 (only on connectors that are not connected).

(21) The main vehicle batteries are to be disconnected. The Computer Electronic Unit (CEU) battery information should be recorded and the CEU battery removed.

(22) Deplete parking brake pressure by repeatedly activating the parking brake until gauge reads zero.

(23) Night vision devices will be stored in accordance with the following:

(a) Remove the stowage box for the DNV from the Driver's compartment by removing all mounting bolts. Open the front of the DNV stowage box and measure l" down from the top of the stowage box on the back wall of the stowage box and 1" in from the right side of the stowage box. Drill a 1/2" diameter hole at the intersection of these two measurements. (Figure 1 below)

(b) Measure 1" in from the top right side of the stowage box cover and 3" forward from the rear of the stowage box cover. Drill a 1/2" diameter hole at the intersection of these two measurements. (Figure 1 below)

(c) Remount the DNV stowage box in its proper location in the Driver's compartment.

(d) Place the DNV in the stowage box and secure it with the straps provided. Close the cover of the stowage box. Loop Seal (5340-00-084-1570) through both of the holes previously drilled in the DNV stowage box and Seal by placing the male end of the Seal into the female end of the Seal. Seal will automatically lock when the male end is fully seated (Figure 2 below). The DNV is now considered ready for shipment.

(e) To access the DNV following shipment of the tank, cut the Antipilferage Seal that has been looped through the back and cover of the DNV stowage box.

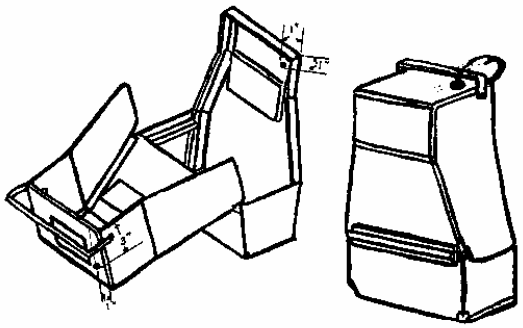

Fig. 1 Fig. 2

aa. Vehicle air conditioning systems.

(1) Non-CH Storage. All refrigeration systems will have charge reduced to 1/4 charge and systems checked for leaks and exercised every 180 days.

(2) CH Storage (land-based sites). All refrigeration systems will be purged and filled with nitrogen and tagged that the equipment is not in an operational state and must be purged of nitrogen, pressure tested, and recharged. This must be accomplished every maintenance cycle as part of the PMCS and exercise requirement.

(3) CH Storage (afloat). All refrigeration systems will be maintained fully charged and exercised every 180 days as part of the exercising.

SECTION X. WEAPONS

5-10. Detailed preservation requirements

a. Cannon (gun and howitzer, vehicle mounted or towed).

(1) Non-CH Storage. The unpainted cannon surfaces, including breech mechanism and machine surfaces underneath the bore evacuator, will be thoroughly cleaned with MIL-PRF-372 (bore cleaner) and subsequently cleaned with MIL-PRF-680, Type III petroleum solvent. The painted surfaces will be cleaned by wiping with clean, dry rags. Immediately after cleaning, the bore, chamber, and machine-finished surface under the bore evacuator of the cannon will be coated with MIL-PRF-3150 preservative oil. Excess oil will be allowed to drain from coated surfaces. A strip of VCI-treated material will be cut and rolled into a tube as long as the cannon chamber and bore, with the VCI-treated surface on the outside when not stored in a CH environment All unpainted surfaces of the breech block, breech mechanism, and firing mechanism will be coated with MIL-PRF-10924, Grade A, grease. Cannons with unpainted barrel surfaces will require a coating of MIL-PRF-10924, Grade A, grease on these surfaces. The muzzle end of the cannon, including the muzzle brake, will be covered with a bag fabricated from A-A-3174 polyethylene film, 6-mil thick, black. Secure cover in place in a manner, which will prevent entrance of air and moisture using tape. The breech shall be closed. On M1A1 tank turrets the travel elevation and transverse locks shall be secured and the exterior ballistics door to the gunner's primary sight shall be locked. Perform a zero pressure check.

(2) CH Storage. Above applies except that the muzzle will not be capped and either MIL-PRF-3150, MIL-PRF-22160, PE 15-40, or MIL-PRF-63460 (CLP) will be used as a preservative oil. Do not use VCI material or cap muzzle.

b. Recoil mechanism. Accessible machined surfaces of the cannon immediately forward of the recoil mechanism will be coated with MIL-PRF-10924 automotive and artillery grease.

c. Elevating and traversing mechanisms, turret ring bearings. Exposed, unpainted surfaces of elevating mechanism, trunnions, and turret traversing ring gear and elevating hand crankshaft will be coated with MIL-PRF-10924 automotive and artillery grease. Handle lock pin, turret ring bearings, and plugs will be removed from grease fitting openings, grease fittings installed, and MIL-PRF-10924 automotive and artillery grease pumped through grease fittings until grease is visible between the two sections around the circumference of the ring. The turret will be rotated five times in both directions and again lubricated until all surfaces on the circumference of the ring are lubricated. Excess grease will be removed from the outside surface of the rail.

d. Mortar Systems with Mount. The entire mortar system will be cleaned with MIL-PRF-680, Type III, petroleum solvent. The surfaces will be dried by wiping with clean, dry rags. Immediately after drying, the system will be preserved as follows:

(1) The entire bore of the mortar tube will be coated with MIL-PRF-3150 preservative oil. All unpainted, exterior surfaces will be coated with MIL-PRF-3150 preservative oil.

(2) The controls of the standard will be extended to the limits of their range and coated with MIL-PRF-3150 preservative oil and returned to their normal position. All unpainted, exterior surfaces will be coated with MIL-PRF-3150 preservative oil.

(3) All unpainted exterior surfaces of the bridge, rotator, and base assemblies will be coated with MIL-PRF-3150 preservative oil.

e. Small Arms. All small arms will be thoroughly cleaned with MIL-PRF-372 (bore cleaner) and subsequently cleaned with MIL-PRF-680, Type III, petroleum solvent. All metallic surfaces of the weapon will be coated with MIL-PRF-32033 or MIL-PRF-63460 CLP preservative oil. Drain excess oil from the weapon, changing draining position as necessary to accomplish thorough draining. If stored in fiberboard or wooden containers, wrap or bag items with MIL-PRF-121.

f. Installed Fire Control Equipment.

(1) All exposed, unpainted, and unplated metal surfaces will be coated with MIL-PRF-32033 preservative oil.

(2) Sighting assembly springs will be cleaned and coated with a light film of MIL-PRF-32033 preservative oil.

(3) All fire control items that require purging will be charged and purged prior to storage.

g. Non-installed Fire Control Equipment.

(1) Components of fire directions sets will be placed in their respective places in the carrying case.

(2) Aiming circle will be placed in its respective place in the carrying case.

h. Launcher, Grenade. Coat unfinished, unpainted surfaces of launcher tubes with MIL-PRF-3150 preservative oil.

i. M36 Series Machine Gun Mounts.

(1) Non-CH Storage. The unpainted surfaces of the mount and ring will be thoroughly cleaned with MIL-PRF-372 (bore cleaner) and, subsequently, cleaned with MIL-PRF-680, Type III, petroleum solvent. The painted surfaces will be cleaned by wiping with clean, dry rags. Immediately after cleaning, all surfaces will be coated with MIL-PRF-3150 preservation oil. Excess oil will be allowed to drain from the coated surfaces. All sliding surfaces of the ring will be coated with a light coat of GAA. Cover the entire ring and mount with 6 mil black polyethylene film.

(2) CH Storage. Requirements are the same as non-CH storage except that the barrier material can be eliminated.

j. TOW. The 180-day TOW subsystem verification will be performed prior to the vehicle being placed in storage.

k. PATRIOT Missile System. CH storage is required for Patriot Equipment.

(1) Perform PMCS per equipment TMs to include intermediate maintenance (IM) and depot forward tasks.

(2) Store per equipment TMs except:

(a) Equipment shall be stored using the landing legs NOT the outriggers.

(b) All tires shall be inflated per applicable technical manuals (ref. Chapter 5, Section III, 5.3.d(1).

(c) All louvers, vents, etc., will be opened to allow for free circulation of air within shelters.

SECTION XI. COMMUNICATIONS AND ELECTRONICS EQUIPMENT

5-11. Preservation procedures

CAUTION

Water or solvents will not be used to clean electronics equipment or wash the floors within electronics enclosures. Electronics enclosures prepared for CH storage will have all vents, louvers, and so forth, opened to allow free circulation of air within the enclosures. Desiccants are prohibited for use within electronics enclosures except as specified in paragraph b(1) below.

Items or equipment marked to indicate susceptibility to electrostatic, electromagnetic, or radioactive field forces will remain in their original containers. These containers will be marked to identify contents and special handling requirements.

a. Portable (MANPACK) Radio Sets and Radar Sets. No preservation required. Place this equipment in weather resistant fiberboard boxes, wrap and/or cushion, as required, to prevent loss or damage of components. (Exception: items in cases require no other protection.)

NOTE

Remove all dry cell batteries from equipment. Internally and externally installed radio sets, handsets, headsets, and control boxes will remain in equipment. Mountings, connectors, and attaching hardware will also remain installed on the equipment In addition to the general cleaning requirements cited in chapter 3, section IV, paragraph b(5).

b. Communications and electronics shelters.

(1) Non-CH Storage.

(a) Wrap all loose spare parts and miscellaneous components with A-A-1051 corrugated fiberboard; place the items within ASTM-D5118 weather-resistant fiberboard boxes; close per ASTM-D1974, using ASTM-D5486, Type IV, tape.

(b) Wrap handsets, headsets, microphones, controls, and similar equipment not disassembled and secured to equipment with bubble or foam wrap; place within a plastic bag; tape in place with ASTM-D5486 tape, Type IV, tape.

(c) Secure coil halyards, rope, and other like items with A-A-1451 twine.

(d) Wind each cable or cord assembly (not on reels) into the smallest dimension, tie the coil with A-A-1451 twine. If reels are provided, wind the assemblies on the reels, and secure the connectors with the locking device. If locking devices are not provided, secure with A-A-1451 twine.

(e) Place nuts, bolts, screws, and other hardware in cloth bags and attach to the equipment from which they were removed.

(f) Secure mast sections together with ASTM-D5486, Type IV, tape and secure within the shelter.

(g) Consolidate the ground rods; secure with ASTM-D5486, Type IV, tape and secure within the shelter.

(h) Secure boxed items, equipment, and accessories (such as ladders, chains, antennas, and brackets) that do not have an assigned location to the shelter floor.

(i) Close and secure all windows and blackout blinds, shields, louver vents, blower vents, and heating intake doors.

(j) Secure all fastenings, shock mounts, bolts, nuts, screws, and straps of all major and auxiliary units mounted on the floor, shelves, or walls of the shelter. Place and secure all covers over equipment.

(k) Store items within designated compartments of cabinets and drawers to the maximum capacity. Place TM(s) in the receptacle provided for this purpose.

(l) After cabinets and drawers have been filled, remaining items will be stored in boxes as follows: Group like items together, place into ASTM-D5118 weather resistant fiberboard boxes and close per ASTM-D1974 using ASTM-D5486, Type IV, tape. (Identify contents on outside of the box.)

(m) Depending upon available floor space to be utilized, the over packed, overflow items shall be blocked, braced, or secured within the shelter. This will be accomplished in a manner that will not cause damage to other equipment and permit access into the shelter.

(n) For storage of equipment outside shelters, remaining items will be placed in wood boxes conforming to ASTM-D6251. Close and secure contents within boxes to prevent movement and damage.

(o) For shelter interior securing, shock-mounted equipment shall float free without blocking and bracing. Utilize integral tie downs to block, brace, secure, and contain the stored load. When built-in tie downs or securing devices are not available, design and construct a blocking and bracing assembly to support and prevent the load from shifting. Fabricate the assemblies using a combination of triple-wall, weather-resistant fiberboard and a wooden support framework. Wood blocks may be used, as required, to supplement the fiberboard fabrication. Cushion wood blocks contacting equipment with A-A-1051 corrugated fiberboard or triple-wall material. Loading and packing procedures of the equipment TM should also be reviewed for specific requirements not covered herein.

(p) Seal all exterior openings and joints (except the door) with tape.

(q) Install a desiccator's breather assembly in the shelter as specified below.

1 Fabricate an adapter panel. Secure gasket to the panel with MMM-A-260 adhesive and apply a coating of adhesive around the blower aperture. Place panel over the aperture, secure with the same screws removed from the blower, and seal with tape. Connect desiccated breather assembly hose to the panel and secure with retainer clamp.

2 Compute the amount of desiccant required for the breather assembly will be based on two units for each cubic foot of volume within the shelter. Static charge amount will be based on 1.6 units for each cubic foot within the shelter. Bulk desiccant for breather assembly will be MIL-D-3716, type II sieve mesh Nos. 6 to 12 grade H. Static charge bagged desiccant shall be MIL-D-3464.

3 Place desiccant in breather assembly and secure cover.

4 Install a plug-type humidity indicator conforming to the adapter panel so it is visible from the outside.

5 The static charge bagged desiccant will be distributed throughout the shelter by suspending the bags 6 to 12 inches above the shelter floor by the use of cord, rope, or wire. Desiccant will not come in contact with installed equipment 6 Breather assembly materials are listed in table 5-3.

Table 5-3. Breather Assembly Materials

Quantity	Material	Specification
1	Drum steel	MS27683
1	Cover for drum	MS27683
1	Locking ring	MS27683
1	Gasket for cover	MS27683
1	Wire cloth 15 3/8"dia.	Local purchase, mesh commercial bronze wire
1	Expanded metal, 15 3/8 dia.	ASTM-F1267, type II, class 3/4, No. 16
1	Steel tubing, .92" seamless wall 3" LG x 3" OD	ASTM A 512, 513, 519 or as appropriate
1	Tubing, flexible 6' 3" LG	Local purchase
2	Clamps for flexible tubing with 3" ID	local purchase
1 RO	Pressure sensitive tape 2" W	ASTM-D5486, type I
As req'd	Desiccant (16-unit bag)	MILD-3464
As req'd	Desiccant bulk sieve mesh, Nos. 6 to 12, grade H	MIL-D-3716, type HI

6 Breather assembly fabrication will be performed as follows: (a) Cut a 3-inch hole in the wall of the drum just above the bottom chime. Insert a 3-inch OD steel tube until its entire circumference can be welded to the drum wall; (b) spot weld wire cloth to the expanded metal and position in the drum so the expanded metal will support the wire cloth. Spot weld wire cloth and expanded metal to the wall of the drum at 12 equally spaced points just above the 3-inch steel tube; (c) connect end of the flexible tube to the 3-inch steel tube in the wall of drum and secure with retainer clamp; and (d) cut a 3-inch hole in the center of the drum cover.

7 Adapter panel materials are listed in table 5-4.

8 Place door padlock and keys in a bag. Attach and secure bag in a location readily accessible on opening of shelter doors.

Table 5-4. Adapter Panel Materials

Quantity	Material	Specification
1	Steel plate, cold-rolled 12"x 12"x1/16"	Fabricate locally
1	Steel tubing, .092" seamless, wall 6" LG x 3"	ASTM-A512, 513, 519 or as appropriate
1	Humidity indicator plug and retainer, NSN 6685-00-618-1822	MIL-I-26860, type II, w/multi-spot insert
4 oz	Adhesive	MMM-A-260

9 Close and secure the shelter door and seal with tape.

10 Inspect at 30 day intervals for condition.

(r) Shelter-Mounted Environmental Control Units-The Environmental Control Unit (ECU) in each shelter requires no special preparation for storage. The unit should be turned off, but the refrigerant gases need not be purged prior to the shelter's being placed into storage.

(2) CH storage.

Prepare shelters for storage as outlined in paragraph b(1) above except as follows:

1 All louvers, vents, etc., will be opened to allow free circulation of air within shelters.

2 Doors, openings, etc., will not be taped.

3 Desiccator’s breather assembly will not be required.

4 Overflow items will be placed in a suitable container to prevent damage and stored in the same location as the shelter.

c. Shop vans and semi trailers containing electronic equipment Prepare vans and semi trailers for storage, as outlined in paragraph b above.

d. Radar set, mobile. Prepare radar set for storage, as outlined in paragraph b above and as follows:

(1) Non-CH storage.

(a) Prepare radar set for storage, as outlined in paragraph b(1) above and as follows:

1 Place proper amount of MIL-D-3464 desiccant in drawers of each radar set section.

2 Seal section drawers with ASTM-D5486, type IV, tape.

3 Place desiccant inside scanner end bell.

4 Enclose each drawer section of radar set in a MIL-PRF-131, class 1 or 3 bag and close by heat seal. Exhaust all entrapped air from bag prior to final heat seal.

5 Close all drains and vents of the mobile unit.

6 Attach a caution tag to the unit instructing personnel to remove desiccant bag prior to operation.

7 Place and secure the tarpaulin over the unit.

(2) CH storage. Prepare radar set for storage, as outlined in paragraph b(2) above except that desiccant and bag will be omitted.

e. Photographic and night vision equipment.

(1) This equipment will be stored only in a CH environment.

(2) Photographic equipment and night vision equipment installed in shelters, vans, or semi trailers will be prepared for storage, as specified in paragraph d(2) above.

(3) Photographic or projector equipment not installed in shelters, vans, or semi trailers will be prepared for storage as follows:

(a) Tighten all screws, knobs, and clamps; engage equipment locking devices.

(b) Coil and secure cord and cable attached to the item with tape.

(c) Place spares, accessories, or tools within the designated spaces provided on the item within the transit case.

(d) Wrap each lens not provided with lens caps with anti-tarnish lens tissue and secure with tape. Place the wrapped lens in a spare parts box or case, when furnished.

(e) Place all equipment with accessories in the appropriate accessory bag or transit case. If accessory bags are not available, cushion the items with bubble or foam cushioning material, place the items in an ASTM-D5118 weather-resistant fiberboard box, and close in accordance with ASTM-D1974.

(f) Equipment with fiber bellows will be packed as specified in paragraph 5 above, further placed in a bag fabricated from MIL-PRF-131 material, and sealed.

CAUTION

Desiccant will not be used, as this will cause the bellows to dry out and become unserviceable.

(g) Consolidate the items of each set, place within a weather-resistant fiberboard box, and seal the box with ASTM-D5486, Type IV, tape.

(h) For afloat storage of night vision devices, with storage containers, secure with antipilferage seal (5340-00-084-1570).

(4) Exceptions to the requirements cited in paragraph (b) above are self-contained equipment in housings or cases. This equipment does not require over packaging and may be stored in the case.

f. Installed tactical AM/FM radio and radio teletypewriter systems. Non-CH storage is not authorized. Mountings, connectors, and equipment hardware not removed from the vehicle will be placed within MIL-PRF-131 bags or protected by placing the MIL-PRF-131 barrier material over and around the units, taping it to the surrounding area with ASTM-D5486, Type IV, tape. Uploaded equipment will be prepared for storage as follows:

(1) Installation kits, accessory kits, intercom sets, control boxes, mountings, matching units, and so forth, will be stored on the respective vehicle, as required.

(2) Wrap, cushion, secure, and/or protect, as required, loose items to prevent loss or damage.

(3) All cables, connectors, and so forth, will be connected and attached to their appropriate components to maintain equipment integrity. Handsets, headsets, and so forth will be protected from dust by enclosing them in plastic bags. They will remain connected and secured to the equipment.

(4) Equipment in original unit packs requires no additional packaging; therefore, equipment shall not be removed from its original pack.

(5) Antenna elements and top sections, when removed, will be taped or tied together to secure individual pieces. All elements and sections shall be taped in a manner that will prevent entry of moisture and dust.

(6) Install or replace dust covers over the equipment, when available.

g. Miscellaneous electrical and electronic equipment. Such equipment is not authorized for non-CH storage. Equipment not installed or uploaded will generally be prepared for storage, as outlined in this section and as follows:

(1) Handsets, headsets, connectors, microphones, electrical assemblies, or components, and so forth will be cushioned with bubble or foam cushioning material, secured with ASTM-D5486, Type IV, tape, placed within ASTM-D5118 weather-resistant fiberboard boxes, closed per ASTM-D1974, and secured with the same tape.

(2) Heavy or delicate items (over 5 lbs) will be individually protected and packaged, as specified in paragraph f(a) above.

(3) Equipment in cases or housings will not require packaging.

(4) Equipment in original packaging will not require over packing; therefore, equipment shall not be removed from its original packaging. Small components or assemblies (5 lbs or less) shall be protected, as required, and consolidated in fiberboard boxes to prevent loss, damage, or theft.

h. Wire, cable, and cord assemblies. These items are not authorized for non-CH storage. Replace connector caps. If caps are not available, insert connectors in a plastic bag. Secure bag to cable with ASTM-D5486, Type IV, tape. Wind assembly uniformly on the reel. Secure connectors to the reel with locking devices provided. If the reel is not equipped with locking devices, secure connectors to the reel with A-A-1451 twine. Protect the contents of the reels with original lagging overprotective covers. If not available, over wrap between the reel flanges with weather-resistant corrugated fiberboard of sufficient width to extend the full distance between the reel flanges and sufficient length to overlap the ends by at least 6 inches. Secure over wrap with flat steel strapping or tape.

i. Kits: hardware, installation, modification, and tool. These items are not authorized for non-CH storage. Kits not installed or uploaded on equipment will be visually inspected, cleaned, and protected, as required, and returned to original containers or cases/tool boxes, when provided.

j. Electronic test, measurement, and diagnostic equipment (TMDE). This equipment is not authorized for non-CH storage.

(1) Each item of TMDE will be inspected, cleaned, returned to carrying/transit case, and secured. Ensure that all spare parts or ancillary items are secured within their respective compartments within the case.

(2) For special requirements not provided in paragraph (a) above, refer to equipment TM. If desiccant is required, fold in or wrap with paper to preclude direct contact with the instruments.

k. Trailer-mounted and hand-held reeling machines. These machines are not authorized for non-CH storage.

(1) Trailer-mounted reeling machine.

(a) Both the trailer chassis and the reeling machine will be prepared for storage using the applicable requirements of this chapter or equipment TM for specific guidance.

(b) Secure all loose components to preclude loss or damage.

(c) Wrap, cushion, and place the running spares and tools within a close-fitting fiberboard box, when furnished.

(d) Replace the equipment cover and secure in place.

(2) Hand-held reeling machine. Hand-held reeling machines require no special packaging requirements. Return each item to original package or place the item within a close-fitting ASTM-D5118 weather-resistant fiberboard box, closed per ASTM-D1974, and secure with ASTM-D5486, Type IV, tape.

l. Antenna groups and masts.

(1) Non-CH Storage. Prepare for storage using the requirements cited in the equipment TMs.

(2) CH Storage. Towers uploaded on vehicles require no special storage processing except to apply spot painting, as required. Critical surfaces will be coated with MIL-PRF-32033 preservative oil.

m. Searchlight, infrared AN/VSS series. This item is not authorized for non-CH storage.

(1) Searchlight assemblies uploaded on vehicles require no special storage processing except spot painting. Critical surfaces will be coated with MIL-PRF-32033 preservative oil.

(2) Equipment not installed or uploaded in vehicles will be visually inspected, cleaned, protected, as required, and returned to the proper receptacles within storage/transit cases.

n. Loudspeakers, digital security equipment, telephone sets, radio sets, and communications terminals. This equipment is not authorized for non-CH storage.

(1) Equipment uploaded on vehicles requires no special storage processing except to return and secure all equipment and components to the proper receptacles within their respective storage/transit cases.

(2) Equipment not installed or uploaded in vehicles will be visually inspected, cleaned, protected, as required, and returned to the proper receptacles within storage transit cases.

(3) Equipment for which no transit case is available shall be wrapped with bubble or foam cushioning material, and placed within ASTM-D5118 weather-resistant fiberboard boxes and taped shut with ASTM-D5486 tape.

o. Spare and repair parts. Not authorized for non-CH storage. All spares/repair parts shall be stored in their original packaging. Smaller items (5 lbs or less), unit packed as specified, shall be consolidated in fiberboard boxes to prevent loss, damage, or theft.

SECTION XII. SUPPORT EQUIPMENT

NOTE

Uploading or partial uploading is authorized; however, unpacking and depreserving equipment for storage shall not delay or cause an undo burden upon storage personnel during handoff.

5-12. Detailed preservation requirements

a. Mine Detecting Set.

(1) Non-CH storage.

(a) The preservation for the mine detecting set shall be as follows: Components comprising a complete detecting set shall be placed within the case as provided for. The case shall be closed and secured by the attached clasps. A minimum of two tamperproof seals shall be attached to the clasps in a manner that the case cannot be opened without destroying the seals.

(b) Each mine detecting set shall be individually packed in a close-fitting box conforming to ASTM-D6251, overseas type, style optional. Blocking and cushioning shall be used as necessary to prevent movement of contents within the shipping container.

(2) CH storage. The mine detecting set requirement will be the same as for non-CH storage except each detecting set shall be individually packed in a close-fitting box conforming to ASTM-D5118. Closure shall be in accordance with ASTM-D1974. The packed detecting sets shall be palletized. The pallets shall conform to NN-P-71, Type IV. Load arrangement shall conform to load pattern 3, Appendix D, of MIL-HDBK-774. The height of the pallet including the load shall not exceed 43 inches. The detecting sets shall be secured to the pallet with a total of five primary and secondary straps. Straps shall conform to ASTM-D3953, type I or IV, finish A.

b. Clothing repair shop.

(1) Non-CH storage.

(a) The preservation for clothing repair shop shall be as follows: The trailer chassis shall be preserved in accordance with MIL-STD-3003.

(b) The sewing machine head shall be removed from each sewing machine and the exterior, uncoated metal surfaces cleaned with solvent conforming to MIL-PRF-680. Exterior surfaces, cleaned as specified, and all interior surfaces of each machine head, except sealed oil reservoirs, shall be thoroughly coated with MIL-PRF-3150 preservative. All sharp projecting edges on the machine shall be covered with a minimum of 1/4-inch thick cushioning material conforming to type II, class B of A-A-1898, and the cushioning material secured in place with cord or twine. Cushioning material placed against preserved surfaces shall be prevented from contacting the preservative by the use of barrier material conforming to type II, grade A of MIL-PRF-121. Each machine head shall then be placed in a bag confirming to

type I, class E of MIL-DTL-117 and the bag closed by heat sealing. Machine heads shall be placed in the appropriate tray, secured with straps provided, and the tray secured in the trailer.

(c) The preservation for the hand tack button attaching machine and hand grommet press shall be as follows: All uncoated ferrous metal surfaces of each hand tack button attaching machine and hand grommet press shall be cleaned in accordance with MIL-STD-2073-1 and thoroughly dried. Surfaces cleaned as specified shall be thoroughly coated with type preservative. The hand tack button-attaching machine and the hand grommet press shall then be individually prepared by method 42 of MIL-STD-2073-1. The preserved machine and press shall be placed in the stowage box on the trailer and secured in such a manner as to prevent movement.

(d) The remaining components shall be steam cleaned in accordance with MIL-STD-2073-1 and thoroughly dried. Preservative shall be MIL-PRF-16173, grade 2, for non-contacting and MIL-PRF-3150 for contacting surfaces. Belts shall be removed from ferrous metal pulleys and the pulleys coated with a primer. Components of each clothing repair shop, such as the stands, tables, chairs, etc., shall be secured with means provided. The doors of the trailer body shall be secured in the closed position and padlocks locked in place. Padlock keys shall be securely wire-tied to the lock shaft with a minimum 0.057-inch diameter annealed wire. The hand tools and accessories shall be preserved except that items not covered therein shall be individually preserved in sealed clear polyethylene film bags and shall be in accordance with method 10 of MIL-STD-2073-1.

(2) CH storage. Requirements for CH storage are the same as for non-CH storage.

c. Kitchen, field feeding, company level.

(1) Non-CH storage.

(a) Refer to military specification, MIL-PRF-44156. The component parts of each complete field kitchen shall be cleaned and preserved in accordance with table III. Apply preservative to unpainted or uncoated metal surfaces only. Greaseproof barrier material shall conform to MIL-PRF-121. Secure barrier material with paper tape conforming to ASTM-D5486 tape. Seal openings with tape conforming to ASTM-D5486.

(b) Each complete field kitchen shall be packed in a two-box unit. Each box shall be constructed in accordance with style DBLCC. The approximate outside dimensions shall be 48 inches in length, 40 inches in width, and 43 inches in depth. Each box shall be mounted on a type I (4-way entry), type IV or type V pallet in accordance with MIL-HDBK-774. Box 1 of two shall contain: heater cabinet, pot cradle, two food containers, water bag, cutting board, fire extinguisher, lantern, tool chest, and M2A burners. Box 2 of two shall contain all remaining components. The contents of each box shall be cushioned, anchored, braced, and blocked as necessary to prevent movement and damage Cover the kitchen field with a canvas tarp or waterproof cover.

(2) CH storage. The field kitchen requirement will be the same as for non-CH storage except the canvas tarp or waterproof cover are not required.

d. Light set.

(1) Non-CH storage.

(a) The methods, preservatives and their application shall be in accordance with MIL-STD-2073-1.

(b) Climber's set, hammer, pliers, reeling machine and screw-drivers shall be preserved by method 20. Apply MIL-PRF-16173, grade 1, preservative to ferrous metal surfaces. Climber's sets and reeling machines shall be individually packaged in boxes conforming to ASTM-D5118, class weather resistant.

(c) The reflectors shall be packaged by method 10 in quantities of 80 each, using a box conforming to ASTM-D5118, class weather resistant. Reflectors shall be nested with a non-corrosive paper between each reflector.

(d) Cable, tube, and wire. Each item shall be packaged by method 10. Individual coils, reels or spools shall be packaged in boxes conforming to ASTM-D5118, class weather-resistant. Tape conforming to ASTM-D5486 shall be used to secure the barrier material.

(e) All other components shall be packaged by method 10 in weather resistant containers conforming to ASTM-D5118 or ASTM-D5168. Items preserved and packaged as specified above weighing less than approximately 40 pounds per package shall be intermediate packaged in boxes conforming to ASTM-D6251, domestic type.

(f) The packing for the light set shall be as follows: Each complete set shall be packed in a crate conforming to MIL-C-104, style a, class optional.

(2) CH Storage. The light set requirement will be the same as for non-CH storage except each complete set shall be packed in a covered crate conforming to ASTM- 6039/-D6039 M.

e. Refrigeration unit.

(1) Non-CH storage.

(a) The preservation for the refrigeration unit shall be as follows: All exposed, uncoated, unpainted, ferrous metal surfaces shall be cleaned by any process that will not damage the item and thoroughly dried.

(b) All cleaned, exposed, unpainted, non-contacting ferrous metal surfaces (surfaces that do not contact other surfaces in operation) of the unit, shall be coated with MIL-PRF-16173, grade 1, preservative. All cleaned, exposed, uncoated, unpainted ferrous metal contacting surfaces (surfaces that contact other surfaces in operation), except shafts and pulleys, of the unit shall be coated with MIL-C-11796, class 3, preservative.

(c) The refrigeration charge shall be pumped down and all hand valves closed and capped. Closed valves shall be tagged or otherwise clearly marked with instructions for restoring to service. Warning tags shall be prominently affixed to the controls and shall caution against operating the unit without opening valves. Oil and refrigerant shall not be removed from the system.

(d) The diesel engine shall be preserved in accordance with TACOM ATPD 2232.

(e) Exposed, uncoated, ferrous metal surfaces of shafts and sheaves shall be coated with compound conforming to A-A-52465. All mounted belts shall be relieved of tension.

(f) All openings into the electric motor, switches, and control boxes, and faces of gauges, meters, thermostats, indicators, et cetera, shall be sealed or covered with tape conforming to type III or IV of ASTM-D5486.

(g) The battery leads shall be disconnected and terminals taped. The battery hold-down clamps shall be coated with MIL-C-11796, class 3 or MIL-PRF-16173, grade 2 preservative. The electrolyte shall be unit packed in accordance with 0-S-801.

(h) Each refrigeration unit shall be packed in a cleated plywood box conforming to overseas type, style B, type 3 load of ASTM-D6251. The electrolyte shall be blocked and braced or anchored and the container closed and strapped. Each box shall be provided with a fully sheathed skid base. The sheathing for the base shall be as specified for the sides, except that the plywood box shall be strapped with a minimum of 3/4 by 0.023 inch steel strapping conforming to type I of ASTM-D3953.

(i) Special handling marking requirements applicable to arrows and the words "This Side Up" shall apply.

(2) CH storage. The refrigeration unit requirement will be the same as for non-CH storage except the ASTM-D6251 shall be domestic type.

f. Surveying set, electronic distance measuring equipment (SEDME).

(1) Non-CH storage.

(a) Preservation for the surveying set will be as follows: All components for which cases are provided shall be placed in their respective cases and the case lids closed and secured. The case containing the SEDME equipment system shall have desiccant placed within the case. The desiccant shall conform to MIL-D-3464 and shall be in the quantity required in accordance with the formula specified in MIL-STD-2073-1. The components shall be placed in the transport case as provided for and the case lid closed and secured. Components such as the tripod, for which cases are not provided, shall be placed in close fitting boxes conforming to ASTM-D5118, W5c, style optional. The box containing the tripod shall have a fitted block of wood secured in the end of the box to prevent the tripod legs from puncturing the box. Each box shall be closed and secured in accordance with method V of ASTM-D1974.

(b) The packing of the surveying set will be as follows: The components comprising a complete SEDME equipment system, including those in carrying cases, shall be packed together in a close-fitting box conforming to ASTM-D6251, overseas type, grade B, style optional. The contents shall be blocked or braced within the box in a manner to prevent movement or damage. The box closure shall be in accordance with ASTM-D1974. Strapping shall conform to ASTM-D3953, class 1, type I or IV, finish B, size as applicable.

(2) CH storage. The surveying set requirement will be the same as for non-CH storage except boxes shall be domestic type and strapping shall be finish A.

g. Expandable shelter.

(1) Non-CH storage.

(a) The preservation and packing for the shelter will be as follows: All hardware necessary for erection and operation of the shelter shall be secured within the shelter. The equipment container shall be securely fastened with tie down straps to the fixed floor. The parts in the equipment container and in the shelter shall be secured and padded, as required, to ensure that no damage shall occur to the parts, the equipment container, or the shelter. All exterior electrical connections shall be covered and all expandable mechanisms shall be secured.

(b) The shelter shall be closed into its container mode and secured by means provided. Mechanical seals shall be placed on the doors to deter unauthorized entry to the shelter.

(2) CH storage. The shelter requirement will be the same as for non-CH storage. USAMMA managed facilities may have shelters expanded for COSIS on installed medical equipment

h. Clam shelter.

(1) Non-CH storage.

(a) Each Clam shelter will be packed in six reusable wooden crates with skids, approximately 12'8" x 4' x 4', sufficiently strong to withstand stacking, and shall not exceed 4,600 lbs per crate. Lights and electrical systems shall be packed in fiberboard boxes. Fabrics shall be folded and stacked. The technical manual shall be packed so it is easily accessible upon opening number 1 crate. All components shall be blocked, braced, or cushioned, as necessary, to prevent damage.

(b) The following special markings shall be included: All interior packaging and unpacked items shall be marked or tapped with part number (if applicable), nomenclature, and quantities. Marking shall match an enclosed packing list of items contained in each crate and the component manual.

(2) CH storage. Requirements for CH storage are the same as for non-CH storage.

i. Tool outfit, pioneer, portable.

(1) Non-CH storage.

(a) The preservation for the tool outfit shall be as follows: Preservatives specified shall be applied in accordance with MIL-STD-2073-1. Unfinished surfaces shall be coated with MIL-PRF-16173, grade I or grade 4, preservative. Exposed exterior machined surfaces shall be coated with MIL-C-11796, class 3, or MIL-PRF-10924 preservative. The coated surfaces shall be wrapped or covered with barrier material conforming to MIL-PRF-121, type I, grade A, class 2 and secured in place with tape. Protected items having mounting brackets or holders shall be preserved as specified and when possible placed in the case.

(b) The trailer components shall be preserved in accordance with level A (mobile) requirement of MIL-STD-3003. All hand tools and similar equipment shall be preserved in accordance with level A requirement.

(c) Interiors of padlocks shall be coated with MIL-PRF-32033 and operated to assure penetration of the lubricant. Padlocks not attached to the body assembly and the required keys shall be preserved in accordance with MIL-STD-2073-1, method 33 or 31 and secured within the body assembly. Attached padlocks shall be additionally protected by a wrap of barrier material conforming to MIL-PRF-121, type I, grade A class 2 and the wrap secured with tape. For the fire extinguisher, exterior metal surfaces requiring the application of a contact preservative in accordance with MIL-STD-2073-1 shall be coated with MIL-PRF-16173, grade 1, preservative. The extinguisher shall be placed in the mounting bracket and secured.

(d) The preserved and unpreserved components and items of equipment shall be placed and secured within the body assembly utilizing the mounting provided whenever possible. Components and items of equipment that cannot be secured by the mountings provided, because of the preservation requirement, shall be consolidated together in boxes conforming to ASTM-D5118, W5c. When level 2 equipment is procured, the fenders shall not be installed. The fender mounting hardware and the body to trailer mounting hardware shall be placed in a close fitting box conforming to ASTM-D5118, W5c.

(e) The packing for the tool outfit shall be as follows: When level 1 equipment is procured, each complete trailer-mounted tool outfit, shall be prepared for unboxed mobile shipment in a manner that ensures carrier acceptance and safe delivery to destination. When level 2 equipment is procured, each complete body assembly shall be packed in a box conforming to MIL-B-26195, type II, style optional, class 2, with rubbing strips and plywood superstructure.

(2) CH storage. The tool outfit requirement will be the same as for non-CH storage, except when level 2 equipment is procured the boxes shall be type 1 for domestic shipment.

j. Container, refrigerated.

(1) Non-CH storage.

(a) The preservation for the refrigerated container shall be as follows: When a plywood cover plate is furnished in lieu of the refrigeration unit, it shall be installed over the refrigeration unit opening.

(b) Fuel tanks fabricated from material requiring the application of a preservative in accordance with the criteria of MIL-STD-2073-1 shall be filled with preservative oil conforming to Type I or Type II, grade 30 of MIL-PRF-21260. The oil shall then be completely drained into a recovery container. Any removed drain plugs shall be coated with the preservative oil specified and reinstalled. The fuel line fitting cap shall be installed on the fuel line.

(c) The bare end of the cable shall be wrapped with tape conforming to ASTM-D5486. The connector shall be covered with a protective cap or by wrapping the tape. The interior surfaces of the exhaust lines shall be atomized sprayed with oil conforming to MIL-PRF-21260, Type I or II, grade 30. Rain caps shall be secured to prevent opening using tape conforming to ASTM-D5486. The glass face of the recorder shall be protected with a piece of plywood placed over and completely covering the glass area. The plywood shall be held in place with tape conforming to ASTM-D5486. The recorder charts shall be preserved in accordance with MIL-STD-2073-1, method 33 or 31 and secured inside the container.

(d) The generator set when furnished shall be preserved in accordance with Level A requirements of PPP-G-2919 except that instead of bolting to a shipping container base, the generator set shall be bolted through the barrier material to the refrigerated container floor frame with the fasteners provided. A cover shall be provided consisting of ends, sides and top constructed in accordance with ASTM-D6251 for an overseas type, style I box.

(e) The refrigeration unit when furnished shall be preserved with MIL-PRF-16173, grade 2, or MIL-C-11796, class 3. The exterior portion of the refrigeration unit shall be completely covered with a shroud made from material conforming A-A-3174. The shroud shall be sealed to the container around the unit with tape conforming to ASTM-D5486.

(f) The refrigerated container shall not require over packing.

(2) CH storage. The refrigerated container will be the same as for non-CH storage except the generator sets shall be preserved in accordance with Level B requirements and the generator covers shall be fabricated as specified for domestic type box.

k. Trailer mounted field kitchen.

(1) Non-CH storage. The components and equipment of the kitchen shall be packed in the center aisle and arranged and secured at the option of the packer. The components and equipment of the kitchen shall be adequately protected and secured to prevent damage. Tape the slack respective lift loops on each side of the trailer tongue with 2-inch minimum width tape conforming to type IV of ASTM-D5486.

(2) CH storage. The trailer mounted kitchen field requirement will be the same as for non-CH storage.

l. Reproduction set.

(1) Non-CH storage.

(a) The reproduction set shall be preserved and packed as follows: All the components of each reproduction set shall be placed into proper carrying cases or boxes. Cushioning shall be used, as necessary, to prevent movement or damage. Closure of the carrying case and boxes shall be accomplished by means provided.

(b) Each complete reproduction kit shall be packed in a cleated-plywood shipping container conforming to overseas type, style A of ASTM-D6251. Cushioning shall be used, as necessary, to fill voids within the shipping container and prevent movement or damage of contents. Each shipping container shall be closed and strapped in accordance with ASTM-D6251.

(2) CH storage. Requirements for CH storage are the same as for non-CH storage.

m. Spray outfit .

(1) Non-CH storage.

(a) It is recommended that the paint spray outfits be packed in a manner duplicating the original packing when received in new condition. Drain gasoline or run gasoline tank dry; spray inside of gasoline tank with MIL-PRF-21260 preservative, type 1, grade 10. Drain and refill engine and compressor crankcase with MIL-L-2126 preservative, type I, grade 10. Attach a tag on both engine and compressor indicating, "Crankcase is filled with MIL-PRF-21260 preservative, drain and refill with approved oil before operating." (b) High humidity and rainy weather condition can cause deterioration of exposed metal parts. Make every effort to protect the paint spray outfit from the elements. If the paint spray outfit is not to be used for a period of time, protect it by covering with a tarpaulin. Keep gasoline tank full to eliminate condensation. Remove and clean fuel filter bowel daily. Lubricate wheel bearings more frequently than normal.

(b) The spray outfit component such as tanks, spray guns, hoses, extension, cups and respirators shall be packaged in the chest provided.

(2) CH storage. Requirements are the same as for non-CH storage except the high humidity and rainy weather condition are not applicable.

n. Target set, surveying.

(1) Non-CH storage.

(a) The target set will be preserved and packaged as follows: All metal surfaces of the instruments shall be cleaned and dried in accordance with MIL-STD-2073-1. Lens and mirror surfaces shall be cleaned with tissue paper conforming to A-A-50177, type I. The unprotected surfaces of instruments and accessories, except those instruments and accessories preserved by method 50, requiring a contact preservative in accordance with MIL-STD-2073-1, shall be coated with a thin film of MIL-PRF-3150. The preservative shall be applied by brushing or wiping. Care shall be exercised to prevent the preservative from contacting lenses, mirrors, instrument finishes, or nonmetallic surfaces. Surfaces to which the preservative is applied shall be wrapped or covered with barrier material conforming to MIL-PRF-121, Type II, grade A, class 2, and the wrap or cover shall be secured with tape conforming to ASTM-D5486.

(b) Each battery and lighting accessory case with all accessories contained within the case shall be preserved by method 10. The container shall be a box conforming to ASTM-D5118, W5c, W6c or V3c. The box shall be waterproof sealed with tape in accordance with ASTM-D1974, method V closure.

(c) Each tribach with optical plummet and base plate and technical publications shall be preserved in accordance with MIL-STD-2073-1, method 42. The inner container shall be the carrying case. The outer container shall be a close-fitting box, class domestic SW, grade 125, conforming to ASTM-D5118.

(d) Target sets preserved as specified above shall be packed in close-fitting boxes conforming to ASTM-D6251, overseas type, style optional. Strapping shall conform to ASTM-D3953, class I, or IV.

(2) CH storage. The target set requirement will be the same as for non-CH storage except that boxes shall be domestic type and strapping shall be finish A.

o. Survey set, artillery fire control.

(1) Non-CH storage.

(a) The preservation for the survey set shall be as follows: Cleaning and drying shall be in accordance with MIL-STD-2073-1. Preservative shall not contact lenses, mirrors, instrument finish, or nonmetallic surfaces. Surfaces coated with preservative shall be wrapped or covered with barrier material conforming to MIL-PRF-121, type II, grade A, class 2. Exposed threads and exposed metal surfaces of instruments, parts and accessories requiring a contact with MIL-PRF-3150 preservative. Each item in the vendor's container, when furnished, shall be preserved by method 33, when necessary to prevent damage from folding or flexing.

(b) The remaining components such as arrow sets, target lights, plumb bobs, range poles, tension handles, and tripods shall be preserved as follow: Each item shall be preserved by method III in a close-fitting box conforming to ASTM-D5118, W5c or W6c.

(c) Set components shall be consolidated packaged in the chest in accordance with the chest loading plan where space permits. Components listed on the chest loading plan that will not fit into the chest and other small components shall be consolidated packaged in close-fitting boxes conforming to ASTM-D5118, W5c. Cushioning and blocking shall be provided to control movement of components within the chest or boxes.

(d) The chest and other components of each complete surveying set shall be packed together in a close-fitting box conforming to ASTM-D6251, overseas type, style optional. Strapping shall be zinc coated and shall be placed adjacent to the box skids.

(2) CH storage. The surveying set requirement will be the same as for non-CH storage except the boxes shall be domestic type and strapping need not be zinc coated.

p. Theodolite, survey.

(1) Non-CH storage.

(a) The preservation for the survey theodolite shall be as follows: The rigid metal hermetically sealed case with the desiccant inside shall not require additional preservation, except that when a transport case is furnished, the theodolite shall be placed in the transport case.

(b) If the case is not hermetically sealed, each case containing the theodolite, tools, accessories, and technical publications shall be preserved in accordance with MIL-STD-2073-1, method 52, using the case as the inner container and a close-fitting box conforming to ASTM-D5118, V3c, style optional, as the outer container. The box shall be waterproof sealed with tape in accordance with ASTM-D1974, method V closure.

(c) Each battery and lighting accessory case with all accessories contained within the case shall be preserved by method 10. The container shall be a box conforming to ASTM-D5118, W5c, W6c or V3c, as applicable to the weight of the case, style optional. The box shall be waterproof sealed with tape in accordance with ASTM-D1974, method V closure.

(d) Each theodolite, with accessories as specified shall be packed in a close-fitting box conforming to ASTM-D6251, overseas type, style A or B. Accessories to be packed with the theodolite that are preserved method 33 shall be consolidated packaged in a close-fitting box conforming to ASTM-D5118, W6c, style optional, before packing is accomplished. The components shall be blocked braced and cushioned within the box. The theodolite shall be completely isolated from the box sides, ends, top and bottom.

(2) CH storage. The survey theodolite requirement will be the same as for non-CH storage except the boxes shall conform to ASTM-D6251, domestic type.

q. Shop vans and non-ISO shelters.

(1) Non-CH storage.

(a) Inventory and order/replace missing or damaged items.

(b) Secure tools and equipment in drawers, cases, or appropriate racks in their ship van, and cushion as necessary to prevent damage. Place remaining tools and equipment in fiberboard boxes, ASTM-D5118, class weather resistant, and cushion to prevent damage. Block and brace boxes to prevent movement within a van or shelter.

(c) Cover electrical connectors with approved caps or cover with MIL-PRF-121, grade A, class 1, barrier material secured with ASTM-D5486, type IV, tape.

(d) Seal technical manuals in water vapor proof plastic bags and store in designated receptacles or ASTM-D5118, class weather resistant, fiberboard boxes.

(e) Coat bare metal surfaces with MIL-PRF-21260, PE 15-40, preservative oil.

(f) Install a desiccator's breather assembly (see Para 5-llb(l)(q)).

(g) Close, secure, and seal door with tape conforming to ASTM-D5486, type IV, tape.

(h) Close and lock doors. Wrap padlocks with MIL-PRF-121, grade A, class 1 barrier material secured with ASTM-D5486, type IV, tape. Secure keys per local procedures.

(2) CH storage.

(a) Prepare as above except do not install a desiccator's breather assembly and tape doors.

(b) Open shelter vents and drains just prior to placing in storage to permit air flow.

r. Decontamination apparatus, power-driven M12A1.

(1) Non-CH storage. Tank Unit. Spray a thin layer of preservative in accordance with MIL-C-10382 into the interior or the tank. The loading hopper and cover shall be installed in place. The two hold down bolts provided shall be tightened to a torque of 10 foot-pounds. Suitable spacers or stops shall be provided between the hopper flange and tank and between the cover flange and hopper flange to limit compression of the gasket to 33 percent of its total thickness. The foot valve assembly shall be installed in its holding clamp and secured in place with the thumbscrew provided. In addition, the valve shall be secured to the installed valve assembly by strapping or wiring to prevent separation from the holding bracket. Threaded areas of the valves shall be coated with preservative oil conforming to MIL-PRF-3150, MIL-PRF-21260 or MIL-PRF-10924. The openings shall be covered with either appropriate plastic caps or plugs or with Grade A, MIL-PRF-121, barrier material, and secured with tape conforming to Type V, of ASTM-D5486. The threads of the thumbscrews shall be coated with preservative oil listed previously. All hoses shall be drained dry. Hose fittings shall be coated with preservative oil conforming to MIL-PRF-3150, MIL-PRF-21260 or MIL-PRF-10924. The hose ends shall be wrapped in barrier material conforming to Grade A, MIL-PRF-121 material and secured with tape conforming to Type V, of ASTM-D5486. The hose assembly P/N 5-59-317 shall be coiled and stowed within the hopper assembly. The suction hose shall be installed, by coiling, within the holding brackets on top of the tank unit. The coiled hoses shall be secured to the tank by steel strapping or wire tying to restrict free movement. Solid fiberboard material shall be utilized between contact points of the strapping and hose as well as the strapping and tank unit, to prevent damage to hose and painted metal surfaces of the tank unit.

(2) CH storage. Same as for non-CH storage.

s. Bakery equipment.

(1) Non-CH storage.

(a) Clean and sanitize the interior surfaces of the mixer, divider, and molder, including the dough troughs, with the following sanitizing rinse solution: One pouch of disinfectant, food service, dissolved in 1 gallon of water. Rinse with clear water and dry with dry compressed air.

(b) Interior surfaces of mixer, including interior surfaces of dough troughs, dough divider, and molder surfaces, which come in contact with dough, will be coated with MIL-C-10382 corrosion preventive compound (food handling machinery and equipment).

(c) Fog the combination chamber, exhaust tube, exhaust pipe, burner nozzle, and shutter assembly with MIL-PRF-21260, PE 15-40, preservative oil. Seal all openings with MIL-PRF-121, type I, grade A barrier material and secure with ASTM-D5486, type IV, tape.

(2) CH storage. No further processing is required after cleaning, as specified in paragraph (1)(a) above.

t. Heaters, duct-type, portable.

(1) Non-CH storage. Exposed ferrous metal surfaces should be covered with MIL-PRF-21260, grade PE 15-40 preservative. Preserved surfaces contacting other surfaces are to be covered or wrapped with MIL-PRF-121, grade A barrier secured with ASTM-D5486, type IV, tape. Seal all openings with approved covers or MIL-PRF-121 grade A, class 1 barrier material secured with ASTM-D5486, type IV, tape.

(2) CH storage. No preservative required.

u. Bath units.

(1) Non-CH storage. Fog combustion chamber, exhaust tubes, exhaust pipe, and burner nozzles with MIL-PRF-21260, grade PE 10 preservative. Seal blower assembly and exhaust port with MIL-PRF-121, grade A, class 1 barrier material secured with ASTM-D5486, type IV, tape. Seal openings in shower stands and shower heads with MIL-PRF-121, grade A, class 1, barrier material, secured with ASTM-D5486, grade IV, tape.

(2) CH storage. No preservation required.

v. Laundry units.

(1) Non-CH storage. Coat all bare ferrous metal surfaces that do not contact other surfaces in operation with MIL-PRF-16173, GR 1 preservative. Surfaces contacting each other in operation will be coated with MIL-PRF-10924 grease. All openings into and around electric motors, switches, outlets, access doors, air vents, timers, shell doors, control panels, etc., will be sealed with MIL-PRF-121, grade A, class 1 barrier material, sealed with ASTM-D5486, type IV, tape.

(2) CH storage. No preservation required.

w. Outboard motors and gasoline engine driven chain saws.

(1) Non-CH storage. With the engine running smoothly at three-fourths open throttle speed, spray MIL-PRF-21260, grade PE 15-40 preservative into the carburetor throat until the engine chokes to a stop. Place item in carrying case and seal with ASTM-D5486, type IV, tape.

(2) CH storage. No preservation required.

NOTE

Gasoline burning equipment will be stored without fuel.

x. Topographic, reproduction, and surveying equipment.

(1) Non-CH storage. Not applicable.

(2) CH storage. Instruments will be placed in their respective carrying cases. No preservative required.

y. Air conditioner A/E32C-39.

(1) Non-CH storage.

(a) The air conditioner shall be preserved a packaged in accordance with method 53 of MIL-STD-2073-1, water vapor proof enclosure, with desiccant. Heat sealed bag shall conform to MIL-B-118. Type I, Class E, F or G, Style 1, 2 or 3 or Type II, Class E, Style 1 or 3 or Type III, Class E, Style 1.

(b) The air conditioner, preserved and packaged per method 53 in accordance with MIL-STD-2073-1 shall be packed in overseas-type containers conforming to ASTM-D6251, wood box. The air conditioner shall be cushioned, anchored, blocked and braced. Skids shall be provided to facilitate machine handling.

(2) CH Storage. The air conditioner requirement will be the same as for non-CH storage except the container shall be of the domestic type of ASTM-D6251.

z. Cargo container.

(1) Non-CH storage. Preservation and packing is not applicable for ISO cargo containers.

(2) CH Storage. Preservation and packing is not applicable.

aa. Refrigerators, prefabricated, panel type, walk-in.

(1) Non-CH storage. The door hinges and latches are the only parts of the refrigerator, which require lubrication. Use a low viscosity SAE oil on these parts once a month. Empty refrigerator completely. Disconnect the external power supply. Disconnect the refrigerator panels. The thermometer and light bulb and globe shall be detached from the panel and packed in a fiberboard box conforming to ASTM-D5118. No packing required.

(2) CH storage. Requirements are the same as for non-CH storage.

ab. Shelter, electrical equipment. Shelters with or without electrical equipment shall be stored in accordance with the provisions of paragraph 5-11lb.

ac. Mats, landing, aluminum.

(1) Non-CH storage.

(a) No preservation is required. (TYPE I) -Twenty four mats shall be stacked one on top of the other on a pallet. Twenty-five locking bars shall be assembled with the mats and taped in place. The pack shall be secured by strapping. (TYPE II) - Thirty two mats shall be assembled with 33 locking bars and stacked in two adjacent stacks, 16 high each, taped and strapped as type I. (TYPE III) - Sixteen mats shall be assembled with required locking bars and packed as for type II.

(b) Components such as starting connectors (15 ea), turn adapters (15 ea), access adapters (75 ea), anchor attachments (375 ea) and edge anchors (760 ea) shall be packed in boxes conforming to ASTM-D6251, overseas type. The boxed components shall be unitized in a crate conforming to MIL-C-104, type I, class 2, style A.

(2) CH storage. Requirements are the same as for non-CH storage, except boxes shall be domestic type.

ad. Alarm Chemical Agent, Automatic M22.

(1) Non-CH Storage. The Alarm Chemical Agent, Automatic M22 shall be unit packed in accordance with its Special Packaging Instruction (SPI) P5-15-19045. The M22 can suffer from contamination when exposed to an uncontrolled environment. Do not remove the system from its packaging unless necessary or upon issue. Avoid long term storage in high temperatures. The M22 contains a low level radioactive source, reference paragraph 3-2(4)(d).

(2) CH storage. Same as for non-CH storage.

ae. Alarm, Chemical Agent, Automatic: Portable Man pack, M8A1.

(1) Non-CH Storage. The Alarm, Chemical Agent, Automatic: Portable Man pack, M8A1 shall be unit packed in accordance with its Special Packaging Instruction (SPI) P5-15-8800. The M8A1 can suffer from contamination when exposed to an uncontrolled environment. Do not remove the system from its packaging unless necessary or upon issue. Avoid long term storage in high temperatures. The M8A1 contains a low level radioactive source, reference paragraph 3-2(4)(d).

(2) CH storage. Same as for non-CH storage.

af. Alarm, Chemical Agent Monitor System

(1) Non-CH Storage. The Chemical Agent Monitor System shall be unit packed in accordance with its Special Packaging Instruction (SPI) P5-15-17100. The Chemical Agent Monitor can suffer from contamination when exposed to an uncontrolled environment. Do not remove the system from its packaging unless necessary or upon issue. Avoid long term storage in high temperatures. The M8A1 contains a low level radioactive source, reference paragraph 3-2(4)(d).

(2) CH storage. Same as for non-CH storage.

ag. M56/M58 smoke generators, NSNs 1040-01-380-1400 and 1040-01-413-8332 respectively, will have their next inspection dates extended to the month and year the vessel scheduled to be uploaded with the materiel is due back in for a maintenance cycle, and will be remarked as such by CEG-A or DDAG. Once aboard vessel, this materiel shall be stored in the temperature and humidity controlled cargo hull of the vessel.

ah. Operational Projects Stock.

(1) Inland Petroleum Distribution System (IPDS). There are approved Preservation, Packing, and Marking Plans that are developed to provide protection against physical deterioration or damage, make the COSIS easier to perform, enhance material identification, and provide an efficient and economical method of packing the equipment for the IPDS. These plans contain complete preservation, packaging, packing, and marking requirements for the IPDS materials and equipment. The descriptions and dimensions of the containers utilized, the required blocking and bracing, contents of each container, gross weights of each container, and the interior/exterior identification markings of each container. Contact Product Manager Petroleum and Water Systems at PAWSHELP@tacom.army.mil , Phone (810) 574-4143, or FAX (810) 574-3988. DSN prefix is 786.

(2) Potable Water System (PWS). The packaging plan developed for this system provides preservation, packing, and marking requirements for the individual PWS equipment systems. The plan was developed to afford maximum protection and provides an efficient and economical method of achieving optimal life, utility, and performance of the PWS. The plan encompasses the protection of items from the point of receipt, to the point where the item is placed in use, to placing the item back in storage for future service. Contact Product Manager Petroleum and Water Systems at PAWSHELP@tacom.army.mil , Phone (810) 574-4143, or FAX (810) 574-3988. DSN prefix is 786.

(3) Fuel System Supply Point (FSSP). The preservation, packing, packaging, and marking plan describes the methods and procedures required for the shipment of the FSSP in standard ISO-1C containers and specialized Triple-Containers (TRICONS). It provides instructions with associated drawings and packing lists for each component. Procedures commonly used by the military for long-term storage have been incorporated. Contact Product Manager Petroleum and Water Systems at PAWSHELP@tacom.army.mil , Phone (810) 574-4143, or FAX (810) 574-3988. DSN prefix is 786.

SECTION XIII. WATERCRAFT

5-13. Detailed preservation requirements

These instructions contain general preservation procedures, applicable to all watercraft prepositioned at Kuwait Naval Base (KNB), Kuwait and Yokohama North Dock (YND), Japan. Procedures applicable to specific craft are provided in paragraphs 6 through 9 below.

a. Underwater hull protection. Prior to accomplishing the general preservation instructions contained in the following paragraphs, the underwater hulls will be cleaned and preserved. Accordingly, all watercraft will undergo dry-docking for required underwater hull repairs, overhaul of the sea valves and strainers, cleaning and painting, and renewal of the cathodic protection system (sea chest and hull zincs), shaft alignments, cutlass bearing renewal, etc. Dry-dock specification shall include:

(1) Indefinite items for underwater weld repair, hull plug welds and plate renewal, all of which will be determined after dry-docking.

(2) Routine overhaul of sea valves and strainers.

(3) Items for cleaning and painting per TB 43-0144, Painting of Watercraft.

(4) The cathodic protection system (zinc configuration) shall be type ZHC or ZSS (bolt-on) zincs and shall be installed per TB 43-0144.

NOTE

To alleviate a potential deterioration problem with the underwater paint system, all underwater surfaces must be washed down with fresh clean water immediately after each craft is removed from the water for dry storage or maintenance. It is important that all marine growth and slime be removed. Extreme care shall be exercised to prevent damage to the underwater paint systems during wash down.

b. General preservation instructions:

(1) Equipment, systems, and machinery of each watercraft will be processed per the following general instruction. Dehumidification will be processed per paragraphs (6) through (9) below. Once the watercraft are preserved and subsequently stored either land cradled in dry storage or moored in wet storage, the interiors will remain in an unlighted condition to preclude or minimize common bacteria growth.

(2) Engines: main propulsion, generator, fire pumps, and anchor winch.

(a) Lubrication systems: At the beginning of each preservation cycle (i.e., after cyclic maintenance, exercise, or contingency) the crankcases and lubricating systems of all engines will be drained and refilled to operating level with MIL-PRF-21260, grade PE-15/40 preservative lubricating oil Upon completion of preservation, the preservative oil will remain in the engines. A tag will be prepared for each engine and attached to or near to lube oil fills: "THIS CRANKCASE IS FILLED TO OPERATING LEVEL WITH PRESERVATIVE LUBRICATING OIL GOOD FOR OPERATION UNTIL THE FIRST REQUIRED OIL CHANGE-DO NOT DRAIN-CHECK OIL LEVEL-IF LOW, FILL TO OPERATING LEVEL WITH OPERATIONAL OE-15/40 FROM THE CLEAN OIL STORAGE TANK".

(b) Fuel systems: Engines will be cranked, thoroughly warmed up, and shut down. The fuel supply valve from the day tank will be secured. The fuel supply line to the engine will be broken at the most accessible/convenient location before the fuel supply pump. A flexible line/hose leading from a container of MIL-PRF-21260, PE-10, preservative oil shall be attached to the fuel supply pump line. The fuel return line shall be disconnected at the most accessible/convenient location. A transparent plastic line will be attached to the broken engine fuel return line and the unattached end shall be inserted into a recovery container to collect the returned fuel. Crank the engine and run at 1/2 speed until undiluted preservative oil MIL-PRF-21260 (as observed through the transparent flex) is flowing into the recovery container. Shut the engine down and reconnect the fuel supply and return lines. Ensure that all air is bleed from the fuel supply line.

NOTE

On the Design 3006 Tug Flight III, the main engine will require several 5-gallon cans of MIL-PRF-21260, PE-10 to preserve the system. EXERCISE CARE TO PREVENT THE FUEL SYSTEM BECOMING AIR BOUND DURING THE PROCESS. The fuel/oil from the recovery container will not be used for preserving other engines.

(c) Combustion chambers: Upon completion of the fuel system preservation and after the engines have cooled to a cylinder head temperature of 100 degrees F or less, the combustion chamber/each cylinder of each engine shall be fogged with MIL-PRF-21260, Grade PE-15/40, as per (a) and (b) below. Air pressure for fogging shall not exceed 25 psi.

1 Two cycle engines with intake port and valves: Remove the air box covers and jack the engine until the piston in the cylinder to be fogged is below the ports. The MIL-PRF-21260, Grade PE-15/40, will be fogged through the ports. Continue jacking and fogging until all cylinders have been fogged, after which the air box covers will be reinstalled.

2 Four cycle engines: Remove the injector nozzles and fog the MIL-PRF-21260, Grade PE-15/40, into each cylinder through the opening with the piston at BDC (bottom dead center). This will entail jacking and fogging until all cylinders are fogged, after which the injectors and nozzles will be reinstalled and timed. The amount of MIL-PRF-21260, grade PE-15/40 to be fogged into each cylinder is 1-1/2 oz. on the Detroit and Cummings engines and 2 oz. on the Flight III tug EMD main engine.

CAUTION

DO NOT RUN ENGINES UPON COMPLETION OF FOGGING.

3 Simplified engine preservation procedure (in lieu of the above, the following procedure may be used): The fuel intake line shall be disconnected at an accessible point A portable container with two compartments shall be connected to the fuel intake line. One compartment shall contain fuel conforming to A-A-52557 and the other shall contain MIL-PRF-21260, Grade PE-15/40, preservative oil. The fuel injector return line shall be disconnected at an accessible point and arranged for drainage into a recovery container. The air inlet shall be disconnected at the point nearest the intake manifold or turbo, as applicable. Engine shall be started and operated at fast idle until thoroughly warm. The engine shall be accelerated to 3/4 speed, at which time the fuel supply shall be switched to portable container containing MIL-PRF-21260, Grade PE15/40, preservative oil. The engine shall be operated at this speed until the undiluted preservative oil is flowing out of the fuel injector return line into the recovery container. Two minutes prior to engine shutoff, begin atomize spraying oil conforming to the crankcase grade of MIL-PRF-21260 specification preservation oil in through the open intake manifold. After 2 minutes of operation, shut off the engine. When the engine has completely stopped, turn off the atomize spray of oil directed into the intake manifold. When the engine has cooled to an acceptable temperature, seal all openings with waterproof tape. Tag the engine as having been preserved.

(3) Cooling systems: All engine fresh water cooling systems will be drained and refilled at the beginning of each preservation cycle with a 50/50 solution of water and military antifreeze (A-A-52624), ensuring the engines are in a ready-to-run status.

(4) Raw water systems: Engines' raw water systems, including piping, coolers, and engine mounted pumps, shall be drained and flushed with fresh clean water. This shall be accomplished by removing installed drain plugs, and/or breaking lines at convenient/accessible low points for the fresh water flush and blowing dry with compressed air. At the beginning of this evolution, the system sea valves shall be secured (wire closed) and not reopened until activation. After all systems/lines/pumps are drained, flushed, and blown dry, plugs shall be reinstalled and broken lines shall be reconnected, leaving the system intact and ready for service.

(5) Governors: Hydraulic type. Fill to operating level with MIL-PRF-21260, grade PE 15/40, preservative oil.

(6) Reduction gears:

(a) Hydraulic type. Prior to engine preservation, the hydraulic reduction gears systems will be inspected for proper fluid level and contamination. Add MIL-PRF-2104 combat tactical engine oil grade 30 to bring to operating level or, if contaminated, drain and flush with operating fluid (OE/HDO-30). Cleaned systems will be filled to operating level with approved fluid (OE/HDO30) and operated during the preservation cycle of the engines. Any exposed ferrous surfaces, control rods/linkages, and so forth, will be coated with MIL-PRF-21260, grade PE-15-40, preservative oil.

(b) Enclosed gears: Oil lubricated gears not otherwise provided for will be inspected for level of lubricant and for evidence of water and contamination of lubricant. Add lubricant specified by the applicable lubrication order to raise to operating level or if contaminated, drain the lubricant and flush the gear housing. The cleaned gear case will be filled to operating level with approved lubricant and operated under no load to ensure coating of all interior surfaces and components.

(c) Exposed gears: Non-precision exposed gears subject to the weather will be coated with MIL-PRF16173, grade 1, preservative; all other exposed gears will be coated with MIL-PRF-16173, grade 2, preservative.

(d) Drive belts and pulleys: Drive belts will be left fully tensioned and ready for service. Pulley grooves shall be coated with a thin film of rust inhibiting lacquer resisting synthetic primer.

(e) Exposed drive chains: Exposed drive chains will be coated with MIL-PRF-16173, Grade 2, preservative.

(7) Hydraulic systems: Brake, ramp, or steering systems shall be filled to operating level with approved fluid required by the applicable lubrication order or the technical manual.

(8) Brakes: The brake disc and/or drum facings shall be coated with a thin film or rust inhibiting lacquer resisting synthetic primer.

(9) Air compressors: The operating lubricant will be drained and the compressor crankcase refilled to operating level with MIL-PRF-21260, preservative lubricating oil, grade PE-15/40. The air line will be disconnected from the compressor. The air cleaner will be removed, and while the compressor is operating, spray 4 or 5 ounces of MIL-PRF-21260, grade PE-15/40, into the air intake. The compressor will be operated long enough to ensure coverage of all internal surfaces. The air cleaner and line will be reinstalled, leaving the compressor ready for service.

(10) Tanks:

(a) Diesel oil day tanks: Upon completion of cleaning, each tank will be atomize sprayed with MIL-PRF-21260, grade PE-15/40, preservative. Excess preservative accumulating in the bottom of the tanks shall be removed, and the tanks closed, ready to be filled with diesel fuel upon activation. LCM-8's have no day tanks, therefore, the LCM fuel storage tanks will be treated as described at (b),2 below.

(b) Diesel oil storage tanks: Diesel fuel oil storage tanks will be cleaned and atomize sprayed with MIL-PRF-21260, grade PE-15-40, preservative. Excess preservative accumulating in the bottom of the tanks shall be removed, and the tanks closed, ready to be filled with diesel fuel upon activation.

(c) Lubricating oil storage tanks: Lubrication oil storage tanks shall be filled with oil as specified in the applicable lubrication order or technical manual to place watercraft in a ready-for-service condition.

(d) Dirty oil and sludge tanks: Dirty oil and sludge tanks shall be drained, cleaned, closed up, and left in a ready condition.

(e) Raw water/ballast tanks: These tanks shall be drained and blown dry. In the case of large tanks, such as ballast tanks, they will be pumped, cleaned, and dried out. Reinstall access covers with new gaskets and leave any installed vents open. Depending on paint system condition, the raw water/ballast tanks may require the removal of corrosion and painting.

(f) Potable water tanks: Portable water tanks shall be inspected prior to preparation of Specifications for Underwater Hull Protection work specified in paragraph a above. For severely deteriorated tanks (needing more than touch-up painting), an item shall be included in the Underwater Hull Protection Specifications to sandblast the tanks and apply an epoxy coating per TB 43-0144. Potable water tanks (pressure tanks, hot water heater/tanks, and so forth), will be drained and blown dry with compressed air. Potable water storage tanks will be drained/pumped, dried, cleaned, and painted as required. Reinstall access covers (access covers on LCU 2000 class vessels are normally left open) and leave installed tank vents open. Preservatives will not be applied or introduced into the portable water systems. Chlorine for sanitization water and tanks or watercraft shall be placed aboard the respective craft in a cool dry place.

(g) Air tanks: Air tanks will be bled down. The valves for purging moisture from the tanks will be left open until activation. No other preservation is required.

(h) Fuel oil tanks: Clean and fog.

(i) Emergency generator tank (LCU, LT) will be filled to 80% capacity.

(11) Oil and separator vessels: These shall be drained. No other preservation required.

(12) Pumps: (Other than engine mounted).

(a) Raw water pumps: Raw water pumps shall be drained and flushed with clean fresh water, and then blown dry with compressed air. Drain plugs on all pumps shall be attached to the pump in a suitable storage receptacle. LCU 2000 electric fire pump will have flexible connection removed and stored adjacent to the pump with the fastening contained in a suitable storage receptacle.

(b) Fresh/portable water pumps: Fresh/portable water pumps shall be drained and blown dry with compressed air. Drain plugs shall be attached to the pump in a suitable storage receptacle. Do not drain/and blow dry the engine cooling water pumps since these systems have anti-freeze protection.

(c) Fuel and lubricating oil pumps: No preservation required. Leave primed and ready for service.

(d) Pump packaging: Pump shaft packing shall be replaced when packing glands are taken up more than 50 percent.

(13) Oil purifiers and filters: No preservation is required. Leave primed ready for service.

(14) Heat exchangers: The raw water sides of heat exchangers shall be drained and blown dry with compressed air. Drain plugs shall be reinstalled.

(15) Refrigeration units: Medium will be pumped down to the unit receiver. All receiver valves will be secured and tested for leaks. Cooling water will be removed from the unit as per this paragraph. Belts and pulleys shall be preserved per this paragraph.

(16) Electrical equipment:

(a) Rotating electrical equipment: Motors and generators can endure a lengthy period of exposure without deterioration. No preservation is required. Ensure that sealed motors exposed to the elements are properly sealed.
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(b) Switch boards, panels, and controllers: No preservation is required. Tie doors on panels and controllers located within the dehumidified area in an open position. Panels fitted with removable disks will have the disks removed and enclosure doors closed. Ensure that sealed controllers on the exterior, exposed to the elements, are properly sealed and protected with Herculite covers.

(c) Receptacles: Non-watertight receptacles exposed to the elements will be sealed with glue and pressure sensitive tape.

(d) Horns, bells, buzzers and lights: All externally mounted horns, bells, buzzers and lights provided with waterproof protection will remain in place. Units not provided with waterproof protection will be removed, identified, and stowed in the dehumidified area.

(e) Gauges and instruments: No preservation required.

(f) Sound powered telephones will have the internals removed, labeled, and stored in a receptacle within the wheelhouse of the appropriate vessel.

(17) Sewage collecting, holding, and transfer (CHT) systems:

(a) CHT systems with raw or fresh water flush: Applicable to the Design 3006 Tugs Flight III. While the vessel's power systems are still operational (early on in the preservation evolution), the system shall be operated per posted instruction, that is, flushing and pumping the collecting tank into the holding tank, then flushing the holding tank into a shore sewage receptacle, leaving both the collecting and holding tanks empty and ready for service. The grinder pumps shall be drained and filled with MIL-PRF-21260, PE-15/40, preservative oil.

(b) CHT systems with mineral oil flush medium: Applicable to the Design 264B (Modified) cranes. While the vessel's power systems are still operational, flush the commode with the oil pressure pump switch off to relieve the system pressure. Pump the collecting tank into the holding tank. Pump the holding tank to a shore sewage receptacle, leaving both the collecting and holding tanks ready for service. The oil pressure pump does not require preservation.

(18) Heating boilers:

(a) Water sides and systems shall be drained and thoroughly dried with dry compressed air: Drain plugs will be removed and lines disassembled sufficiently to effect complete draining of water. After drying, plugs will be attached to the boiler in a suitable storage receptacle. Lines will be reassembled to ensure that the boiler is left in a ready for service condition.

(b) Fire sides. Fire sides of the boilers shall be cleaned, closed, and left in a ready for service condition.

(c) Oil burners. Pot and atomizing type oil burners will be removed, drained, cleaned, dried, and reinstalled in a ready for service condition. No other preservation required.

(19) Valves.

(a) Weather exposed valves. Valves will be turned to a fully open position. The stems will be coated with MIL-PRF-16173, grade 2, preservative, and then closed. Unpainted ferrous metal surfaces remaining exposed will be coated with MIL-PRF-16173, grade 1 preservative.

(b) Sea valves and overboard discharge valves will be secured in a closed position with wire to prevent accidental opening. Sea strainers baskets will be cleaned and left in place with covers installed and secured, ready for service.

(c) Other valves within compartments, valves will be left in an open position unless preservation procedure/configuration dictates otherwise in which case the valve/valves would be closed. For example, "The fuel oil day tanks supply valves shall remain closed until such time as the craft is activated.

(20) Capstans, winches and windlasses. The above deck portions of capstans, winches, and windlasses such as exposed gears and pinions will be preserved per this paragraph. Gear boxes (enclosed gears) and brake drums will also be preserved per this paragraph. All exposed ferrous metal surfaces of shafts, linkages, and threaded adjustments shall be coated with MIL-PRF-16173, grade 1 preservative. Herculite covers shall be installed for protection from the elements.

(21) Piping systems.

(a) Raw water piping systems. All raw water systems (bilge and ballast, fire fighting, sanitary, and engine cooling) shall be drained, flushed with clean fresh water, and blown dry. Lines or fittings broken or removed to effect draining and/or flushing shall be reinstalled leaving the system ready for service. This shall be accomplished in conjunction with the preservation of raw water pumps as described in this paragraph.

(b) Fresh water piping systems: All fresh water systems including potable, heating, and hot water shall be drained, and blown dry with dry compressed air. Lines and/or fittings removed to effect drainage shall be reinstalled leaving the system ready for service. This shall be accomplished in conjunction with potable water pumps, as described in this paragraph.

(22) Davits. Davits rigged, or unrigged, and stowed on deck, shall have the bearing surfaces and matching davit socket bearing surfaces coated with MIL-PRF-16173, grade 2 preservative.

(23) Deck fitting. Flush deck fittings shall have the threads coated with MIL-PRF-16173, grade 2, preservative and reinstalled.

(24) Anchors. Any bare ferrous metal surfaces and unpainted fittings anchors rigged or stowed on deck shall be coated with MIL-PRF-16173, grade 1, preservative.

(25) Wire, rope, rigging and fittings.

(a) Rigging, standing rigging, and related fittings will remain in place and will be cleaned and coated with rust resistant lubricant (MIL-PRF-18458). Threaded fittings such as turnbuckles, shackles, and ramp load binders shall be turned sufficiently to ensure a coating of preservative on the mating surfaces.

(b) Wire rope. Wire rope on all of the craft will remain reeved and/or rigged. Wire rope on drums such as winches and similar gear will be inspected and coated with rust resistant lubricant (MIL-PRF-18458). The exposed surfaces of the drums will also be cleaned and coated. Precautions shall be taken to ensure wire ropes on the landing craft that are stowed through the voids and/or ramps are not overlooked. Ensure that tension is maintained, with proper lay, as the wire rope is rewound onto the drums.

NOTE

On the 115 ton BD Cranes, it is neither feasible nor necessary to unwind all of the wire rope from the auxiliary, main hook, and luffing drums. The wire rope exposed to the elements including the unpainted surfaces of the sheaves, shall be thoroughly cleaned and coated with rust resistant lubricant (MIL-PRF-18458). The wire rope within the rotate machinery house, from the house penetrations to the top layer on the drums shall also be coated.

(26) Sheaves. All sheaves shall be lubricated per the design watercraft's applicable lubrication order.

(27) Steering systems. Unpainted surfaces of quadrants, rods, and linkages, exposed to the weather/elements shall be coated with MIL-PRF-16173, grade 1 preservative. Exposed surfaces of hydraulic rams shall be coated with MIL-PRF-21260, grade PE-15-40.

(28) Galley equipment. A light coat of MIL-C-10382, vegetable oil, will be applied to those surfaces of galley equipment vulnerable to corrosion, such as grill tops, and so forth. Oven doors will be locked and wired open. Oil burners of galley ranges will be drained. Doors on refrigerators will be blocked and wired open for ventilation.

(29) Sanitary drains. All drain traps shall be drained. Plugs will be removed to drain the systems and stored in a suitable receptacle adjacent to the fitted position.

(30) Fixed fire fighting systems. Systems shall be ready for service. Systems will be tested and certification stored in the appropriate vessel’s files.

(31) Equipment removal. LCM, radio mounts, horns, life ring mounts, light masts, screen wipers, and well deck stanchions will be removed and stored within the appropriate vessel with the dehumidification boundaries.

CAUTION

Some of the LCU's have a HALON System that is controlled by a manual/automatic switch located in the switchboard room. During storage the switch will be placed in manual position. Do not vent this system. The others have a FM 200 system that is controlled by manual or automatic switches. All will eventually have the FM 200 system fitted.

c. Special preservation instructions.

(1) Batteries. After all other preservation has been accomplished and the need for the installed batteries no longer exists, the battery cables shall be disconnected. The cable lugs shall be cleaned and coated with a light coat of oil or grease. The old batteries shall be removed and turned into the preservation facility supply section for disposition. New starting batteries (dry charged) shall be installed and secured in the battery storage trays. The cables will not be connected. Electrolyte for the batteries to be used when the craft is activated in a hostile environment shall be placed and secured in close proximity of the batteries. Two each 12V dry charged batteries for use during biennial activation and test will be stored on each preserved watercraft. Electrolyte in sufficient quantity will be stored near each battery. Electrolyte must have at least 2 years of shelf life remaining.

(2) Dehumidification. Critical areas of each craft shall be placed under dehumidification per paragraphs (6) through (9) below, each of which pertains to a specific design craft Sealing of the watercraft shall be accomplished utilizing, as much as possible, installed doors, scuttles, covers, port lights, and so forth, augmented with tape, glue and strip coat, plywood, and duct seal.

(3) Lubrication. Each craft will be lubricated per the applicable lubrication order, except in those areas requiring the application of contact preservatives.

(4) Hazardous materials. Materials considered hazardous including, but not limited to, open or used containers of paint, thinners, solvents, or other flammable materials and pyrotechnics, will not be stored aboard preserved watercraft.

(a) Paint, thinners, solvents, and so forth. Open or partially used containers of flammable materials shall be removed from the craft by the preserving activity. Disposal shall be by approved methods.

(b) Pyrotechnics. These shall be inventoried, boxed/packaged using an approved method (identified as belonging to craft) and removed from the craft for storage at the appropriate armory/ASP.

(c) The two oxygen and two acetylene cylinders normally supplied empty as part of the BII, shall be filled to capacity and placed in an upright position in the paint locker and bosun's store on the deck of the vessel. For reasons of safety, the oxygen and acetylene storage bottles will be separated with one type stored in the paint locker and the other in the bosun's store. These cylinders shall be replaced every 3 years, during cyclic maintenance.

(5) Machinery and miscellaneous equipment covers. Normally machinery and miscellaneous equipment exposed to the elements are enclosed and protected with dehumidified air and/or sealed with pressure sensitive tape, glue, strippable and bituminous coatings. In lieu of performing the above, machinery and miscellaneous equipment will be protected from the elements with covers manufactured from Herculite.

(a) The Herculite, a commercial trade name for Nylon Chloroprene, Color 36440 light gray, covers shall be provided by the activity or organization.

(b) The Herculite covers will be manufactured with grommets and nylon draw strings to secure the cover to machinery and miscellaneous equipments.

(c) It is the responsibility of the storage activities and organizations to lift the actual dimensions from the watercraft for each cover to be fabricated by local vendors.

(d) Research reveals that Herculite is the best material to use for covering machinery and miscellaneous equipment exposed to the elements. The Herculite cover will breathe a small amount of air and will provide circulation within the cover.

(6) Plywood blanks. Blanks are normally used in preservation procedures to introduce dehumidification to a vessel. They are normally sealed with pressure sensitive tape, glue, strippable and bituminous coatings over large openings penetrating the dehumidified area which are not air tight It is the responsibility of the storage activity/organization to lift the actual dimensions from the watercraft for each blank to be fabricated and to design, procure and install the simple quick-acting dogging devices or strongback securing devices.

(7) BII (basic issue items). Boat sets are provided for each watercraft as a minimum authorized requirement for the operation, maintenance, health, safety, and welfare of the crew. All vessel operating equipment, operating supplies, repair parts, and accessory items will have been previously inventoried, replenished, represerved, and repackaged by the storage activity/organization. The storage activity/organization will also have had previously re-stowed on each vessel all items in their appropriate stowage brackets, bins, lockers, and storerooms, except accessory items normally stored on the exterior (fire hoses, nozzles, fire axes, spanner and dog wrenches), which shall be tagged with identification/location and stored inside the dehumidification zone. At KNB, heat sensitive items will be marked and packaged by vessel accordingly and stored in the 10K building. Refer to the appropriate Common Table of Allowances (CTA) for Army vessels, Table of Distribution and Allowances (TDA), vessel technical manuals (TMs), and/or boat set listings for the authorized items and items and quantities. All vessel technical manuals, lubrication orders, drawings, support publications and operating logs and records shall be inventoried, replenished, and stowed in lockers aboard the watercraft.

(8) Gaskets, packing and fasteners. New gaskets, packing, seals and fasteners in good condition shall be used during reassembly of equipment upon completion of preservation. This procedure does not provide for openings in fuel, raw water, fresh water systems to D/H areas.

(9) Fresh water chlorination. It is the responsibility of the storage activity or organization tasked to prepare watercraft for storage to provide and store chlorometric test kits and calcium hypochlorite technical (HTH), face shields, and rubber gloves for use on board watercraft. The calcium hypochlorite technical (HTH) will be stowed in a cool dry place inside the watercraft.

(10) On dry stored watercraft, the packing will be removed from the stern glands and stowed in a convenient position alongside in the engine room ready for installation at activation.

(11) At KNB, all exposed shafts and bearings will be coated with P-9 and wrapped to prevent ingress of sand.

d. COSIS represervation.

(1) When watercraft are activated for routine cyclic inspection and maintenance, represervation is required. Represervation requires limited operations of machinery and therefore, must be accomplish before the watercraft are returned to storage. The amount of represervation required, depends entirely upon the extent of depreservation/ activation.

(2) The man-hour requirements for represervation will not be appreciably different from initial preservation; however, the material requirements will be considerably less.

(a) There will be a cost savings by reusing the PVC piping, flex hoses, sensing elements, humidistat, plywood blanks, and Herculite covers.

(b) Preservation oil in the engine lubricating systems and antifreeze in the fresh water cooling systems will require replenishment only.

(c) Engine fuel system will require preservation.

(d) Essentially, the represervation shall follow the pertinent instructions set forth previously, in the initial preservation routine.

(e) Dry-docking for underwater hull cleaning and painting should not be required if all underwater surfaces are washed down with fresh water to remove accumulated marine growth and slime. This can be accomplished with the fire hose; however, care should be taken to ensure that the paint system is not damaged during wash down.

(f) Since the tray loaded starting batteries were not used, there will not be a need for replacement. The interim 12 VDC batteries will be used for represervation, after which they shall be removed from the watercraft and turned in for disposal. The next activation contact team will replace batteries that are disposed of.

(g) Specialized equipment will not require replacement.

(h) The lubricating oil storage tanks should not need replenishing.

(i) On completion of represervation requirements, prepare DA Form 3256 (Preservation and Depreservation Guide for Marine Equipment).

(3) Detailed preservation instructions concerned with each particular design of watercraft are identified in the TACOM publication "Preservation Procedures for New Watercraft Assigned to the Army Strategic Mobility Prepositioned Fleet."

(4) Exposed, machined surfaces of propeller shafts, including splines, slip joints, constant velocity joints, and universal joints will be coated with type MIL-PRF-16173, grade 4, preservative.

SECTION XIV. MEDICAL EQUIPMENT

5-14. Scope

This section describes the policy and procedures for the preparation, preservation, storage, and maintenance required to place Medical Equipment Sets (MESs), Medical Materiel Sets (MMSs), Medical Recommended Stockage Lists (MRSLs), and Dental Equipment Sets (DESs) in APS, AR 40-61, chapter 5, governs all aspects of the Medical Assemblages Program.

a. Major assemblages. The medical assemblages stored in APS contain an aggregation of supplies and equipment. Each assemblage is designed and developed for a specific purpose and identified by a single NSN. The NSN, nomenclature, and descriptive data of all assemblages in APS are placed on the exterior container for quick and easy identification. A packing list and list of initial shortages is furnished with each assemblage. Packing list can be found inside the packed containers.

b. Initial preservation, packaging, and packing. The initial preservation and packing of items will be done at an assembly depot, APS land-based site, or the Combat Equipment Battalion-Hythe. Packaging will be in accordance with military packaging requirements prescribed in FM 38-701. The methods used for packaging provide ready accessibility to facilitate use or to maintain the assemblage in a serviceable state. All major medical assemblages are packed in reusable containers.

c. Long-term storage (LTS). Medical equipment stored in assemblages will be prepared for LTS and packed in accordance with appropriate military specifications for packaging and will be subjected to a cyclic surveillance program as prescribed in appendix M of AR 702-18. This equipment is packed to maximum military protection, which will provide adequate protection to equipment for maintenance cycles not to exceed 5 years.

d. Maintenance of medical assemblages.

(1) All MESs and MMSs, MRSLs, and DESs that have been placed in APS 3 LTS will require COSIS every 24-30 months unless the sets have been used prior to the scheduled COSIS date. The same equipment prepositioned at land-based sites will be scheduled for reconstitution per USAMMA established fielding schedules unless the sets have been used prior to the scheduled reconstitution date. USAMMA has the responsibility to reconstitute all APS sets stored in land-based sites, and afloat. USAMMA is responsible for directing of all medical assemblages in APS. USAMMA will reconstitute sets based on the most recent unit assemblage listing (UAL). Deployable Medical System (DEPMEDS) Hospitals will undergo reconstitution/upgrades per USAMMA established fielding schedules. Serviceability inspections and performance testing of equipment will be performed during the reconstitution of the medical assemblages.

(2) APS 3 exclusionary items will require “push packages” to be shipped upon notification of handoff. USAMMA will maintain asset visibility to the component level detail.

(3) USAMMA is responsible to order replacement stores, provide disposition for excess, cross-leveling, and procurement of any new requirements. .

e. Storage of medical sets.

(1) CH storage. No additional preservation will be required for MESs and MMSs, which are packed at assembly depots or at APS sites to military packaging specifications.

(2) Weather deck storage. No medical assemblages will be stored on the weather deck.

(3) Non-CH storage. All hospital unit sets and any APS-3 afloat will be packed for LTS in accordance with the following specification:

(a) Conventional mod med sets. These medical equipment sets are packed at assembly depots or APS sites. Packaging is in accordance with level A military packaging requirements that provide maximum protection for material under the most severe worldwide shipment, handling, and storage conditions. Components packed within the MESs can be packaged in level A, B, C, or commercial packaging in accordance with ASTM-D3951 meeting military packaging specifications.

(b) Deployable Medical Systems (DEPMEDS). DEPMEDS materiel sets are packed at assembly depots or APS sites. Packaging is in accordance with appropriate military packaging specifications. The use of a static-free breather dehumidification system will provide adequate protection to materiel packed within DEPMEDS shelters/containers repositioned in a field environment for a period of up to 5 years provided the surveillance and desiccant change procedures are followed. Components packed within DEPMEDS shelters can be packaged in levels A, B, C, or commercial packaging in accordance with ASTM-D3951 meeting military packaging specifications.

f. Maintenance of DEPMEDS containers.

(1) USAMMA on-site personnel are responsible for ensuring that DEPMEDS containers to be stored are correctly prepared for loading. Accountable Officers are responsible for the surveillance of DEPMEDS containers in APS storage.

(2) Ensure dunnage beneath ISOs and MILVANs support all four lower ISO fittings, while off-loaded.

(3) Medical logistics personnel are responsible for the maintenance of medical materiel stored in each ISO shelter/MILVAN prior to placing in storage. During maintenance cycles, inspect all medical materiel for damage. Recharge the dehumidification systems as required. Humidity indicators should be inspected at intervals no longer than monthly.

(4) Procedure for recharging the Static-Free Breather System. Several procedures can be used on DEPMEDS modules, however, use only the following procedures when recharging the static-free breather system. If container does not have static-free breather system installed, use only those steps, which apply.

Step 1: Seal external static-free breather tube opening with ASTM-D5486, type IV, tape.

Step 2: Close vent cover on personnel door (ISO shelter only).

Step 3: Remove old caulking material from around door and open.

Step 4: Open breather drum and remove nylon bag with saturated desiccant.

Step 5: Remove mesh bags containing draw down desiccant.

NOTE: Replace desiccant in the static-free breather system as quickly as possible, preferably on a day with low relative humidity.

Step 6: Place large open mesh nylon bag in breather drum. Fill bag with 50 pounds of dry silica gel desiccant (MIL-D-3716, type 1, grade H, NSN 6850-00-616-9146). Evenly distribute the desiccant over the trivet area providing good contact around the inside of the drum. Close and tie the top of the bag with cord.

Step 7: Replace drum lid and secure it in place. Ensure flexible ducting is securely attached to drum adapter plate and the module adapter plate.

Step 8: Fill 4 open mesh nylon bags with 25 pounds each bagged desiccant (MIL-D-3464, NSN 6850-00-264-6572) as a static load to initially dehumidify the air (100 pounds total). Tie filled bags at both ends and suspend horizontally within the container. If bags cannot be suspended within the container, arrange them allowing the maximum flow of air around desiccant. Do not in any circumstances pack desiccant in containers such that air flow is prohibited around the desiccant bag. If the container does not have a static-free breather installed, use 200 pounds of bagged desiccant.

Step 9: Close and secure personnel door.

Step 10: Seal doors using procedure in paragraph f(5), step 11 for ISO shelters or paragraph f(6), step 9 for MILVANs.

Step 11: If the container is an ISO shelter and was expanded for any reason, follow the procedures in paragraph f(5) to seal the container. Door vent cover on the ISO shelter must remain closed during the draw down.

Step 12: The draw down phase requires 48 to 72 hours to complete. Check the four-spot humidity indicator. On the ISO shelter this requires opening the personnel door vent cover. The indicator should show a reading of 30 % or less. If the reading is greater than 30 %, re-close the vent cover (ISO shelter only), wait another 24 to 36 hours, and check again.

Step 13: When the readings are 30 % or less, activate the static-free breather by removing the tape from the exterior static-free breather tube opening. After removing the tape from the breather vent, cover the vent opening with a 4- by 4-inch piece of wire screen or nylon mesh material. Tape the material in place using ASTM-D5486, type IV, tape to prevent insects from entering the breather tube. On ISO shelters the door vent cover where the static-free breather vent is located must remain partially open allowing for airflow.

(5) Procedures for the preparation of shelters, expandable 1-sided, NSN 5411-01-124-1377 and 2-sided, NSN 5401-136-9838 for long-term storage are as follows:

Step 1: Cover the ventilation filters inside the cargo doors, utilizing MIL-PRF-131 barrier material cut to size 23-1/4 by 23-1/4 inches. Secure the barrier materiel with 2-inch wide ASTM-D5486 type IV, tape.

Step 2: Jack up the module to a sufficient height to seal cracks between module floor and lower ISO fittings at all four corners of the module with silicone sealant, type MIL-A-46106.

Step 3: Apply a 6-inch strip of Herculite material, type 1, class 3, NSN 8305-00-226-1065, over the full length of the rubber seal along the top edge, leaving approximately 1/2-inch slack. This slack is required to allow for side panel stress when modules are being transported. Secure the Herculite material with 3-inch tape NSN 7510-00-926-8939, 3M, number 481.

Step 4: Seal openings at the four corners between the top and bottom ISO fittings utilizing 3-inch strip of Herculite material leaving 1/2-inch slack to allow for side panel stress, secure Herculite material with tape referenced in Step 3.

Step 5: Apply a base coat conforming to MIL-PRF-6799, type 11, class 1, NSN 8030-00-721-9380 over the tape and the Herculite. This base coat should be a minimum of 12 mils thick (wet measure). It can be applied with a brush or a paint roller. Extend this coating a minimum of 1-inch beyond edge of tape. After allowing the base coat to dry, apply atop coat conforming to MIL-PRF-6799, type 2, class 6, NSN 8030-00-060-4566. (A brushable patching compound, NSN 8030-00-060-4566, is available for touch-up if necessary.)

Step 6: Load ISO shelter with required medical materiel.

Step 7: Install the static-free breather using the following procedures:

a. Using a Number 2 Phillips screwdriver, remove the retaining screws and ventilation filter from inside the personnel door. With rubber gasket in place, replace the filter with the adapter plate furnished with the static-free breather. The plate is to provide a mount for the outside vent adapter and RH indicator plug. Place the 4-1/2 inch portion of the adapter tube inside the shelter. Cover the exterior tube opening with a 4- by 4-inch piece of wire screen or nylon mesh material. Utilize tape or hose clamp to secure the screen. This prevents insects from entering the breather tube.

b. Open the vent cover on the personnel door. Utilizing A-A-1936 contact adhesive, glue a 5- by 5-inch one-eighth inch thick rubber gasket of ASTM-D1056, grade 5BE7, NSN 9320-00-824-8816, or equivalent, to the inside center of the vent cover. This is necessary to close off the free breather during the draw down phase of dehumidification.

c. Position the free breather drum on the floor of the shelter near the door and secure in place using web straps or heavy wire.

d. Open the breather drum and remove the drum lid adapter plate, 6 feet of flexible ducting, hose clamps, and hardware. With the rubber gasket in place, mount the adapter plate to the lid of the free breather drum with the bolts and

nuts provided. Connect the flexible ducting between the drum adapter plate and the module adapter plate and secure both ends with the hose clamps provided. Close the vent cover on the personnel door.

e. Install the four-spot humidity indicator (NSN 6685-00-618-1822) in the hole in the cover plate.

Step 8: Charge the static free-breather system following the procedures in paragraph f(4).

Step 9: Close and secure personnel door.

Step 10: Seal around doors using the following procedures:

a. Insert nylon rope, NSN 4020-00-263-3483 or equivalent, into gaps around doors. This rope will keep the silicone sealant from contacting the neoprene door gasket. Insert single strands or double widths according to the width of the gap. Leave a 2- to 3-inch length of rope loose at a bottom corner to aid future removal.

b. After inserting rope, apply silicone sealant, type MIL-A-46106, over rope to form a complete seal. Ensure that sealant does not contact rubber door gasket. Otherwise, damage to the gasket may result when removing the sealant.

Step 11: Complete draw down procedures in accordance with paragraph f(4), steps 12 and 13.

(6). Procedures for installing a static-free breather into a MILVAN.

NOTE: Preferred method for cutting 3" and 1" holes in MILVAN wall is to use a hydraulic knock out set if available.

Step 1: Using a 3-inch hole saw, cut a hole in the MILVAN's right side, 9 inches from the metal door frame, and 9 inches down from header at the top of MILVAN. A 1/2-inch portable electric drill may be used for this procedure.

Step 2: From inside the MILVAN, place adapter plate through the 3-inch hole and mark location for the installation bolt holes. Drill four each 9/32-inch diameter holes through the MILVAN wall. With gasket in place, attach the adapter plate to the MILVAN wall with four each 1/4-inch by 3/4-inch bolts. The same adapter plate used in the free breather drum lid is utilized for this application. The 1-inch length of metal tube will extend to the outside. Seal the external tube opening with ASTM-D5486, type IV, tape. Seal contact area between tube and external MIL VAN wall with caulking compound.

Step 3: Using a 2-inch hole saw, cut a hole in the 1/4-inch plywood inner liner inside the MILVAN, 24 inches from top, directly below the adapter plate.

Step 4: Using a 1-inch hole saw, cut a hole through the outer wall centered inside the 2-inch hole that was cut in the plywood inner liner in Step 3.

Step 5: Install the 4 spot humidity indicator (NSN 6685-00-618-1822) in the 1-inch hole. Seal contact area between indicator and wall with silicone sealant.

Step 6: Load MILVAN with required medical materiel.

Step 7: Place free breather into the MILVAN. Place the breather drum on the floor of the MILVAN near the wall vent. Secure the breather drum in place with heavy wire or nylon web straps. Thread the wire or straps through the strap loops attached to the breather drum. Connect the flexible ducting hose between the breather and wall adapter plates. Secure at each end with hose clamps.

Step 8: Follow procedures in paragraph f(4) to charge the static-free breather system.

Step 9: Close and secure MILVAN doors. Utilizing caulking gun (NSN 6120-00-293-3208), apply a bead of silicone sealant, type MIL-A-46106, around the outside edge of the rubber door seals. Smooth the compound flush with the rubber seal. In extreme cold weather, the caulking compound may require warming prior to use.

Step 10: Complete draw down procedures in accordance with paragraph f(4), steps 12 and 13

Step 11: Fabricate a 14- by 11-inch rain cover for the external breather tube. This cover may be fabricated from a variety of materials. A thin sheet of steel or aluminum is preferred, but weather-resistant fiberboard or 1/4-inch exterior grade plywood may be used. Secure cover in place at an angle over the breather tube utilizing ASTM-D5486, type IV, tape.

(7). The following is a list of items required for recharging each static free breather system:

Quantity	**Materiel**	Part Number
1 each	4 spot color-change humidity indicator disc	3456P – fits SAE AS26860 type humidity indicator assembly
2 each*	Multi-purpose silicone sealant, MIL-A-46106	**Dow Corning #732**
100 pounds	Bagged desiccant, MIL-D-3464	6850-00-264-6572
50 pounds	Silica desiccant, MIL-D-3716, type 1, grade H	6850-00-616-9146
1 each	Bag, nylon, 58” x 36”	Fabricated item
4 each	Bag, nylon, 22” x 60”, with ties	Fabricated item
* Additional silicone sealant needed for ISO shelters along with nylon rope, NSN 4020-00-263-3483		

Miscellaneous hand tools are required.

Contact the USAMMA for specifications and fabrication information on acquiring static free breather systems.

SECTION XV. AVIATION SUPPORT EQUIPMENT

5-15. Detailed preservation requirements.

a. Aircraft. Presently aircraft are not authorized for APS storage, however, aviation support equipment is authorized.

b. Tool kits and sets.

(1) Non-CH storage. Not applicable.

(2) CH storage. Kits and sets will be biannually inspected for condition and completeness. Components will be cleaned and protected as required. Non-electrical metal components will be wiped with a rag dampened with preservative oil. Components will be returned to and properly positioned in containers or tool box as appropriate.

c. Air mobile shelters.

(1) Non-CH storage is not applicable.

(2) CH storage.

(a) Open shelter and inspect shelter and tentage for damage. Repair as necessary in accordance with TM 55-4920-376-14&P.

(b) Preserve uploaded tool kits and sets in accordance with paragraph 5-14b above.

(c) Clean shelter and tentage inside and out with a mild detergent solution. Rinse and dry thoroughly.

(d) Clean grounding rod and tent poles and laterals. Tape together with ASTM-D5486, type IV, tape. Stow flat on floor diagonally.

(e) Clean electrical cables and coils and tape together with ASTM-D5486, type IV, tape.

(f) Fold tentage and stow in shelter.

(g) Apply a small quantity of lubricant to each hinge and cover hasp.

(h) Lower hinged cover and secure locking hasp.

d. Hydraulic jacks.

(1) Non-CH storage is not applicable.

(2) CH storage.

(a) Inspect for leaks and damage. Repair as required.

(b) Clean jack with mild detergent and dry thoroughly.

(c) Fully extend jack and lubricate all bare metal surfaces with a clean rag dampened with the type of hydraulic fluid that the jack is serviced with.

(d) Retract jack.

e. Aviation Ground Power Unit (AGPU). All towing, servicing, and preservation of the AGPU will be in strict accordance with TM 55-1730-229-12.

CAUTION

Towing AGPU with clutch lever engaged will damage drive mechanism.

(1) Non-CH storage is not applicable.

(2) CH storage.

Perform PMCS in accordance with Table 3-2 of TM 55-1730-229-12:

Step 1: Turbine engine fuel control. Pressure APGU fuel control as follows (Figure and item numbers refer to TM 55-1730-229-12):

1 Disconnect battery.

2 Disconnect positive electrical wire at auxiliary fuel pump. Secure wire so that accidental contact with frame or components (ground) cannot occur.

WARNING

The ignition system contains high voltage electricity and can cause injury or death. Extreme caution must be used when handling the igniter lead.

3 Disconnect igniter plug lead (figure 4-58, item 1) from igniter plug (figure 4-59, item 2). Secure igniter lead so that accidental contact of lead with engine or frame (ground) cannot occur.

4 Disconnect fuel line (figure 4-49, item 1) from fuel nozzle (figure 4-49, item 4).

5 Cap inlet on fuel nozzle.

6 Connect silicone rubber hose to fuel line (figure 4-49, item 1). Place end of hose in a container.

7 Disconnect fuel inlet line (figure 4-48, item 3) from fuel control (figure 4-40, item 6).

8 Cap fuel inlet line.

9 Connect silicone rubber hose to fuel control inlet fitting. Place hose in a container of clean MIL-C-6801 oil.

10 Connect battery.

11 Set control panel MASTER SWITCH to ON.

12 Momentarily set ENGINE CONTROL SWITCH to START and then release to RUN.

13 Allow starter to run until only oil is expended from fuel line.

14 Set ENGINE CONTROL SWITCH to OFF.

15 Disconnect battery.

16 Remove silicone rubber hose from fuel control and connect fuel inlet line to fuel control.

17 Remove silicone rubber hose from fuel line (figure 4-49, item 1) and connect fuel line to fuel nozzle.

18 Connect positive electrical wire to auxiliary fuel pump.

19 Remove and discard fuel control fuel filter. Install new fuel control fuel filter.

20 Connect igniter lead to igniter plug.

21 Tag AGPU control panel with a tag stating, "This fuel system has been preserved with MIL-C-6801. Flushing is required in accordance with this manual before placing AGPU in service".

Step 2: Engine oil system. Drain engine oil and replace filter in accordance with TM 55-1730-229-12. Service oil system with corrosion inhibited type oil described by MIL-PRF-23699.

Step 3: Generator. Grease generator bearings in accordance with TM 55-1730-229-12.

Step 4: Lubrication. Perform annual lubrication in accordance with TM 55-1730-229-12. 3 Disconnect igniter plug lead (figure 4-58, item 1) from igniter plug (figure 4-59, item 2). Secure igniter lead so that accidental contact of lead with engine or frame (ground) cannot occur.

Step 5: Battery.

WARNING

Both lead-acid and nickel-cadmium batteries' gases can explode. Do not smoke, use open flames, or make sparks around batteries.

WARNING

Electrolyte and corrosion products from both lead-acid and nickel-cadmium batteries will cause injury. Wear safety goggles, gloves, and apron when handling or servicing batteries. If electrolyte or corrosion products contact eyes, skin, or clothing, flush immediately with large quantities of cold water. In the case of eye contact, see a physician immediately.

CAUTION

To prevent damage to batteries, keep nickel-cadmium batteries away from lead acid batteries. Do not handle or service them with the same tools. Do not store nickel-cadmium batteries in the same room with lead-acid batteries.

a. General. The AGPU may be equipped with either a nickel-cadmium or lead-acid battery. The batteries are very different in nature and servicing and storage characteristics.

b. Lead-acid batteries. Remove battery from AGPU.

CAUTION

Nickel-cadmium battery cleaning solution (boric acid) will damage battery if allowed inside battery cells. Use care to prevent solution from entering through cell caps and vent

c. Nickel-cadmium batteries. Remove battery from AGPU. Clean, service and store battery in accordance with TM 11-6140-203-14-1. Clean and neutralize battery cables, clamps, supports, retainers, and battery box with a 3 percent solution of boric acid. Coat battery cable clamps and terminals with VV-P-236 petroleum. Wrap cable ends with MIL-PRF-131, class 3, barrier material secured with ASTM-D5486, type IV, tape and secure to battery holder.

Step 6: Fuel system.

WARNING

Fuel and fuel vapors are extremely flammable. To prevent death or injury from fire and explosion, do not conduct refueling operations indoors or within 50 feet of any spark, open flame, maintenance operation, operating equipment or building. Adequate fire fighting equipment will be immediately available during refueling operations.

a. Position AGPU so that fuel tank drain valve is at lowest position relative to the tank. Use a container and open drain valve to completely defuel tank. Close drain valve.

b. Spray interior of tank with MIL-PRF-6081, Grade 1010 oil.

c. Remove and discard auxiliary fuel filter element.

d. Install new auxiliary fuel filter element.

Step 7: Hydraulic system. Perform all hydraulic servicing operations strictly in accordance with the procedures in TM 55-1730-229-12. Service hydraulic system with MIL-PRF-83282 hydraulic fluid only.

a. Replace low-pressure 10 micron hydraulic filter and high pressure 3 micron hydraulic filter in accordance with TM.

b. Replace vent dryer desiccant with new MIL-D-3716 desiccant in accordance with TM 55-1730-229-12.

c. Fill hydraulic reservoir to 7/8 full level with MIL-PRF-83282 hydraulic fluid.

Step 8: Tires. Service tires to 28 PSIG.

Step 9: Cables and hoses. Properly stow all cables and hoses.

Step 10: Fire extinguishers. Inspect and service fire extinguishers as necessary.

Step 11: Access doors. Close and latch all access doors.

SECTION XVI. CONTAINERIZED MATERIEL (Inter-modal Transportable Containers)

5-16. General instructions

a. All ASL/PLL items including tools, TMDE, and other related items will be consolidated in inter-modal transportable containers. Items will be, as a minimum, packaged to the highest level as specified in the FEDLOG Packaging Segment. Items already packed level B need not be repacked solely to bring it up to level A. They will remain packaged in this manner or may be uploaded, as directed by AMC, USAMMA, ARCENT, MTMC, and/or AFSC. For consolidation purposes, heavier items (70 to 200 lbs) may be packed in weather-resistant, triple-wall, ASTM-D5168 fiberboard boxes, or in wood boxes (wire bound, nailed, or plywood). All items over 200 pounds should be packed in wood boxes. Limited quantities of ASL and PLL are classified as HAZMAT. All HAZMAT will be segregated, stowed, and secured per Title 49 CFR 176.5 and the International Maritime Dangerous Goods Code.

b. Critical surfaces are those providing closeness of fit or surfaces involving motion while in contact with another surface or surfaces. Items that have critical surfaces are considered critical items. Examples of critical items are automotive intake and exhaust valves, camshafts, crankshafts, and antifriction and friction bearings. Examples of non-critical items are axe heads, pry bars, track pads, tow cables, and so on.

c. All containerized items will be properly blocked and braced within the container to prevent movement and damage while afloat.

d. All ASL, PLL, BII, and miscellaneous items which are part of APS Program inventories will be tagged, labeled, or stenciled with official identification of the item including nomenclature, NSNs, and line item numbers (LIN) when available and applicable. Appropriate packing lists will be included. A minimum of two lists will be placed on the outside of the container and three lists will be placed in the container.

e. In general, petroleum, oils, and lubricants (POL) will be unit packed and palletized prior to being shipped to the storage location or port for loading. POL products not containerized when received will be properly consolidated in barges or inter-model containers prior to being placed in storage.

f. Meals Ready to Eat (MRE) will be palletized with 48 cases per pallet. The palletization pattern is contained in MIL-HDBK-774, Appendix B, pattern 12. More specifically, each pallet will contain 4 tiers of 12 cases. When loaded in inter-modal containers, pallets will be stacked two high. Unitization of these loads may be with strapping or wrap. If a wrap is used, the top shall be left open to facilitate air circulation.

g. Due to the uniqueness of loading barbed and concertina wire special framing must be applied to accommodate stacking, if required.

h. Construction materials should be containerized in inter-modal containers whenever practical and possible for loading aboard APS 3 vessels. Loading configurations will be developed at the consolidation point or at the port Standard consolidation practices will be utilized to develop the load pattern. The goal is to minimize the amount of containers that must be used.

SECTION XVII. SUPPY CLASS V

5-17. General instructions

a. Ammunition and explosives will be maintained in accordance with established regulations including SB 742-1 and AR 702-6.

b. All supply class V will be packaged in accordance with appropriate packaging drawings and palletization procedures. Drawings references can be located in the ARMS Packaging Segment; palletization procedures can be located in the U.S. AMC drawing index 1948-75-5.

c. Special supply policies and procedures are to be followed for all JMC and AMCOM managed supply class V that is prepositioned afloat, per the latest Ammunition Information Notice (AIN): SUBJECT, AFLOAT PREPOSITIONED. LMC POC for AIN is HQ OSC, ATTN: AMSIO-QAS, Rock Island, IL 61299-6000. AMCOM POC for AIN HQ, AMCOM, ATTN; AMSAM-MMC-LS-M, Redstone Arsenal, Al. 35898-5239.

d. Supply class V prepositioned afloat requires controlled temperature and humidity storage.

e. Supply class V that is prepositioned at land-based sites will be stored in accordance with appropriate storage drawing procedures. These procedures can be located in the U.S. AMC Drawing Index 19-48-75-5.

SECTION XVIII. PACKAGING AND COSIS EQUIPMENT AND SUBSTITUTE PACKAGING MATERIALS

5-18. General guidelines

a. In addition to the maintenance and MHE organic to APS maintenance sites, certain other basic equipment is essential to efficient performance of the requirements of this manual. A list of recommended packaging and COSIS equipment is provided at Appendix B.

b. At times during redeployments packaging materials specified in this manual may not be available. Appendix B contains a list of packaging materials that can be substituted when absolutely necessary.

CHAPTER 6

CARE OF EQUIPMENT AND SUPPLIES IN STORAGE (PHASE II)

SECTION I. GENERAL

6-1. Policy

a. When required inspection, calibration, and maintenance have been performed and materiel placed in storage, this section applies until equipment is issued. The functions outlined herein are the minimum for control and effective results.

b. There will be an established and identifiable in storage inspection and maintenance program for all APS materiel. The program will provide for the necessary inspection, test, and surveillance actions set forth in the equipment's technical manuals and this manual.

c. When equipment is properly preserved and placed in storage in the prescribed readiness status, maintenance will, in the majority of cases, only be accomplished at the end of the storage cycle. Certain materials may "age out" or components fail during test or exercises, and because of this, maintenance skills and resources above the organizational level must be accessible. Maintenance is also required to accomplish essential modifications as the need arises. A combination of cyclic maintenance, 30-day visual surveillance, special exercising requirements, and dehumidified storage is designed to ensure that equipment meets all operational requirements for reporting operational readiness in accordance with AR 220-1.

d. For watercraft the COSIS program will ensure the exterior surfaces and deck-mounted equipment are maintained in good condition. All watercraft will be sealed and dehumidified with the relative humidity set at 40% +/- 10%. External inspection will occur on a monthly basis to include removal of all Herculite covers for protected equipment inspection. Following inspection covers will be replaced and secured. All signs of DH sealing, leaks or corrosion will be annotated and corrective action undertaken. Internal inspection on wet stored vessels will occur on a monthly basis. All ingress of water will be annotated and corrective action undertaken. DH seals will be inspected and corrected where necessary. LCU2000 bow thruster drive shafts and main propulsion shafts will be rotated at least 2.75 revolutions leaving the shaft 90 or 270 degrees from its start point. Large tug main propulsion shafts will be rotated at least 2.75 revolutions leaving the shaft 90 or 270 degrees from its start point. Quarterly propeller shafts on dry stored LCM8, ST and SLWT will be rotated at least 2.75 revolutions leaving the shaft 90 or 270 degrees from its start point, while lubricating the cutlass bearings. Maintenance on watercraft is unlikely to be required within each scheduled 3-year cycle unless activated for exercise or contingency or storm/unusual damage occurs. Maintenance may be required to accomplish essential modifications where applicable. In this instance a team from Combat Equipment Battalion - Hythe or a Shipyard contractor may be used to accomplish the MWO application.

e. For modular causeway system ISOPAK's the COSIS program will ensure the exterior of ISOPAKS are inspected monthly. All signs of corrosion will be annotated and corrective action undertaken. Corroded areas shall be cleaned free of corrosion and repainted with the applicable type and color of paint compatible with existing system. Once within every three year period the two 20ft ends will be removed from the 40ft mid piece of all ISOPAKS in storage at KNB and YND and all operational parts tested, repaired where applicable and represerved

f. At YND diver services will be obtained/procured to clean the hulls of wet stored vessels each six months to prevent excessive marine growth accumulation.

g. At KNB the vessels will be lifted on the syncrolift and high pressure water blasted to clean the hulls of wet stored vessels each six months to prevent excessive marine growth accumulation with the exception of the 115tn floating crane, where diver services will be obtained/procured to clean the hull each six months to prevent excessive marine growth accumulation.

SECTION II. SURVEILLANCE INSPECTION

6-2. Overview

a. A materiel surveillance program should be administered to maintain an effective COSIS program. Visual inspections are to be simple and unencumbered by disassembly actions or other time-consuming requirements (DA Form 2404 will be used to record faults). The primary purpose of the inspection is early detection of deficiencies that may be indicative of more serious problems or that may lead to more serious problems if undetected or not corrected. Visual inspection of each item in storage is required at least every 30 days.

(1) If tires are flat, they should be repaired immediately. If this is impossible, flats will be noted on the inspection report and repaired at the first opportunity.

(2) Leakage of coolant (e.g., keel coolers on LCU 2000), oil, or grease that is not sufficient to warrant immediate maintenance action should be noted on the inspection check sheet and be a special item for review during subsequent inspection.

(3) Particular attention should be paid to condensation, water leaks, and plugged scuppers body drain holes. Coolant and lubricant levels should be checked the first 30 days after storage. Checks during subsequent inspections are not required unless there is visual evidence of leaks or adequate reason to suspect contamination or internal leaks.

b. Surveillance includes inspection of CH capabilities to detect evidence of malfunction of dehumidification machinery, controls, or recording devices, and damage to or failure of structures or covers, and reporting of it for corrective action.

c. Surveillance also includes those actions necessary to prevent and detect security deficiencies and recommend corrective actions relative to incidents of pilferage and sabotage.

d. Surveillance of equipment requires knowledge of the visual characteristics associated with materiel failure or deterioration. The following are some of these characteristics:

(1) Leakage or seepage of lubricants. This may be caused by overfill or excess lubrication, or internal pressures resulting form clogged vents or defective seals or gaskets. Thorough analysis is required before conclusions are reached and repair is requested.

(2) Appearance of red, brown, black, or white precipitates around or on the surface of metallic items. The precipitate may or may not be accompanied by the visual evidence of moisture. This is usually evidence of corrosion in process. Recognition of the appearance of corrosion is contained in TB 43-0213, Corrosion Prevention and Control, including Rust proofing Procedures For Tactical Vehicles and Trailers (see also Table 6-1, pg 6-9). This TB also contains some repair procedures. Report all repetitive corrosion problems to AFSC for TACOM equipment, copy furnish TACOM-WARREN, AMSTA-TR-E/MEPS, Warren, MI 48397-5000.

(3) The visual or scent evidence of fungus, mildew, or microbiological attack on materials. A strong musty odor may be evidence of such attacks.

(4) Evidence of insect or rodent infestation in organic materials such as food, fabric, cellulosic paper, and fiberboard, and so forth.

(5) Effect of natural environmental elements such as ozone and ultraviolet light. Deterioration induced by ozone is indicated by cracking of surfaces of rubber items such as tires, pontoons, and hoses. Cracking will be most severe at points of stress such as bends. The effect of ultraviolet light is found in the fading of paints and discoloration and crazing of plastic material.

(6) Soft or flat tires can be caused by either manufacturing defects, leaking tubes, or defective valves. The major cause of premature tire failure is porosity (e.g., air migration, slow leaks, and permeation), which allows some air to escape. Some tires will continually lose air pressure while others require that the tire get hot. It is imperative to maintain proper air pressure in all tires.

(7) Deterioration of supply class III materials used in preservation of equipment often can be seen. The mixture of water in oil (emulsification) may also be seen as milky or tan. Dulling, hardening, or a complete loss of coating may evidence drying or evaporation of preservation. Questions concerning preservative supply class III products or lubricants and fuels should be addressed to the AFSC. Questions concerning preservative supply class III products or lubricants and fuels should be addressed to TACOM, TARDEC, Petroleum and Water Business Area, AMSTA-TR-D, Warren, MI 48397-5000, DSN786-4207 thru the TACOM War Reserve Office, AMSTA-LC-CIPRW, Warren, MI 48397-5000.

(8) Delaminating, cracking, or complete breaks in barrier materials, caulking, and/or tape.

(9) Leakage of any freon or other refrigerant from air conditioning must be immediately repaired to comply with the Clean Air Act and host nation environmental laws and regulations. All repairs must be accomplished by Clean Air Act, Section 608/609 certified technicians or equivalent, using approved refrigerant recycling equipment.

e. Surveillance of watercraft stored at Yokohama North Dock and Kuwait Naval Base is normally restricted to exterior inspection only, performed without broaching the integrity of the sealed CH environment within each watercraft. Each site will have a designated contractor on base performing ongoing COSIS on a continual basis.

f. Inter-modal containers will be checked weekly for evidence of leakage and/or pilferage. Deficiencies in the containers will be corrected immediately and AFSC and/or USAMMA notified of the problem and action taken. Containerized supplies shall have sample inspections as determined by the AFSC or USAMMA and Table 3-5.

g. Humidity indicators on desiccated containers will be checked monthly subsequent to CH failure for evidence of moisture content in packages and saturated desiccant. Report any discrepancy.

h. Absorbed Glass Mat (AGM) and activated flooded lead acid batteries will be maintained in accordance with AFSC Battery Maintenance Management Plan. A cold battery (below 40-degrees F) won't readily accept a charge. When a fast charger is connected to cold battery, the charging rate will be low at first, and then increase as the battery temperature increases. It is recommended to recharge the M1 tank battery six-pack after each maintenance cycle of approximately 6 months. Battery charger model 2937-4419 will charge 1; 2; 4 or 6 military batteries as they are configured in the vehicle. The M1 tanks are to be charged a minimum of 3 hours. After the 3-hour minimum charge the batteries are to be tested with the Medtronic's Battery Tester "MICRO 400" or equivalent. Two of these testers are provided shipboard. The M1 batteries after a minimum of 3 hours should TEST "GOOD" using the MICRO 400 tester. If the M1 batteries have been deeply discharged for some reason, run the battery charger for 10 hours maximum. Battery charger model 29374419 may also be used to charge a trailer battery like the M-1000 Trailer, Transport, H.E. 700 Ton. The battery may be charged using the 12-volt selection on the charger model 2937-4419 or run the APU for 30 minutes.

i. Containers and weapons boxes will be checked on daily basis, or as directed.

j. Fire control devices should be checked for deterioration every 180 days.

k. Surveillance of supply class V and storage locations shall be performed per SB 742-1 by qualified personnel. Shelf-life extensions are provided to the ammunition community through a Missile Information Notice.

(1) Periodic inspections performed according to the applicable Supply Bulletin or Technical Manual will identify those items with an expiring shelf-life, which will require replacement or extension.

(2) Maintenance of ammunition and munitions will not be conducted on board ship.

SECTION III. EXERCISING

6-3. Requirements

a. Exercising equipment in storage. The primary purpose is to determine the degree of functionality of the item, prevent accelerated deterioration of component surfaces and seals through distribution of lubricants and oils over surfaces normally lubricated during equipment operation, and ensure that the operational capability of the item is maintained. See Table 6-2 for general guidance for non-cyclic maintenance exercising.

CAUTION

Prior to slave starting any vehicle, make sure everything that can be turned off is turned off. This is imperative to prevent power spikes, which can damage components (e.g., diodes in the CTIS Control Assembly will be damaged by power spikes).

b. General Exercising Requirements. Exercising equipment will be integrated into, and made a part of, the cyclic maintenance program. Constraints aboard ships and warehouses limit and in some cases eliminate the ability to fully exercise equipment. Low ceiling heights, close storage configurations, and inaccessibility are the main constraints. It is essential that the cyclic maintenance schedules include an exercising program to the fullest extent possible. Inability to completely exercise equipment during a cycle must be documented and maintained with that piece of equipment. If a system on an operational vehicle, e.g., hydraulic unit is not used on a regular basis, that system will be exercised once every 90 days.

(1) The PMCS tables in the operator (-10) and organizational (-20) manuals will be used for vehicles being evaluated during the APS maintenance cycle.

(2) When the PMCS for a specific vehicle does not specify time (period of operation), speed, or distance, the following guidance will be followed:

(a) Perform “before” operations checks. Start engine and run for a period sufficient to bring engine and lubricants to normal operating temperature prior to start of testing. If there is no prescribed warm-up time, engines will be allowed to run until they reach normal operating temperature or a minimum of 20 minutes.

(b) During testing, the vehicle will be operated in all power ranges, forward and reverse. Speeds and engine rpm normal to operation of the vehicle will be attained during the testing. Make several right and left 90 degree turns. Make several hard braking stops without skidding. While exercising, and when it is safe and convenient, operate all other functional components and perform all during and after operational checks.

(c) Service and parking brakes will be tested in accordance with PMCS tables in the applicable TMs. Trailers having brake and light systems will be hooked up to a prime mover and subjected to brake and light testing. Any fluid on lines, drums, or tires prior to test should be wiped clean. Visual inspection after testing will disclose whether the system is leaking at the points inspected.

(d) For all track vehicles, test brake holding capability in accordance with PMCS tables in the applicable TM or if not specified, use guidance in paragraph 7.4a(5).

(3) All brake systems will be visually inspected (lines, master cylinder, and drums) before and after test for evidence of fluid leakage. Any fluid on lines, drums, or tires prior to test should be wiped clean to start. Visual inspection after testing will disclose whether the system is leaking at the points inspected.

(4) Check axles and constant velocity joints for evidence of lubricant leaks.

NOTE

Evidence of leaking lubricant does not necessarily indicate a failed seal. Overfill during lubrication, separation of grease (GAA) MIL-PRF-10924, and plugged axle vents can cause external signs, which may be mistaken for failed seals. Road wheels of tracked vehicles lubricated with oil frequency disclose oil seepage around hub gasket on the side of the vehicle exposed to the sun. When this condition is present and shady side does not show leakage, replace lost lubricant.

(5) Vehicle-mounted auxiliary and ancillary components, such as winches, pumps, engines, hoists, generators, etc., will be functionally tested every maintenance cycle. Cables, e.g., winches and wrecker hoists, will be unwound and examined for crushed sections and broken strands. The only approved exceptions to this are that it is not practical to run tar through the asphalt spreader and concrete through concrete/ cement mixers to check the operation of the equipment. These type of operations will be waived through the waiver process, see Chapter 1.

c. Tank/automotive vehicles/power-driven equipment.

(1) Afloat. Each self-propelled vehicle in CH storage aboard vessels will be started and exercised every six months during the afloat period. Engines will be allowed to operate until they reach normal operating temperature, minimum of 20 minutes. With the transfer case in neutral, where appropriate, the transmissions must be manually run through all gearshift ranges. All vehicles will be activated to the extent necessary to power up all systems and subsystems and perform limited technical inspections (LTIs), serviceability/visual inspections and tests, and the required maintenance functions needed to maintain the equipment FMC throughout each maintenance cycle. Follow appropriate vehicle TMs and all warning plates and decals to ensure safe operation of equipment during exercising. Equipment that is preserved level A aboard the vessels will not be deprocessed while afloat unless specifically instructed.

(2) Land-based.

(a) Combat vehicles. Each vehicle will be exercised at least once every 30 months when stored in a CH environment. Combat vehicles in other than CH storage will be exercised at least once every 12 months. If vehicles are stored in a non-CH environment, they will be processed to Level A requirements in accordance with appropriate military specifications. All vehicles will be activated and road tested to the extent necessary to power up all systems and subsystems and perform necessary PMCS, serviceability and visual inspections and tests, and the required maintenance functions needed to repair the equipment at the appropriate maintenance level to established -10/20 standards. Prior to return to storage, vehicles will be represerved.

(b) Tactical vehicles. Each vehicle in a CH environment will be exercised at least once during the storage period within the respective maintenance cycle. As a minimum, each vehicle in CH will be exercised once every 48 months. Vehicles processed to Level A and stored in a non-CH environment, as detailed on the appropriate EPDS, will be exercised every 24 months. If EPDS is not available, contact the AFSC for a copy of the EPDS. All vehicles will be activated to the extent necessary to power up all systems and subsystems and perform necessary PMCS, serviceability and visual inspections and tests, and the required maintenance functions needed to repair the equipment at the appropriate maintenance level to established -10/20 standards. Prior to return to storage, vehicles will be represerved.

CAUTION

If an engine is not in continuous use, oil will run off cylinder walls, piston rings, main bearings, connecting rod bearings, crankshaft, gears, and other parts that normally get lubricated during operation. When the engine is started, before these surfaces get oil, the metal-to-metal contact will cause wear. To keep this wear at a minimum, ensure oil pressure is shown on the pressure gauge prior to starting the engine. This can be accomplished by using the starter to turn the engine with the throttle in the fuel OFF position or by covering the air intake with an air restrictor cover to prevent the engine from firing. Operator manuals should be consulted to determine unique starting procedures for individual equipment.

NOTE

Only licensed drivers shall operate combat and tactical vehicles. Operators not licensed for specific vehicles can do more damage to equipment during exercising than would occur from not exercising. For example, driving an M1 tank with the parking brake on will destroy the transmission and not following the specific shut-down procedures will destroy the engine.

(c) Commercial equipment and non-developmental items (NDI) equipment. For equipment stored in a CH environment, the requirements are the same as for tactical vehicles in CH storage. For equipment in other than CH storage, the same requirements apply as for tactical vehicles in this type of storage environment, if preservation processing for storage requirements are available, and equipment is processed Level A. If no long-term protection requirements are available, follow the exercising requirements and cycles specified in the vehicle technical manuals. If no requirements are available for processing equipment for long-term storage, contact Headquarters, Field Support Command (AFSC), ATTN: SIOEC-CO, Rock Island, IL 61299-6500.

(3) In addition to the exercising requirements established in b(l) and b(2) above, the following exercising will be performed for the systems and subsystems identified and in the frequencies and time periods established.

(a) Weapons systems. Turrets and commander's cupolas will be rotated 360 degrees in each direction, a minimum of three rotations (each direction). Main guns will be operated through a maximum elevation/ depression cycle, a minimum of three cycles. Recoil mechanisms will be exercised in accordance with TB 9-1000-234-13 and the appropriate TMs. DA Form 2408-4 shall be annotated after the completion of a recoil exercise. All exercising will be accomplished in place and at a frequency level of 180 days. The M109 self-propelled howitzer (SPH) requires elevation

to maximum QE. If restrictions within the warehouse or vessel prevent complete rotation of turrets or complete elevation/depression of guns, they will be rotated or elevated to the maximum extent possible. Main guns will be elevated during rotation if such elevation maximizes turret rotation. The M109 SPH requires maximum elevation. The mast system for the Patriot AMG and OE-349/MRC will be exercised three cycles to full 30-meter extension at a frequency of once per 90 days IAW Table 6-2. During every cycle, hold extension for 15 minutes to check for leaks. Additionally, the Patriot Radar cooling system will be exercised a minimum of 4 hours every 90 days IAW Table 6-2.

(b) Thermal imaging systems. Power up thermal imaging systems and allow to cool down. If cool down is not attained in 15 minutes, a cool down light will activate. A DA Form 2407 (Maintenance Request) should be submitted to maintenance indicating thermal system failure. This requirement shall be performed during cyclic maintenance and time of issue.

(c) Hydraulic Systems. All afloat equipment hydraulic systems in storage will be exercised to the maximum extent possible (given the ship board limitations) every 180 days in conjunction with vehicle start up. CH stored land-based equipment hydraulic systems will be exercised completely in conjunction with the specified CH storage exercising requirements except the following equipment/systems, which will be exercised every 365 days:

1 M60/M48 series armored vehicular launched bridge(AVLB) and bridge, armored-vehicle launched: scissoring type, class 60 and 70 will be subjected to three complete launch and retrieval cycles. Follow the PMCS guidance in the appropriate TMs and inspect before, during, and after exercising for failures. Inspection shall include:

(a) Engage the clutch assembly and activate the power take-off assembly and check for use of clutch lever operation to indicate proper adjustment of the clutch to assure there is no clutch slippage.

(b) Check for noise in the power takeoff assembly to indicate a defective clutch assembly, universal joint, or power take-off assembly.

(c) Inspect for leaks in the hydraulic system, excessive noise, vibration, or chatter in the hydraulic system, abnormal or excessive heating in the hydraulic system, valve bank controls sticking, filter condition per indicator, high hydraulic pump noise level, hanging or sticking of swivel elbows on tongue cylinder, proper fluid level in hydraulic reservoir, and binding at pivot points during operation.

2 M728 vehicle boom hydraulics and the dozer hydraulic system will be subjected to two complete raise and lowering cycles, see vehicle TM.

3 Forklifts, engineer construction equipment, and other material handling hydraulic equipment will be subjected to two complete raise and lowering cycles, see vehicle TM.

4 M88 series vehicles spade and boom hydraulics will be subjected to two complete raise and lowering cycles, see vehicle TM.

5 Mine Clearance Launcher Hydraulics. Exercise the launcher completely through two cycles of launch and retrieve.

NOTE

An exercising program will be developed and implemented for any new vehicle system entering APS. Any vehicle currently in APS having unique or special hydraulic mechanisms requiring exercising at a frequency level other than the specified maintenance cycle, will have requirements developed by the material fielding plan or AMC.

(d) Brake and clutch systems. Hydraulic brake systems on all vehicles will be exercised by pumping the brake pedal a minimum of four times during equipment start-up. This includes all trailer assemblies equipped with hydraulic braking systems. An auxiliary power source will be supplied to the trailers or the equipment deprocessed and started and the brake system exercised by the power source. When the functional exercise is performed on vehicles, which have a spring brake, it (spring brake) must be disengaged prior to the check. In most cases, the spring brake is disengaged when the air pressure has reached the minimum operating level. If the spring brake is not disengaged, the brake system will not function correctly. On vehicles with an air-spring brake chamber caging system for the rear brakes, e.g., M939 series, the vehicles must be inspected to ensure the brakes are not caged prior to the functions check to allow operation of the rear brakes. Once the functions check is completed, the air tank/reservoirs must be drained on both air and air-over-hydraulic brake systems to prevent damage to the system. Combat vehicle and tactical vehicle TMs must be reviewed for operational PMCS checks of the braking system prior to exercising.

(e) APUs, generators, or other subsystems that contain lead-acid batteries. For subsystems that are preserved for long term storage and contain dry charged batteries no charging or any battery maintenance/servicing is required (see Chapter 7 for special handoff requirements). Subsystems that are operational and contain wet charged batteries must be started every 180 days and operational checks performed, batteries charged/serviced (per paragraph 6-2h), etc.

(f) M139 Volcano Mine Dispenser. Launcher rack circuits need to be conditioned annually. The hardware should be assembled, installed, and tested per Section 2 of TM 9-1095-208-10-1. If any error code 8s (Rack Electronics) occur, the entire system should be checked per section 3 of the manual. If the error code 8s is isolated to the launcher racks, the launcher rack capacitors shall be replaced per the TM. If replacing the capacitor does not eliminate the error code, then replace the circuit cards.

(g) 120MM MORTAR : Every six months the following shall be accomplished for the 120MM mortar:

(1) Unlock and open the clamping support assembly (travel clamp) and perform the following:

(a) Buffer Mechanism. Exercise the buffer mechanism by pulling down (back) on both housing tubes at the same time and then releasing. Repeat two additional times (three times total).

(b) Traversing Mechanism. Turn traversing handle and move traversing mechanism fully to the left and then fully to the right. Return to an approximate middle position.

(c) Elevating Mechanism. Turn elevating handle to fully elevate mortar. Turn elevating handle to fully depress mortar.

(d) Cross-Leveling Mechanism. Turn cross-leveling to fully extend. Turn cross-leveling handle to fully retract. Turn cross-leveling handle to return elevating mechanism to an approximate vertical position.

(2) Reposition cannon tube in clamping support assembly by adjusting elevating, traversing, and cross-leveling mechanisms as necessary. Lock clamping support assembly. Reapply preservative/lubricating oil MIL-PRF-3150 to any unpainted surfaces, if needed.

(h) M870A3 Semi-Trailer. For land-based storage, with the gooseneck restrained, exercise the gooseneck once a year.

(i) The M56 and M58 smoke generators will be exercised per TM3-1040-282-10, PMCS item number 52 and TM3-1040-285-10, PMCS item number 53, respectively.

SECTION IV. MODIFICATION WORK ORDERS (MWO)

6-4. Application

a. MWOs that have been negotiated for equipment in storage will be applied in the following manner:

(1) Emergency and urgent MWOs will be applied while in storage, when possible, or at the first unscheduled issue, contingency, exercise, or scheduled maintenance cycle.

(2) Equipment will not be disturbed for accomplishing routine MWOs. These will be applied at the time of scheduled cyclic maintenance.

b. Advantage should be taken of imminent inspections, scheduled maintenance, or projected military exercises in planning for the application and verification of MWOs.

Stages of corrosion	Description	Painted surfaces	Exterior machine surface (functional and nonfunctional)	Interior machine surface (functional and nonfunctional	Remarks
I	Discoloration staining; no direct visual evidence of pitting, or other surface damage.	This condition does not require immediate corrective action.	This condition does not require immediate action other than reprocessing as necessary	This condition does not require immediate action other than reprocessing as necessary	Use as is, except in the case of elevating cylinders subjected to functional wiping action. Remove corrosion using crocus cloth
II	Loose rust, black or white corrosion accompanied by minor etching, and pitting of surface. No scale or tight rust.	Clean by any applicable process. Touch up with paint as originally applied.	Clean, exercise, and reprocess	Clean, exercise, and reprocess.	In the case of elevating cylinders subjected to functional wiping action, remove corrosion by use of crocus cloth.
III	Rust, black or white corrosion accompanied singularly or in - combination with etching, pitting, or - more extensive surface damage. Loose or granular condition.	Clean by any applicable process. Touch up with paint as originally applied.	Clean, exercise, and reprocess	Exercise and reprocess	This condition would have minor effect on fit or wear of paint or component but would permit use without reprocess. Does not apply to such items as instruments (electrical or manual) and critical surfaces that are necessary to effect a seal against pressurized liquids.
IV	Rust, black or white corrosion progressed to the point where fit. wear, function life of the item have been affected. Powdered or scaly condition with pits or irregular areas of material removed from surface of item.	Clean by any applicable process. Touch up with paint as originally applied.	Replace or rework parts and components involved.	Replace or rework and components involved.	This condition will require action as indicated.

TABLE 6-1. STAGES OF CORROSION

Table 6-2
Non-Cyclic Maintenance Exercising Guide

	TYPE STORAGE				
SYSTEM	**NON-CH**		**CH**	**SPECIAL INSTRUCTIONS**	**REFERENCE**
All Vehicles	30 days		30 days	Visual Inspection	6-2 a.
	180 days		180 days	When "wet" batteries are installed in vehicles start vehicle & charge batteries. Alternately, charge batteries using fast or trickle chargers IAW TM 9-6140-200-14	6-2 h.
	12 months		30 months	For combat vehicles perform all exercises ICW cyclic maintenance. Start-up, Road Test, Power up all systems & subsystems.	6-3 c. (2) (a) & 6-3 c. (3) (b)
	24 months		48 months	For tactical vehicles perform all exercises ICW cyclic maintenance. Start-up, Road Test, Power up all systems & subsystems	6-3 c. (2) (b) & 6-3 c. (3) (b)
	AFLOAT	N/A	180 days (min 4 times while afloat) Afloat only	Start, bring up to normal operating temperature, run gearbox through gear range with transmission in neutral	6-3 c. (1)
		N/A	180 days (min 4 times while afloat) Afloat only	Power up all systems & subsystems to do limited technical inspections (LTI) & FMC maintenance	6-3 c. (1)
		N/A	180 days	Exercise all hydraulic systems w/start-up	6-3 c. (3) (c)
Vehicles w/Turrets/ cupolas/ main guns	180 days		180 days	Rotate 360 degrees/3 rotations/ each direction/ raise and lower main guns. Exercise recoil mechanisms IAW TB 9-1000-234-13. Raise M109 to max QE. All exercises accomplished in place to maximum extent possible	6-3 c. (3) (a)
M48/M60 AVLB	180 days		365 days	Raise launcher system and launch/retrieve bridge 3 times	6-3 c. (3) (c) 1
M728	180 days		365 days	Turret rotated, gun elevated and depressed, recoil system, boom hydraulics and dozer system exercised. Perform 2 complete raise and lowering cycles.	6-3 c. (3) (c) 2
Forklifts/ ENG Eqpt/MHE	180 days		365 days	Hydraulic systems exercised. Perform 2 complete raise and lowering cycles.	6-3 c. (3) (c) 3
M88	180 days		365 days	Spade and Boom Exercised. Perform 2 complete raise and lowering cycles.	6-3 c. (3) (c) 4
MICLIC	365 days		365 days	Exercise through 2 cycles launch and retrieve	6-3 c. (3) (c) 5
APU, Generators subsystems w/wet charged batteries	180 days		180 days	Start and perform operational checks, service batteries by starting or charge IAW TM 9-6140-200-14.	6-3 c. (3) (e)
M139 Volcano	365 days		365 days	Condition rack circuits annually IAW TM 9-1095-208-10-1	6-3 c. (3) (f)
120MM Mortar	180 days		180 days	Buffer, Traversing, Elevating, Cross-Leveling Mechanisms; Reposition cannon tube	6-3 c. (3)(g)

Table 6-2 (continued)
Non-Cyclic Maintenance Exercising Guide

	TYPE STORAGE			
SYSTEM	**NON-CH**	**CH**	**SPECIAL INSTRUCTIONS**	**REFERENCE**
Patriot Missile System RS, ECS, ICC,CRG, AMG, EPP, LS, EPU		90 days	Tactically emplace and initialize all equipment. Verify functionality of all switches, lights, and indicators. -Loop-back all radio Relay Terminals and verify operation. -Verify Green communications links for all RRT. -Verify Green DDL for all launchers with radio and cable. -Perform LSTS and MRCTS checks. -Perform LS special test and remote shut down. -Verify Missile round count using simulators. -Verify AMG/CRG/ECS/ICC control interfaces. Run RS diagnostic baseline. -Run complete TWUD for ECS/ICC. -Radiate in K7 for a minimum of 6 hours with at least two hours in TBM. -Verify correct RS TWPS operation. -Load Test EPP, EPU, and 15kW generators for 4 hours at 100% load. -Verify shelter AC/Heater proper operation. -Verify MCPE function. -Erect both AMG Masts to maximum height and verify antenna positioner limits and function. -Verify IFF operational interface. -Verify no leaks in glycol system and proper resistivity.	6-3 c.(3) (a)
		365 days	-Perform System Integration and Checkout (SICO) procedures.	Appendix J

CHAPTER 7

ISSUE FROM STORAGE (PHASE III)

SECTION I. POLICY

7-1. Policy

Before equipment is handed off to a using unit, all necessary PMCS will be performed in accordance with operator's requirements outlined in the equipment's TM -10/-20 manuals.

SECTION II. GENERAL

7-2. Requirements

a. There are three possible reasons to issue/unload APS materiel and supplies; specifically, these are cyclic maintenance, contingency, and training exercises. It is essential that during cyclic maintenance all serviceability checks and services are performed prior to preservation and placement of equipment back in storage. If failures are detected and cannot be repaired the equipment should be replaced. The replacement must meet the established TM -10/-20 maintenance standards. During contingency hand-offs and training exercises crew level checks and selected unit level checks must be performed prior to the issue to the using units or in conjunction with the using units. The rationale for fully performing these checks is that some storage limits the maintenance checks, exercising requirements, and other essential inspections that must be performed to determine equipment functionality.

b. For afloat equipment the on-board crew will depreserve and activate the equipment, undertaking all crew level checks and selected unit level checks prior to the handover/issue to the using units or in conjunction with the using units. If an emergency situation occurs, the on-board lead man may request that a "supplemental OPP" join them.

c. Land-based equipment hand-off will normally be accomplished by the personnel assigned to that site. Additional or special assistance could be provided by AMC materiel fielding teams.

d. During hand-off the application of MWOs, servicing equipment, reassembly, BII inventory, testing, calibration, and major repairs (including dry docking) and special systems checks not accomplished while in storage must be considered.

e. For APS watercraft forward stored at WES-KNB and WEB-YND an OPP team will be assembled at CEB-H and flown to the site to activate and hand off the vessels and ancillary equipment within a ten day period in accordance with established activation procedures for each vessel published in each sites appropriate battlebook.

SECTION III. PLANNING

7-3. Prior to hand-off

Planning requires written handoff procedures, which include the following:

a. A location record for all equipment that can be issued and personnel thoroughly familiar with the locator system.

b. A flow chart to route equipment to servicing, work, and staging areas within the minimum amount of time.

c. Inspection and inventory checkpoints to ensure that planned actions are accomplished.

d. MHE, tools, special equipment, and instrumentation for test and calibration.

e. Fully charged and activated batteries. Class IX such as fan belts, tires, inner tubes, checked for serviceability.

f. Trained personnel to assemble, test, and assure operational readiness.

g. Equipment, fuel supplies, and operators for fueling point.

h. A staging area for assembling and releasing equipment.

i. Joint inventory of materiel between losing and gaining organizations.

j. Procedures for transfer of accountability. A series of scan points, depending on the hand-off operations, will be established to track accountability.

NOTE

No AOAP sampling or calibration of equipment will be performed on APS-3 materiel during hand-off unless directed by the gaining commander.

SECTION IV. ACTIVATION AND DEPROCESSING

7-4. Issue precedents

a. Equipment removed from non-CH storage or container vessels will, in most cases, require more deprocessing time even though the preservation proceedings herein have been designed to require minimum deprocessing time. Generally, the equipment can be placed in service by removal of barrier materials and tapes. In most cases, contact preservatives need not be removed. The major deprocessing effort will be in activation and purging of preserved engines and fuel and gun systems.

(1) Vehicles may have preservative oil in the fuel system and engine combustion chambers. The presence of this oil sometimes makes starting difficult. Preserved gasoline-fired engines can be started more easily and quickly if a supply of fresh fuel is connected directly to the fuel inlet side of the carburetor. If crankcase contains preservative oil, MIL-PRF-21260, of the proper type and grade, the oil need not be drained.

(2) Weapon systems will be deprocessed by the removal of preservation materials from the breech and muzzle ends and the VCI tube from the barrel. The barrel may be cleaned by light swabbing, if desired.

(3) MIL-C-10382 (P-14) preservative compound applied to potable water tanker's internal tanks, piping, and/or faucets will be removed by flushing with hot water (160 degrees F.) or with steam before filling with potable water.

NOTE

Do not retain these materials for reuse.

(4) Vehicles requiring replacement batteries or stored without batteries will have batteries installed.

CAUTION

Improperly connected batteries can damage vehicle electrical systems. Reversed polarity (positive to negative) can damage alternator.

(5) Dismount installed air-spring brake chamber storage brackets to prevent brake failure, where appropriate. Any time a vehicle is removed from storage, the brakes will be tested by stopping the vehicle, traveling at 15 mph maximum, five times. During this test, visually examine exterior of brake for evidence of leaking fluid.

(6) Fill fuel tanks with proper grade and type of fuel. Take special precautions during fueling to avoid spills and ensure tires exposed to fuel are immediately cleaned.

(7) Check all refrigeration systems to ensure systems are fully charged in accordance with the applicable technical manuals.

(8) All fuel tankers must have tanks pressure tested, if tankers have been in storage over one year, in accordance with Title 49, see paragraph 3-2 d(l)(b).

(9) Removal of preservative compounds is not required before issue of petroleum tank vehicles. Replacement filters will be provided to draw units in addition to new filters currently installed. The separator vessel will be stenciled with the month and year put into service.

b. Components previously disassembled/removed must be collected and reinstalled. Generally, the end item shall be activated before components are reinstalled. This permits the availability of on-board power for checkouts.

c. Issued equipment is subject to the tests and inspection specified in their applicable TMs. Of particular concern are the following:

(1) TOW missile systems. The TOW subsystem verification will be performed prior to hand-off to the war fighter. See TM 9-1425-453-34-1 and TM 9-1425-453-34-2.

(2) MLRS launchers. See TM 9-1425-646-10.

(3) M139 mine dispenser. See .

(4) Night Vision Driver's Viewer, AN/VVS-2. The AN/VVS-2 must be tested and calibrated in a dark location prior to handoff per the procedure listed in section 2.8 of TM 5855-299-12 & P, Operator's and Unit Maintenance Manual for the Test Set, Electronics Systems, TS-4348/UV. The operator should be familiar with the general operating procedures of the TS-4348/UV contained in TM 11-5855-249-10, Operator's Manual Viewers, Driver's Night Vision, before performing calibration.

(5) Following activation and hand off of watercraft, the services of a fully sanctioned U.S. Coast Guard company will be acquired to swing the compass of vessels prior to them leaving port.

(6) PATRIOT Missile System. The PATRIOT Radar will have a complete receiver and transmitter alignment to include TVM Uplink and transmitter synchronizer adjustments. See TM 9-1425-602-34-1 and Annex J of this manual.

d. For contingency off-loads and training exercises, medical equipment will be subject to the following:

(1) Seasoning of X-ray tubes. Seasoning of X-ray tubes prior to putting them in operation is mandatory if they have been in storage for periods greater than 180 days. Seasoning is required because, over time, metallic ions previously held by a getter inside the tube may become conductive pathways during an initial exposure and arc, destroying the X-ray tube after a few exposures. The recommended procedure is:

(a) Set the X-ray tube current (mA) at the lowest or continuous fluoroscopic exposure (generally the leakage technique factor) and lowest kVp value selection.

(b) Make an initial series of timed exposures at ½ of the maximum advertised kVp rating of the system, e.g., 65 kVp for a system rated at 130 kVp maximum. Allow sufficient operation time at each kVp selection to equal about ½ of the maximum heat lead of the X-ray tube (mA x kVp = HU). Gradually raise the kVp in 5 kVp to 10 kVp increments until maximum rated kVp is reached. As maximum or rated kVp is approached, more time should be spent at each kVp selection with additional cool down time between exposures. More exposure time should be spent between 90 percent and 100 percent rated voltage than is spent between 60 percent and 90 percent rated voltage. This will gradually raise the HU values inputted into the X-ray tube, and may cause the tube housing to become warm to the touch.

(c) The longer the period that a tube has been idle, the longer the seasoning period. Tubes in storage for longer than 6 months will benefit from seasoning periods of 1/2 hour or longer.

(d) Should any instability in tube current (mA) appear during the seasoning process, STOP and reduce the kV selection until the instability disappears. If the lower kVp selection allows operation, continue the seasoning and heat loading to about 50% of the maximum rating. Allow for cool down after the exposure and then gradually raise the kVp to continue the process.

(e) Do not attempt to continue the seasoning process of any tube unit if the initial instability or "arcing" reoccurs at the same kVp level. Arcing inside the tube unit is usually audible as "cracking," "spitting," or "hissing" sound become louder and more frequent as the kVp is increased.

(2) Additional sterilizer parts. Due to long-term storage, several parts of the Sterilizer Surgical Field, NSN 6530-00-926-2151, could fail to operate when first tested. The parts that are known to fail will be added to the initial fielding kit for the sterilizer. The kits and the spare parts are located with the medical maintenance set.

(3) Medical equipment repairers. At the time of issue, medical equipment repairers (MERs), MOS 91A, will be responsible for unpacking, testing, and calibrating medical equipment prior to use. The brigade, hospitals, and minimal care detachments must ensure that this MOS is attached and deployed with the equipment.

(4) "Push packages." For APS-3, those component items with special storage and handling codes which were excluded from the packed portion of the assemblage to maintain security, prevent deterioration, and avoid such damage to packed components as corrosive leaks, and items with a shelf-life will be sent as a "push package." All other APS sites should maintain components on site.

(5) Battery powered equipment.

(a) Batteries used in medical equipment should be tested and/or recharged as soon as possible to include batteries in medical equipment usable on line voltage (115 volts nominal) or batteries.

(b) Batteries in medical equipment should be fully charged upon completion of training exercises.

e. Cyclic maintenance serviceability inspections and performance testing of medical equipment will be per-formed in accordance with applicable TMs or manufacturer's literature prior to reconstitution of the medial assemblages by medical equipment repairers. In addition, the following will be accomplished prior to reconstitution.

(1) All medical equipment will be inspected, tested, and serviced. Applicable preventive maintenance, calibration verification, and electrical safety services will be performed to ensure medical equipment is FMC prior to being placed in storage.

(2) All X-ray equipment will be inspected for signs of visible damage. X-ray equipment will be energized to determine condition and operational usability.

(3) All electrically or battery powered medical diagnostic or treatment equipment will be operationally tested. Upon completion of determining equipment is fully mission capable, batteries will be disconnected. Operator replaceable, commercial off the shelf (AA, A, C, D, 9 volt) batteries will be removed from equipment.

(4) Medical equipment requiring the use of water during testing (for example, field sterilizer and field surgical sinks) will be operationally tested. Ensure a capability to purge 100 percent of the residual water is available. Add a small quantity of environmentally safe anti-freeze after purging the system.

(5) Medical equipment containing critical rubber components will have 100 percent of the items inspected for cracking, flaking, and blooming.

(6) Any defective medical equipment will be repaired on site or replaced.

CHAPTER 8

RECORDS AND REPORTING

SECTION I. GENERAL

8-1. Requirements and recommendations

a. The requirement for records of many types has been specified throughout this manual. For the purpose of emphasis, record requirements are reiterated in this chapter. In a limited number of cases, this manual specifies dual use of forms. In those instances where no existing form is available, local development of a form is recommended.

b. APS projects are subject to many record and reporting requirements pertaining to inventory status, financial reporting, QA, and so forth. Nothing in this manual is intended to alter or waive regulatory reporting requirements.

c. Actions and procedures required to conform with regulatory equipment records will be planned on the basis of what is most efficient for the available resources and what system will provide the greatest assurance of accurate, timely entry of required data.

d. It is recommended that each site or vessel have a weatherproof room where equipment records can be maintained in an orderly and secure manner. As equipment is inspected, tested, exercised, or calibrated, resulting data can be channeled to personnel responsible for maintenance of equipment records. This will ensure that personnel making the entries are those familiar with what is required and how it is to be entered.

e. A central location is recommended for storing TMs required as part of the equipment records. This permits a degree of flexibility not possible when stored on or in each piece of equipment. Normally, the only publications stored with equipment are those required as a part of the logbook, and the operator's manual (-10) that is a part of the BII. All other publications will be brought with the deploying units' to-accompany-troops (TAT) materiel.

f. Records and reporting requirements for ammunition and munitions should be performed according to a scheduled maintenance cycle and/or surveillance inspection plan.

g. Records for medical materiel will be specified by OTSG.

SECTION II. DA PAM 738-750, THE ARMY MAINTENANCE MANAGEMENT SYSTEM (TAMMS)

8-2. Reporting requirements

Maintenance reporting equipment will be according to DA Pam 738-750, AR 700-138 and as directed by AFSC.

SECTION III. HUMIDITY CONTROL RECORDER CHARTS

8-3. Use and retention

a. Recorder charts are necessary for quality control, surveillance, and equipment maintenance. Surveillance of hygrothermographs is required in accordance with manufacture’s specifications. When the CH is functioning properly and within the prescribed limits of RH, no action is required. However, corrective action must be taken immediately, as indicated by fluctuating RH levels (i.e., notification of facilities engineers or the locally based engineer contractors).

b. RH charts will be maintained for 1 year by the responsible facility engineer project inspection personnel.

SECTION IV. READINESS REPORTING

8-4. Readiness reporting

a. HQ AMC will report readiness on a quarterly basis for APS in accordance with AR 220-1 utilizing input from subordinate activities, U.S. ARCENT, and USAMMA.

b. Special reports are required whenever a significant change occurs due to extraordinary circumstances, such as windstorm, hurricane, tornado, or other critical incident. The report will be prepared as a partial report to show the changed condition.

c. HQ DA-SMR is the approval authority for all excused reporting requirements, e.g., training.

d. Requests for waivers or deviations from the requirements of Materiel Condition Status Reporting (AR 700-138, Chapters 2, 3, or 4) and requests for additions to or deletions from the equipment reportable items list will be submitted to Commander, USAMC Logistics Support Activity, ATTN:AMXLS-RRS, Redstone Arsenal, AL 35898-7466. LOGSA will forward requests through HQ AFSC, to Commander, AMC, ATTN: AMCLG-RS, to HQ DA. Functional staff proponents within ODCSLOG (DALO-SMR, DALO-AV, and DALO-SMM) will be responsible for the final decision. Request may be made by any service member or Department of the Army civilian employee through their MACOM to LOGSA for final decision by HQ DA.

APPENDIX A

GENERAL REFERENCES

A-A-289
Brushes, Acid, Swabbing

A-A-1051
Paperboard, Wrapping and Cushioning

A-A-3174
Plastic Sheet, Polyolefin

A-A-1451
Twine, Fibrous

A-A-1898
Cushioning Material, Cellulosic, Packaging

A-A-1936
Adhesive, Contact, Neoprene Rubber

A-A-50177
Paper, Lens

A-A-50185
Cloth, Batiste, Cotton, Polishing

A-A-52408
Preservative Coating, Rubber: for Rubber Surfaces

A-A-52557
Fuel Oil, Diesel; for Posts, Camps and Stations

A-A-52465
Primer Coating, Synthetic, VOC Compliant (for Brake Drums)

A-A-52624
Antifreeze, Multi-Engine Type

A-A-59133
Cleaning Compound, High Pressure (Steam) Cleaner

A-A-59303
Talc, Technical

AR 11-9
Army Radiation Safety Program

AR 40-61
Medical Logistics Policies and Procedures

AR 190-11
Physical Security of Arms, Ammunition, and Explosives

AR 190-13
Army Physical Security Program

AR 190-51
Security of Unclassified Army Property (Sensitive and Non-Sensitive)

AR 200-1
Environmental Protection and Enhancement

AR 220-1
Unit Status Reporting

AR 380-4
DA Physical Security Program In The National Capital Region

AR 380-5
Department of the Army Information Security Program

AR 385-55
Prevention of Motor Vehicle Accidents

AR 700-48
Management of Equipment Contaminated with Depleted Uranium or Radioactive Commodities

AR 700-68
Storage and Handling of Compressed Gases and Gas Liquids in Cylinders

AR 700-138
Army Logistics Readiness and Sustainability

AR 702-6
Ammunition Stockpile Reliability Program (ASRP) and Army Nuclear Weapons Stockpile Reliability Program (ANWSRP)

AR 702-18
Materiel Quality Control Storage Standards

AR 710-1
Centralized Inventory Management of the Army Supply System

AR 710-2
Inventory Management Supply Policy Below the Wholesale Level

AR 710-3
Asset and Transaction Reporting System

AR 735-11-2
Reporting of Supply Discrepancies

AR 740-1
Storage and Supply Activity Operations

AR 740-26
Physical Inventory Control

AR 750-1
Army Materiel Maintenance Policy and Retail Maintenance Operations

AR 750-43
Army Test, Measurement and Diagnostic Equipment (TMDE) Program

ASTM-D928
Standard Specification for Sodium Bicarbonate

ASTM-D1974
Standard Practice for Methods of Closing, Sealing, and Reinforcing Fiberboard Shipping Containers

ASTM-D3951
Standard Practice for Commercial Packaging

ASTM-D3953
Strapping, Flat Steel, and Seals

ASTM-D4057
Standard Practice for Manual Sampling of Petroleum and Petroleum Products

ASTM-D4176
Free Water and Particulate Contamination in Distillate Fuels (Visual Inspection Procedures)

ASTM-D4860
Free Water and Particulate Contamination in Mid-Distillate Fuels (Clear and Bright Numeric Rating)

ASTM-D5118
Standard Practice for Fabrication of Fiberboard Shipping Boxes

ASTM-D5168
Practice for Fabrication and Closure of Triple-Wall Corrugated Fiberboard Containers

ASTM-D5486
Tape, Pressure Sensitive, Packaging for Box Closure and Sealing

ASTM-D5749
Specification for Reinforced and Plain Paper Gummed Tape for Sealing and Securing

ASTM-D6039/-D6039 M
Crates, Wood, Open and Covered

ASTM-F1267
Standard Specification for Metal, Expanded, Steel

CCC-C-440
Cloth, Cheesecloth, Cotton, Bleached and Unbleached

DA Form 1804
Petroleum Sample Tag

DA Form 2028
Recommended Changes to Publications and Blank Forms

DA Form 2404
Equipment Inspection and Maintenance Worksheet

DA Form 2407
Maintenance Request

DA Form 2408-4
Weapon Record Data

DA Form 2408-20
Oil Analysis Log

DA Form 3256
Preservation and Depreservation Guide for Marine Equipment

DA Pam 205-1
Energy Conservation Guidelines for the Operation of Controlled Humidity Warehouses

DA PAM 700-48
Handling Procedures for Equipment Contaminated with Depleted Uranium or Radioactive Commodities

DA PAM 710-2-1
Using Unit Supply System (Manual Procedures)

DA Pam 738-750
Functional Users Manual for the Army Maintenance Management System (TAMMS)

DOD 4000.25-2M
Military Standard Transaction Reporting and Accounting Procedures

DOD 4140.27-M
Shelf-Life Item Management Manual

DOD 5100.76M
Physical Security of Sensitive Conventional Arms, Ammunition, and Explosives

FM 10-67-1
Concepts and Equipment of Petroleum Operations

FM 10-67-2
Petroleum Laboratory Testing and Operations

FM 38-701
Packing of Materiel for Packing

FM 100-17-1
Army Pre-Positioned Afloat Operations

FM 100-17-2
Army Pre-Positioned Land

FM 100-17-3
Reception, Staging, Onward Movement, And Integration

MIL-PRF-46146
Adhesives-Sealants, Silicone, RTV, Noncorrosive (for use with Sensitive Metals and Equipment)

MIL-B-117
Bags, Sleeves and Tubing

MIL-PRF-121
Barrier Material, Greaseproof, Waterproof, Flexible

MIL-C-104
Crates, Wood: Lumber and Plywood Sheathed, Nailed, and Bolted

MIL-C-11796
Corrosion Preventive Compound, Petrolatum, Hot Application

MIL-DTL-53072
Chemical Agent Resistant Coating (CARC) System Application Procedures and Quality Control Inspection

MIL-C-81309
Corrosion Preventive Compounds, Water Displacing, Ultra-thin Film

MIL-D-3464
Desiccants, Activated, Bagged, Packaging Use and Static Dehumidification

MIL-D-3716
Desiccants, Activated for Dynamic Dehumidification

MIL-PRF-18458
Grease, Wire Rope and Exposed Gear

MIL-HDBK-138
Container Inspection Handbook for Commercial and Military Intermodal Containers

MIL-HDBK-774
Palletized Unit Loads

MIL-I-22110
Inhibitor, Corrosion, Volatile, Crystalline Powder

MIL-PRF-46147
Lubricant, Solid Film, Air Cured (Corrosion Inhibiting)

MIL-PRF-131
Barrier Materials, Water/vaporproof, Greaseproof, Flexible, Heat-Sealable

MIL-PRF-372
Cleaning Compound, Solvent (for Bore of Small Arms and Automatic Aircraft Weapons)

MIL-PRF-680
Degreasing Solvent

MIL-PRF-2104
Lubricating Oil, Internal Combustion Engine, Combat/Tactical Service

MIL-PRF-2105
Lubricating Oil, Gear Multipurpose (Metric)

MIL-PRF-3150
Lubricating Oil, Preservative, Medium

MIL-PRF-6081
Lubricating Oil, Jet Engine

MIL-PRF-6799
Coatings, Sprayable, Strippable, Protective, Water Emulsion

MIL-PRF-10924
Grease, Automotive and Artillery

MIL-PRF-16173
Corrosion Preventive Compound, Solvent Cutback, Cold-Application

MIL- PRF-21260
Lubricating Oil, Internal Combustion Engine, Preservative and Break-in

MIL-PRF-22750
Coating, Epoxy, High Solids

MIL-PRF-23377
Primer Coating: Epoxy, High-Solids

MIL-PRF-23699
Lubricating Oil, Aircraft Turbine Engine, Synthetic Base, NATO Code Number 0-156

MIL-PRF-44156
Kitchen, Company Level, Field Feeding (KCLFF), Components Thereof

MIL-PRF-46010
Lubricant, Solid Film, Heat Cured Corrosion Inhibiting

MIL-PRF-46167
Lubricating Oil, Internal Combustion Engine, Arctic

MIL-PRF-46176
Brake Fluid, Silicone, Automotive, All Weather, Operational and Preservative

MIL-PRF-63460
Lubricant, Cleaner and Preservative for Weapons and Weapons Systems (Metric)

MIL-PRF-83282
Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Metric, NATO Code Number H-537

MIL-PRF-85582
Primer Coatings: Epoxy, Waterborne

MIL-STD-3004
Quality Surveillance for Fuels, Lubricants, and Related Products

MIL-STD-2073-1
Standard Practice for Military Packaging

MMM-A-260
Adhesive, Water-Resistant, (for Sealing Waterproofed Paper)

NN-P-71
Pallets, Material Handling, Wood, Stringer Construction, 2-way and 4-way (Partial)

NAS833
Plug-Protective, Flared Hose or Tube Assembly

NAS836
Plug-Protective, Flared Tube, Hose Assembly or MS33649 Boss

O-B-41
Battery Water

ASTM-D6251
Boxes, Wood, Cleated-Plywood

SB 3-30-2
Chemical-Biological Canisters and Filter Elements: Serviceability Lists

SB 740-94-1 Storage Serviceability Standards for SBCCOM Material
Sets, Kits, Detectors and Alarms, CBR and Ancillary Items

SB 740-94-2 Storage Serviceability Standards for SBCCOM Material
Decontaminating Equipment and Decontaminating Agents

SB 740-94-5 Storage Serviceability Standards for SBCCOM Material
Mask, Chemical-Biological (All Types), And Ancillary Equipment

SB 740-94-6 Storage Serviceability Standards for SBCCOM Material
Filter Units, Gas Particulate and Ancillary Items

SB 740-94-8 Storage Serviceability Standards for SBCCOM Material
Riot Control Agent Dispersers and Ancillary items

SB 740-94-9 Storage Serviceability Standards for SBCCOM Material
Smoke Generators and Ancillary items

SB 742-1
Inspection of Supplies and Equipment Ammunition Surveillance Procedures

US Army Field Support Command G4 Deputy for Logistics SOP 4500.9-R-AFSCG4-1, Automated Identification Technology (AIT) Management Placement of Radio Frequency Tags on U.S. Army Prepositioned Stocks

TB 9-1000-234-13
Exercising of Recoil Mechanisms and Equilibrators

TB 9-1300-278
Guidelines for Safe Response to Handling, Storage, and Transportation Accidents Involving Army Tank Munitions or Armor Which Contain Depleted Uranium

TB 43-0116
Identification of Radioactive Items in the Army

TB 43-0134
Battery Disposition and Disposal

TB 43-0135
Environmentally Safe Substances for Use With Communications-Electronics Equipment

TB 43-0137
Transportation Information for CECOM Radioactive Commodities

TB 43-180
Calibration and Repair Requirements for the Maintenance of Army Materiel

TB 43-0142
Safety Inspection and Testing of Lifting Devices

TB 43-0144
Painting of Watercraft

TB 43-0197
Instruction for Safe Handling, Maintenance, Storage, and Disposal of Radioactive Items Licensed by US Army Armament and Chemical Acquisition and Logistics Activity

TB 43-0212
Purging, Cleaning and Coating Interior Ferrous and Terne Sheet Vehicle Fuel Tanks

TB 43-0213
Corrosion Prevention and Control Including Rust proofing Procedures For Tactical Vehicles and Trailers

TB 43-0216
Safety and Hazard Warnings for Operation and Maintenance of TACOM Equipment

TB 43-0242
CARC Spot Painting

TB 43-0255
Disposition/Disposal Information for CECOM Radioactive Commodities

TB 750-25
Maintenance of Supplies and Equipment: Army Test, Measurement and Diagnostic Equipment (TMDE) Calibration and Repair Support (C&RS) Program

TB 750-651
Use of Antifreeze Solutions, Antifreeze Extender, Cleaning Compounds, and Test Kit in Engine Cooling Systems

TM 43-0139
Painting Instructions for Army Materiel

TM 9-1005-201-23 & P
Unit and Direct Support Maintenance Manual (Including Repair Parts and Special Tools Lists) for Machine Gun, 5.56MM, M249 with Equipment NSN: 1005-01-127-7510 (EIC: 4BG)

TM 9-1095-208-10-1
Operator's Manual for Dispenser, Mine: M139 (NSN 1095-01-235-3139) (EIC: 3V8) with mounting Kits for 5-ton Vehicle (NSN 1095-01-252-2818) (EIC: 3V9) and M548A1 Vehicle (NSN 1095-01-331-6755) (Ground Volcano)

TM 9-1425-453-34-1
Intermediate Direct Support and Intermediate General Support Maintenance Manual for Bradley Fighting Vehicle TOW 2 Subsystem Consisting of: Missile Guidance Set (NSN 1420-01-329-8870), Launcher Assembly (NSN 1440-01-178-1141), Launcher Assembly (NSN 1440-01-167-7514), and Integrated Sight Unit (NSN 1240-01-216-6331)

TM 9-1425-453-34-2
Direct Support and General Support Maintenance Manual for Bradley Fighting Vehicle TOW 2 Subsystem Consisting of: Missile Guidance Set (1420-01-329-8870), Launcher Assembly (NSN 1440-01-178-1141), Launcher Assembly (NSN 1440-01-167-7514), and Integrated Sight Unit (NSN 1240-01-216-6331)

TM 9-1425-646-10
Operator's Manual For Launcher, Rocket, Armored Vehicle Mounted: M270 Part No. 13029700-201 (1055-01-192-0358) Multiple Launch Rocket System

TM 9-2330-356-14
Operator's, Unit, Direct Support, And General Support Maintenance Manual For Semitrailer, Tank: 5000 Gallon, Bulk Haul, Self-Load/Unload M967 (NSN 2330-01-050-5632) M967A1(2330-01-155-0046) Semitrailer, Tank: 5000 Gallon, Fuel Dispensing, Automotive M969 (2330-01-050-5634) M969A1 (2330-01-155-0048) Semitrailer, Tank: 5000 Gallon, Fuel Dispensing, Under/Overwing Aircraft M970 (2330-01-050-5635) M970A1 (2330-01-155-0047)

TM 9-2350-264-20-1-1
Unit Maintenance Manual, Vol 1 of 5 for Tank, Combat, Full-Tracked: 120-MM Gun, M1A1 (NSN 2350-01-087-1095) General Abrams, Hull

TM 9-2350-264-20-2-1
Unit Maintenance Manual, Vol 1 of 4 for Tank, Combat, Full-Tracked: 120-MM Gun, M1A1 (NSN 2350-01-087-1095) (EIC: AAB) General Abrams Turret

TM 9-2350-284-24P-1
Unit Maintenance, Direct Support And General Support Maintenance Repair Parts And Special Tools List (Including Depot Maintenance Repair Parts) For Fighting Vehicle, Infantry, M2A2 (NSN 2350-01-248-7619) (EIC: AlG) Fighting Vehicle, Infantry M2A2 Operation Desert Storm (2350-01-405-9886) (EIC: APE) And Fighting Vehicle, Cavalry M3A2 (2350-01-248-7620) (EIC: AlH) Fighting Vehicle, Cavalry M3A2 (2350-01-405-9887) (EIC: AlH) Hull

TM 9-2530-200-24
Unit, Direct Support and General Support Maintenance Manual Standards for Inspection and Classification of Tracks, Track Components and Solid-Rubber Tires (FSC 2530)

TM 9-6140-200-14
Operator's Unit, Direct Support and General Support Maintenance Manual for Lead-Acid Storage Batteries

TM 9-2610-200-14
Operator's Unit, Direct Support, and General Support Maintenance Manual for Care, Maintenance, Repair, and Inspection of Pneumatic Tires and Inner Tubes

TM 11-5855-249-10
Operator's Manual for Viewers, Driver's, Night Vision, AN/VVS-2 (NSN 5855-00-629-5278), AN/VVS-2(V)1A (5855-01-096-08), AN/VVS-2(V)2 (5855-01-057-1880, AN/VVS-2((5855-01-096-0872), AN/VVS-2(V)3 (5855-01-105-7793, AN/VVS-2(V)4 (5855-01-235-5489)

TM 11-6140-203-14-1
Operator's, Organizational, Direct Support, and General Support Maintenance Manual for Aircraft and Non-aircraft Nickel-Cadmium Batteries (General)

TM 38-400
Joint Service Manual for Storage and Materials Handling

TM 55-1730-229-12
Operator and Organizational Maintenance Manual, Power Unit, Aviation, Multi-Output GTED Electrical, Hydraulic, Pneumatic (AGPU) Wheel Mounted, Self-Propelled, Towable AC 400HZ, 3PH, 0.8 PF, 115/200V, 30 KW, DC 28 VDC 700 AMPS, Pneumatic 60 LBS/M AT 40 PSIG, Hydraulic 15 GPM at 3300 PSIG, DoD Model MEP-360A, Class Precise, Hertz 400, (NSN 1730-01-144-1897)

TM 55-4920-376-14&P
Operator's Organizational, Direct Support and General Support Maintenance Manual Including Repair Parts and Special Tools List for Air Mobile Shelter (AA4920-7016-1) (NSN 4920-00-900-8378)

MIL-PRF-32033
Lubricating Oil, General Purpose, Preservative (Water-Displacing, Low Temperature)

VV-P-236
Petrolatum, Technical

APPENDIX B
PACKAGING AND CARETAKER EQUIPMENT AND SUBSTITUTE PACKAGING MATERIALS

B-1. Overview

a. Certain basic equipment, above the equipment organic to an APS maintenance or redeployment site, is essential to accomplish the requirements of this manual. The following equipment should be made available:

(1) Mechatronics Tester.

(2) Cleaner, steam pressure jet, wheel-mounted, 125 psi maximum, oil heated.

(3) Paint spray booth, drive-through dry-type, with exhaust stack and damper or portable spray systems to include compressors..

(4) Lubricating and servicing unit power-operated, truck-mounted, 15 cubic foot per minute (ft/min) air compressor, gas-driven.

(5) Blasting machine, used with dry abrasive.

(6) Fuel Filtration/Additive Unit.

(7) Antifreeze recycler.

(8) High pressure water blaster.

(9) Dehumidification equipment for watercraft.

(10) Watercraft jacking system.

(11) Generators and welding sets.

b. The following items should be part of the equipment list for use by the contractor shipboard COSIS team on LSMR vessels or warehouse:

Quantity	Materiel	NSN
6	Tool Kit, General Mechanics	5180-00-606-3566
3	Multimenter,AN/PSM-45	6625-01-265-6000
2	Tester, Optical Battery and Antifreeze	6630-00-105-1418
4	M1A1 Abrams Tank Gun Mount Exerciser Kit*	4933-01-346-1791
1	Purging Kit, Fire Control*	4931-00-065-1110
1	Repair Kit, Electrical Connector	5935-01-119-7103
1	Tool Kit, Breakout Box Assembly	5999-01-130-8077
2	Wrench, Hub Cap, MIA Abrams*	5120-01-129-2138
4	Wrench, Set, Crowfoot	5120-01-117-7855
1	Repair Kit, Battery Service	5180-00-051-3806
1	Tool Kit, Artillery Mechanic*	5180-00-699-3594
1	Pump Kit, Hydraulic, M3*	4933-00-712-2378
6	Grease Gun	4930-00-204-2550

Quantity	Materiel	NSN
6	Adapter, Grease Gun	4930-00-288-1511
1	Bench Grinder	3415-00-517-7754
1	Bench Vise	5120-00-293-0110
6	Drop Light	6230-00-146-8898
6	Extension Cord, 25'	6150-00-485-6149
2	Hack Saw Frame	5110-00-289-9657
10	Hack Saw Blades	5110-00-927-1063
1	Helicoils Set	5180-00-752-9793
2	Extractor, Tap Set	5120-00-305-2275
1	Tap & Die Set, Course	5136-00-357-7494
1	Tap & Die Set, Fine	5136-00-357-7504
1	Counter Sinks Set	
1	Electric Drill, 1/4"	
1	Electric Drill, 1/2"	5130-00-283-3231
2	Drill Bits Sets	5133-00-529-5691
2	Standard Test Equipment (STE/ICE)	4910-01-222-6589
1	Circular Saw	5130-00-889-8991
3	All Purpose Blade, 22 Teeth	5130-00-212-8046
3	All Purpose Blade, 44 Teeth	5130-00-212-8047
1	Vacuum Cleaner	7910-00-550-9123
1	Stencil Machine, 1/2"	7490-00-256-1839
2	Ladder, Heavy Duty, 8 feet	5440-00-227-1594
2	Trielectron Battery Charger	6130-01-435-2800
1	Come Along (Mini Mule)	3950-01-071-1746
2	Rubber Apron	8415-00-634-5023
2	Rubber Gloves	8415-00-266-8675
3	Tight/Fasten Kit	5120-00-870-6928
12	Industrial Goggles	5240-00-269-7912
1	Work Table	4910-00-357-5342
1	Work Table Maintenance	4910-00-543-7771

* These items are unique to specific end items, therefore, it will not be necessary to have these items on every LMSR.

c. The following items should be part of the equipment stored at WES-KNB and WEB-YND to be used by the OPP for activation of the watercraft:

Quantity	Materiel	NSN
1	Steel Strap Seal Kit 3	3540-00-565-6243
10	Goggles Industrial	4240-00-052-3776
6	Face Shield Industrial	4240-00-542-2048
6	Grease Gun Hand Lev	4930-00-253-2478
6	Oiler Hand 16 oz	4930-00-262-8868
6	Oiler Hand 8 oz	4930-00-266-9182
2	Stripper Wire	5110-00-063-3037
6	Knife, Pocket	5110-00-162-2205
10	Screwdriver, Flat Tip	5120-00-278-1283
1	Saw Circular Electric	
1	Tool Kit Radio	5180-00-356-4614
3	Tool Kit General Mechanics	5180-00-629-9783
2	Tape Measuring Tank	5210-00-526-0752
2	Rubber Sheet, Solid	5330-00-179-0050
1	Rubber Sheet Solid	5330-00-179-0054
20	Padlock	5340-00-158-3805
10	Tape Insulation Electrical	5970-00-543-1154
3	Battery (12)	6135-00-835-7210
6	Battery Filler Gravity	6140-00-635-3824
10	Flashlight	6230-00-264-8261

Quantity	Materiel	NSN
1	First Aid Kit Gen P	6545-00-116-1410
6	Pail Utility	7240-00-160-0455
10	Funnel Steel 1 Gallon	7240-00-223-4482
6	Measure Liquid 4 QT	7240-00-233-6025
1	Tape, Pressure Sensitive	7510-00-074-5124
2	Rag, Wiping	7920-00-205-1711
10	Brush Wire Scratch	7920-00-291-5815

Quantity	Materiel	NSN
10	Absorbent Material	7930-00-269-1272
5	Bag, Plastic	8105-01-183-9769
6	Glove, Rubber	8415-00-823-7460
25	Gloves Leather MN Work	8415-00-268-7870
5	Apron, Laboratory	8415-00-634-5023
6	Glove, Insert Cotton	8415-01-138-2495
2	Soap, Grit	8520-00-634-1594
25	Sodium, 25 Kilos	
1	Chainsaw Petrol	
1	Cable Assembly Spec (Jump Leads)	2920-01-027-0125
1	Truck Band	3540-00-344-8642
1	Banding Equipment (3/4" set)	3540-00-565-6243
40	Exposure Suit Survival	4220-01-251-6466
2	Hammer Sledge, 6 lb	5120-00-265-7462
2	Wrench Pipe 36"	5120-00-270-4309
2	Wrench Pipe 14"	5120-00-277-1486
1	Crimping Tool	5120-00-278-2423
4	Bar, Wrecking	5120-00-293-0665
6	Jack Hydraulic Hand, 10 Ton	
1	Saw, Circular, Electric	5130-0-X96-0077
10	Tape, Electrical	
1	Charger, Battery	6220-01-481-3827
2	Battery Storage	6140-00-190-9828
8	Acid, Sulfuric	6810-00-249-9354
2	Can, Water, Military	7240-00-089-3827
6	Measure, Liquid, 14 QT	7240-00-233-6025
10	Absorbent	7930-00-269-1272
2	Release Oil (WD-40)	8030-00-938-1947
2	Hard Hat (Orange)	8415-00-935-3136
1	GA Grease	9150-01-197-7692

d. For the purpose of uniformity, economy, and efficiency, preservation and packaging materials have been limited and standardized in this manual. Generally, one preservative can be substituted for another of the same general type (compound for compound, oil for oil). Some tapes can be substituted for others. The tape specified herein for sealing, ASTM-D5486, type IV, tape except on painted surfaces. Other acceptable and non-acceptable substitutes are as follows:

(1) Preservative compound, MIL-PRF-16173, grade 4 can, if necessary, be substituted for MIL-PRF-16173, grade 1. Grade 1 cannot be universally substituted for grade 4 and should not be used on any surface where it must be removed before the item is used. Commercial off-the-shelf items may be substituted with the approval of the Commodity Command. For example, TACOM has approved the use of CARWELL CP 90 in lieu of MIL-PRF-16173, Grade 4 and, in certain specific applications, for Grade 1. The NSNs for this product are 8030-01-414-7423 (16 oz. bottle), 8030-01-414-8947 (5 gallon container), and 8030-01144-7430 (55 gallon drum).

(2) In cases of absolute necessity, MIL-PRF-2104 lubricating oil (as prescribed by applicable LO) can be substituted for specified types and grades of MIL-PRF-21260 preservative engine oil in crankcase.

(3) MIL-PRF-21260, PE-10 may be substituted for W-L-700; MIL-PRF-21260, PE-30 may be substituted for MIL-PRF-3150.

(4) MIL-PRF-46010 cannot replace MIL-PRF-46147 because of the difference between air-cured and heat cured solid film lubricants. In most applications, MIL-PRF-46147 can replace MIL-PRF-46010.

e. It is preferred that environmentally friendly cleaners and degreasers be used. If MIL-PRF-680, Type I or II, is used, Breakthrough, Electron 296, Skysol 100, Skysol, and PF may be substituted. 134 Hi-Solv may be substituted for MIL-PRF-680, Type III.

NOTE

Industry continues to develop environmentally friendly cleaners, however, not all are acceptable for all military applications. LOGSA PSCC should be contacted before using any substitute cleaners not listed above.

f. If the equipment LO authorizes more than one grease or lubricant, and a lubricant with preservative value is included, use Table C-1 as a guide.

g. A silicone fluid conforming to MIL-PRF-46146, Type I, Group II (NSN 8040-01-009-1562 (8 OZ)) may be substituted for GAA grease when preserving cleaned battery terminals.

APPENDIX C

SPECIFICATIONS AND NATIONAL STOCK NUMBERS FOR PACKAGING MATERIALS

SPECIFICATION	TITLE	NSN	ITEM DESCRIPTION
A-A-289	Brushes, Acid, Swabbing	7920-00-543-7728 7920-00-514-2417	8.25" long; bristle 1 ea. 5.75" long; bristle and horsehair 1 ea.
A-A-1051	Paperboard, Wrapping, and Cushioning	8135-00-290-3402 8135-00-782-3953	36" x 250' Roll 18" x 250" Roll
A-A-1451	Twine, Fibrous	4020-00-233-5990 4020-00-231-5860	1500' Ball; 12 ply 2250' Cone; 8 ply
A-A-1898	Cushioning Material, Cellulosic, Packaging	8135-00-989-9889 8135-00-849-7847	200' x 24" x .25" Roll 100' x 36" x 1" Roll
A-A-1936	Adhesive, Contact, Neoprene Rubber	8040-00-779-9595 8040-00-058-2399 8040-00-754-2685	1 pint 1 quart 1 gallon
A-A-50177	Paper, Lens	6640-00-559-1385	7" x 11" (100 ea/ pack)
A-A-50185	Cloth, Batiste, Cotton, Polishing	8305-01-152-3587	YD
A-A-52408	Preservative Coating, Rubber. For Rubber Surfaces	8030-01-314-2213 8030-01-282-5626 8030-01-314-2214	1 quart 1 gallon 5 gallons
A-A-52465	Primer Coating, Synthetic, VOC Compliant (for Brake Drums)	8010-01-359-9245	1 gallon
A-A-52624	Antifreeze, Multi Engine Type	6850-01-464-9263 6850-01-464-9137 6850-01-464-9152 6850-01-464-9096	5-gallon pre-diluted (60%) 5-gallon concentrated (100%) 55-gallon pre-diluted (60%) 55-gallon concentrated (100%)
ASTM-D3953	Strapping, Flat Steel, and Seals	8135-00-283-0669 (strapping) 8135-00-239-5293 (seals)	.75"; approx. 1700' 2000 ea. per box

SPECIFICATION	TITLE	NSN	ITEM DESCRIPTION
ASTM-D5486, Type 4	Tape, Pressure Sensitive, Packaging for Box Closure and Sealing	7510-00-266-5006 7510-01-235-0013	1" x 60 yards 2" x 60 yards 3" x 60 yards
CCC-C-440	Cloth, Cheesecloth, Cotton, Bleached and Unbleached	8305-00-205-3496 8305-00-205-3495	36" x 10 yards 36" x 100 yards
	Cotton	8320-00-299-8625 6510-00-201-4000	1 lb (roll) non-sterile 1 lb (10') sterile
A-A-3174	Plastic Sheet, Polyolefin	8135-00-584-0610 8135-00-618-1783	8' x 100' x .004" 16' x 100' x .006"
MIL-PRF-121	Barrier Material, Greaseproof, Waterproof, Flexible	8135-00-292-9719 8135-00-292-9728	3' x 300' (heat sealable) 3' x 300' (moldable)
MIL-PRF-131	Barrier Material, Water-vaporproof, greaseproof, Flexible, Heat-Sealable	8135-00-282-0565	3' x 600'
MIL-PRF-46176	Brake Fluid, Silicone, Automotive, All Weather, Operational and Preservative	9150-01-123-3152 9150-01-072-8379	5 gallons 55 gallons
MIL-PRF-372	Cleaning Compound, Solvent (for Bore of Small Arms and Automatic Aircraft Weapons)	6850-00-224-6658 6850-00-224-6663 6850-00-249-8029	1 quart 1 gallon 5 gallons
MIL-PRF-6799	Coatings, Sprayable, Strippable, Protective, Water Emulsion	8030-00-721-9380	5 gallons
MIL-C-11796	Corrosion Preventive Compound, Petrolatum, Hot Application	8030-00-598-5915 8030-00-231-2353 8030-00-285-1570	1 pint 5 pounds 35 pounds

SPECIFICATION	TITLE	NSN	ITEM DESCRIPTION
MIL-PRF-16173	Corrosion Preventive Compound, Solvent Cutback, Cold-Application	8030-00-231-2345 (Grade 1) 8030-00-244-1299 (Grade 1) 8030-00-244-1297 (Grade 2) 8030-00-244-1298 (Grade 2) 8030-00-062-5866 (Grade 4) 8030-00-526-1605 (Grade 4)	1 gallon 5 gallons 1 gallon 5 gallons 1 gallon 5 gallons
MIL-C-81309	Corrosion Preventive Compounds, Water Displacing, Ultra-Thin Film	8030-00-546-8637	16 ounces
MIL-PRF-10924	Grease, Automotive and Artillery	9150-01-197-7693 9150-01-197-7692 9150-01-197-7691 9150-01-197-7689 9150-01-197-7688	14 ounce (cartridge) 35 pounds (can) 120 pounds (drum) 6.5 pounds (can) 2.25 ounces (tube)
MIL-PRF-18458	Grease, Wire Rope and Exposed Gears	9150-00-530-6814	35 pounds
MIL-PRF-83282	Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Aircraft Metric, NATO Code Number H-537	9150-00-180-6290 9150-01-149-7432 9150-00-149-7432 9150-00-149-7431	55 gallons 5 gallons 1 gallon 1 quart
MIL-I-22110	Inhibitor, Corrosion, Volatile, Crystalline Powder	6850-00-865-2916 6850-00-368-5233	2 ounces (powder) 1 pound (crystalline)
MIL-PRF-2105	Lubricating Oil, Gear Multipurpose (80w-90 Grade)	9150-01-035-5392 9150-01-313-2191 9150-01-035-5393 9150-01-035-5394	1 quart 1 gallon 5 gallons 55 gallons
MIL-PRF-6081	Lubricating Oil, Jet Engine	9150-00-273-2388 9150-00-273-8807 9150-00-231-6676	1 quart 1 gallon 55 gallons

SPECIFICATION	TITLE	NSN	ITEM DESCRIPTION
MIL-PRF-21260	Lubricating Oil, Internal Combustion Engine, Preservative and Break-in	9150-00-111-3199 9150-00-111-0209 9150-01-293-2773 9150-01-359-8567 9150-01-293-7696 9150-01-293-2772	5 gallons (10w) 5 gallons (30w) 5 gallons (40w) 1 gallon (15w-40) 5 gallons (15w-40) 55 gallons (15w-40)
MIL-PRF-23699	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base, NATO Code No. 0-156	9150-01-439-0756 9150-00-985-7099 9150-00-681-5999	1 quart 1 quart 55 gallons
MIL-PRF-63460	Lubricant, Cleaner and Preservative for Weapons and Weapon Systems (Metric)	9150-01-079-6124 9150-01-053-6688 9150-01-054-6453 9150-01-327-9631	4 ounces 1 gallon 1 pint 1 liter
MIL-PRF-3150	Lubricating Oil, Preservative, Medium	9150-00-271-8427 9150-00-231-2356 9150-00-231-2357 9150-00-231-2361	4 ounces 5 gallons 55 gallons 1 quart

SPECIFICATION	TITLE	NSN	ITEM DESCRIPTION
MMM-A-260	Adhesive, Water-Resistant, (for Sealing Waterproofed Paper)	8040-00-273-8704 8040-00-273-8703	5 gallons 1 gallon
O-B-41	Battery Water	6810-00-286-3783 6810-00-297-9540	1 gallon 5 gallons
A-A-59282	Ethyl Alcohol (Ethanol): Denatured Alcohol: Proprietary Solvents and Special Industrial Solvents	6810-00-127-4532	1 gallon (99.5% ethyl)
A-A-59133	Cleaning Compound, High Pressure (Steam) Cleaner	6850-00-965-2087 6850-00-965-2330	25 pounds 150 pounds
MIL-PRF-680	Dry Cleaning and Degreasing Solvent	6850-01-377-1916 6850-01-377-1811 6850-01-377-1809 6850-01-377-1808 6850-01-331-3349 6850-01-331-3350	4 ounces 1 pint 1 gallon 1 quart 5 gallons 55 gallons
	Soap, Saddle (Leather Goods)	7930-00-170-5467	1 pound
MIL-PRF-32033	Lubricating Oil, General Purpose, Preservative (Water Displacing, Low Temperature)	9150-00-252-6173 9150-00-231-9045 9150-00-231-9062 9150-00-231-6689 9150-00-281-2060	4 ounces 1 gallon 5 gallons 1 quart 55 gallons
VV-P-236	Petrolatum, Technical	9150-01-444-1171 9150-00-250-0926 9150-00-250-0933 9150-00-250-0928	8 ounce (tube) 1.75 pounds 7.5 pounds 35 pounds

APPENDIX D

PETROLEUM SAMPLING PROCEDURES AND EQUIPMENT

D-1. General

a. Required sampling devices for each method should be constructed using equipment identified in this appendix.

b. All sample containers must be absolutely clean and free of water, dirt, lint, washing compounds, naphtha, or other solvents, soldering fluxes or acids, corrosion, rust, or oil. New sample containers meeting all of the above criteria are not required to be cleaned. If a previously used sample container is employed, the following cleaning procedures must be completed prior to using the container. Rinse container with Stoddard solvent or naphtha Then wash the container with strong soap solution, rinse it thoroughly with tap water, and finally with distilled water. Dry either by passing a current of clean, warm air through the container or by placing it in a dust free cabinet at 104 degrees F (40 C) or higher.

c. Minimum sample size for liquid fuels taken from rolling stock is one gallon. Only UN/1A1 approved containers should be used such as the type identified in Appendix D.

d. Refer to Appendix E, Table E-2 for minimum sample size requirements for packaged products.

e. DA Form 1804 (Petroleum Sample Tag) should be completed and attached to the sample container immediately after taking each sample. Package products, which require more than one container to make up one sample, should all be tagged; however, all containers required to make up one sample should be given the same sample number.

f. Equipment that has been sampled and subsequently resulted in a test failure should be excluded from future sampling unless corrective action has been taken to bring the fuel in the specific piece of equipment to an on-grade condition.

D-2. API gravity screening procedures

a. The purpose of API screening is to ensure equipment intended to be loaded aboard APS 3 vessels contains JP8, or an adequate JP8/DF mixture to prevent microbial growth, and provide good cold temperature operability. Equipment tested for API Gravity with a reading 37.0 degrees API or above, will initially be considered as JP8, or having an adequate JP8/DF mixture to warrant sampling and laboratory testing. Equipment having an API Gravity less than 37.0 degrees API will be considered as not adequate for prepositioning until at least 1/2 of the volume of fuel is removed and replaced with JP8. API gravity screening should be performed prior to laboratory sampling on all pieces of equipment except M1 tanks. Ml tank API screening should be performed after the laboratory sample is taken.

b. API Gravity Screening is conducted by lowering a hydrometer into a hydrometer cylinder that has been filled with liquid fuel from 75 percent-85 percent full, and then reading the scale on the hydrometer.

(1) Inspect the thermo hydrometer to ensure none of the round beads at the bottom are loose. Also check the thermometer to ensure there is no separation in the mercury column. Discard any thermo hydrometer failing the inspection.

(2) Clean the sampling device as indicated in the sampling procedures.

(3) Pump or pour fuel directly from the equipment into the hydrometer cylinder until it is approximately 75 percent--85 percent full. Position the hydrometer cylinder on a flat surface once filled. Remove any air bubbles on the top of the liquid surface by gently taping the palm of the hand on the top of the cylinder. Air bubbles on the liquid surface may also be removed by dabbing them with a paper towel.

(4) Lower the hydrometer gently into the liquid until it reaches a point where it will float all by itself. Using the stem, impart a spin on the hydrometer. Note: Spinning the hydrometer will help to center it in the liquid, and help prevent it from sticking to the side of the hydrometer cylinder.

(5) Position the eye slightly below the surface of the fuel and read the API where the fuel cuts across the scale divisions on the stem of the hydrometer. Leaving the thermo hydrometer in the fuel, read the temperature inside the body of the hydrometer.

(6) Using Table D-1, match the temperature observed on the hydrometer and determine the correction factor. Add or subtract the correction factor from the observed API on the hydrometer to arrive at the corrected reading plus or minus 40 degrees API will initially be considered as JP8, or having an adequate JP8/DF mixture to warrant sampling and laboratory testing. Equipment having a corrected API Gravity greater than 40 degrees API will be considered as not adequate for prepositioning until at least 1/2 of the volume of fuel is removed and replaced with JP8.

D-3. Liquid fuel sampling procedures

a. All-levels sample will be taken by submerging a stoppered beaker (copper weighted beaker) to the bottom of a storage tank, or bulk fuel compartment of a petroleum tank vehicle, then opening the sampler and raising it at a uniform rate so that it is no more taken 85 degrees full as it emerges from the liquid.

(1) Fill the copper weighted beaker and allow it to drain back into the storage tank. Also rinse the sample container.

(2) Lower the weighted beaker to the bottom of the tank, and then jerk upward to remove the stopper. Raise the weighted beaker at a rate so that it is no more than 85 degrees full when it emerges from the liquid.

(3) Empty the product into sample container and repeat the sampling process until the container is approximately 90 degrees full. Close the cap on the sample container immediately.

b. Lower the weighted suction end of the tube connected to the vacuum sampler just below the top of the fuel level in the tank. Place the rubber grommet into a slop fuel can and pump the sampler. Draw approximately 1000% of the volume of the sampler and tubing into the slop container to rinse the sampler.

NOTE
Do not rinse the vacuum sampler with fuel from the bottom of the fuel tank/cell.

Lower the weighted suction end of the tube connected to the vacuum sampler all the way to the bottom of the fuel tank/cell. Place the rubber grommet into the sample container and pump the vacuum sampler to draw fuel from the bottom of the fuel tank/cell. Fill the sample container to approximately 90%/6 full. Close the cap on the sample container immediately.

NOTE
Newer equipment fuel screens are constructed so that vehicle operators cannot remove them. Removing the complete fuel cap/fuel screen assembly with a pipe wrench can access the fuel tank.

c. Smoke generator pump outlet will be taken by attaching a sampler to the fuel line of the smoke generator electrical fuel pump.

(1) Attach the jumper cable cannon plug to the smoke generator electrical fuel pump.

(2) Connect the sampler to the fuel supply line (Male-coupling half, quick disconnect) located next to the smoke generator electrical fuel pump and insert the sampler fuel hose into the sample container.

(3) Connect the jumper cable electrical clips to the M1 batteries to start pumping fuel into the sample container. Fill the sample container to approximately 90% full.

NOTE
This operation requires one person to operate the sampling device and one person to engage the smoke generator pump while the sample is being taken.

d. Fuel filter inlet will be taken by attaching a sampler to the fuel line before the filter separator inlet and drawing fuel from the lower fuel tank.

(1) Connect the sampler to the fuel supply line (female-coupling half, quick disconnect) located at the front of the pack and insert the sampler fuel hose into the sample container.

(2) Flush 1/2-3/4 of a gallon from the Bradley Fighting Vehicle fuel hose into a slop container by engaging the master power and engine accessory controls.

NOTE

This operation requires one person to operate the sampling device and on person to engage the master power and engine accessory controls while fuel is flowing into the sample container.

(3) Take sample by repeating procedures in step 2; however, fill sample container to approximately 90 degrees full. close the cap on the sample container to approximately 90 degrees full.

D-4. Class III (P) Sampling Procedures

a. Package containers smaller than 55 gallon drums are randomly selected by taking one or more packages in a given lot and submitting the sample in its original container. Procedures for calculating the required number of samples and required sample quantity for testing are provided in Appendix F.

b. Fifty five gallon drums will be taken by inserting drum thief into the drum and taking an all-levels sample.

(1) Randomly select a drum from the lot and lay the drum on its side. Roll the drum 10 feet in one direction and then back to ensure mixture of the drum contents. Stand the drum upright so that the bung end is facing up.

(2) Wipe away any contaminants from the bung, and then remove the bung enclosure. Using a clean dry drum thief, cover one end of the drum thief with the thumb and lower it approximately 1 foot into the drum. Remove the thumb and allow product to enter the thief. Rinse the thief by rotating it so that product touches all areas of the thief that will be used to sample. Discard the rinse product.

(3) Take an all levels sample by slowly inserting the drum thief into the product and allowing the product to fill as the thief is lowered to the bottom. Place the thumb over the end of the thief, remove the thief and empty the contents into a clean one gallon sample can. Repeat the sampling process until the sample can is approximately 90 degrees full.

TABLE D-1. CORRECTION FACTORS FOR API GRAVITY

TEMP	FACTOR	TEMP	FACTOR	TEMP	FACTOR	TEMP	FACTOR
100	-3.1	80	-1.6	60	0.0	40	+1.7
99	-3.1	79	-1.5	59	+0.1	39	+1.8
98	-3.0	78	-1.4	58	+0.2	38	+1.8
97	-2.9	77	-1.4	57	+0.3	37	+1.9
96	-2.8	76	-1.3	56	+0.4	36	+2.0
95	-2.8	75	-1.2	55	+0.5	35	+2.1
94	-2.7	74	-1.1	54	+0.6	34	+2.2
93	-2.6	73	-1.0	53	+0.0	33	+2.3
92	-2.5	72	-1.0	52	+0.0	32	+2.4
91	-2.5	71	-0.9	51	+0.0	31	+2.5
90	-2.4	70	-0.8	50	+0.0	30	+2.5
89	-2.3	69	-0.7	49	+0.9	29	+2.6
88	-2.2	68	-0.6	48	+1.0	28	+2.7
87	-2.1	67	-0.6	47	+1.1	27	+2.8
86	-2.1	66	-0.5	46	+1.2	26	+2.9
85	-2.0	65	-0.4	45	+1.2	25	+3.0
84	-1.9	64	-0.3	44	+1.3	24	+3.1
83	-1.8	63	-0.2	43	+1.4	23	+3.2
82	-1.8	62	-0.2	42	+1.5	22	+3.2
81	-1.7	61	-0.1	41	+1.6	21	+3.3

PETROLEUM SAMPLING EQUIPMENT

ITEM DESCRIPTION	PART NUMBER/NSN
ALL LEVEL	
COPPER WEIGHTED BEAKER	6695-00-359-9944
CORD, COTTON (ROPE)	4020-00-233-6556
BOTTOM	
VACUUM SAMPLER	6695-01-312-9091
(M1) SMOKE GENERATOR PUMP OUTFIT	
SAMPLER	
HOSE, ASSEMBLY	4720-01-086-6824
JUMPER CABLES	
CONNECTOR PLUG, ELEC	5935-01-115-0215
WIRE, ELECTRICAL, 16 GAUGE	
CLIP, ELECTRICAL (RED)	5999-00-014-0432
CLIP, ELECTRICAL (BLACK)	5999-00-014-0431
(BRADLEY) BEFORE FUEL FILTER INLET TM 9-2350-284-24P-1	
COUPLING HALF, QUICK MALE	4730-01-115-3381
HOSE ASSEMBLY, NON-METALLIC	4720-01-122-4279
GENERAL EQUIPMENT	
DRUM THIEF	6695-00-512-1816
HYDROMETER (39-51 API)	6630-00-245-8376
HYDROMETER CYLINDER	6640-00-244-4341
1 GALLON ROUND SAMPLE CAN W/BX	8110-01-436-7340
PETROLEUM SAMPLE TAG	DA FORM 1804

APPENDIX E

CALCULATING SAMPLE SIZE AND REQUIRED SAMPLE QUANTITY FOR TESTING

E-1. Calculating sample size

Regardless of the type of containerization, the number of packages for any product batch/lot is determined by counting the units of issue, i.e., if the unit of issue is BT (bottle) a box or case of 12 cans is counted as 12 items. Assuming there are 132 boxes of insect repellent, Lot #AAA, with 12 bottles in each box. The batch/lot size would be 132 x 12 = 1584.

E-2. Required sample quantity for testing

a. Package products vary in both size and type of container. In order to test adequately any given product, a minimum amount of sample is required. Example: Some insect repellents come in a box of 12, with each individual plastic bottle containing 2 oz. The required sample quantity for testing the repellent is 8 oz. One sample would be 4 each 2-oz bottles, totaling the required sample amount of 8 oz.

b. Calculate the required amount of product required to make up one complete sample IAW Tables E-1 and E-2.

TABLE E-1. NUMBER OF SAMPLES FOR CLASS III (P) LOT/BATCH

NUMBER OF PACKAGES IN LOT/BATCH	NUMBER OF SAMPLES S-2 LEVEL*
2 TO 8	2
9 TO 15	2
16 TO 25	2
26 TO 50	2
51 TO 90	2
91 TO 150	2
151 TO 280	2
281 TO 500	2
501 TO 1200	2
1200 TO 3200	5
3201 TO 10000	5
10001 TO 35000	5

*S2 level is extracted from ANZI 1.4. Number of samples is calculated from the Single Sampling Plan for Reduced Inspection using an AQL of 4.0

c. Individual sample containers that make up the sample must come from the same batch/lot. Also, when more than one container is required to make up one sample, containers should be taken from the same location. Containers drawn for different samples in the same lot/batch should be randomly selected from a different location.

TABLE E-2. REQUIRED SAMPLE QUANTITIES FOR TESTING

TYPE OF CONTAINER	SIZE OF SAMPLE
Acid	1 qt
Anti-Freeze	1 gal
Cleaner, Lubricant	2 qt
Cleaning Compound	2 qt
Disinfectant, Food	2 pouches
Fuel Additive	2 qt
Grease	2 1/2 lbs
Hydraulic Fluids	3 qt
Insecticide, Aerosol	3 cn
Insecticide, Liquid	8 oz
Insulating Oil	2 qt
Lubricating Oil	3 qt
Solvents	1 gal

APPENDIX F

AOAP SAMPLING PROCEDURES AND SUPPLIES

When taking AOAP samples from your ground equipment avoid contaminating the fluid sample by using clean sampling equipment and proper techniques. Often the reason for an abnormal sample is due to improper sampling techniques, which can cause contamination.

1. To make sampling easy, many components are equipped with a special sampling valve. These valves are installed according to instructions in equipment TM. To take a sample with a valve, you may need to start the engine to pressurize the system. Once the oil starts to flow, flush a small amount of oil from the line to clear out contamination, then fill the sample bottle from the valve. Sampling oil from equipment that has no special sampling valve, then the equipment needed is listed in the table below.

2. To obtain an oil sample using the pump method follow these steps:

a. If the equipment hasn't been operated for the past 180 days run the equipment to normal operating temperatures before sampling.

b. Rest the tubing on the dipstick. Put a mark on the tubing where the dipstick ends. Measure about 10 inches beyond that mark before cutting the tubing.

c. Loosen the T-handle on the pump. Insert the tubing about two inches into the pump head, making sure the tubing goes about 1/4 inch into the bottle. Tighten the handle just enough to grip the tubing firmly.

d. Attach the bottle to the sampling pump. Remove the filler cap or dipstick from the oil reservoir.

e. Insert the tubing into the reservoir. Be careful not to go past the mark you made on the tubing. If the tube touches the bottom or sides, sludge will be picked up, and the lab will request another sample.

f. Hold the pump horizontally and pull the pump handle out slowly. Oil should enter the bottle. Fill the bottle to the bottom of the bottle's neck or about 1/2 inch from the top. Push the vacuum relief valve (on top of the pump) to stop the flow. Be careful not to contaminate or get oil in the pump. If this occurs clean the pump thoroughly before taking another sample.

g. Unscrew the bottle from the pump and replace the bottle cap. Wipe off any oil with a clean rag.

h. Remove the tubing from the reservoir. Loosen the T-handle and pull the tubing from the pump. Put the used tubing in an approved hazardous waste container.

i. Replace the reservoir cover.

3. Whether the pump method or the valve method is used, the next steps are:

a. On the sample bottle label, fill in the equipment's bumper number, component serial number, and hours and miles.

b. Put that same information on the DD Form 2026 or the ULLS DA Form 5991E.

4. If you want more info on AOAP, read TB 43-0211, AOAP Guide for Leaders and Users. It contains details on how AOAP works and answers to frequently asked questions. The TB publication identification number (PIN) is 033805-000. It is recommended that each site be placed on initial distribution number (IDN) 340333 to get updates and revisions to the TB.

5. For further AOAP assistance, contact AOAP directly. Call DSN 645-0862, (256) 955-0862, or e-mail aoap@logsa.redstone.army.mil , or write to:

Commander, USAMC LOGSA
Army Oil Analysis Program Office
ATTN: AMXLS-LA, Bldg 3627
Redstone Arsenal AL, 35898

6. To ensure compliance with AOAP requirements, keep an adequate stock of sampling supplies on hand. This chart gives basic information about supplies needed to sample aeronautical and non-aeronautical equipment. If your equipment has a sampling valve, you do not need the oil sampling pump or tubing. It's recommended that a 90-day supply of expendables be stocked.

Non-Aero NSN	*Item*	*Aero NSN*
8125-01-082-9697 (Note)	Sampling Bottle	8125-00-933-4414
4930-01-119-4030 N/A 30-in long	Pump, Oil Sampling 3/8-in Plastic Tube 15-in long	N/A 4710-00-933-4415 4710-01-087-1629
4720-00-964-1433	Nonmetallic tubing 1/4 in outside diameter	N/A
8105-00-290-0340 8105-00-837-7754 8105-00-837-7753	Shipping Sack Plastic Bag	8105-00-290-0340 8105-00-837-7754
8125-01-193-3440	Mailer Kit (Note 2)	N/A

NOTES
(1) The 3 ounce non-aeronautical plastic sampling bottle will be used for submitting grease samples.
(2) The mailer kit, NSN 8125-01-193-3440, is leak proof and contains 24 non-aeronautical sampling bottles, plastic shipping sacks, and mailing cartons. It is used when shipping samples through the U.S. Postal Services.

APPENDIX G

ENGLISH-METRIC CONVERSION

Two tables describing English-metric conversion applicable to this manual are provided. For convenience in calculation, metric equivalents are expressed in two decimal places (nearest hundredth), wherever practical.

TABLE 1. Standard English-metric equivalents

Volume:					
1 fluid ounce	=	29.57 milliliters	1 quart	=	0.95 liter
1 pint	=	0.47 liter	1 gallon	=	3.79 liters
Weight:					
1 ounce (avoirdupois)	=	28.35 grams			
1 pound (avoirdupois)	=	453.59 grams or 0.454 kilogram			
Length:					
1 inch	=	2.54 centimeters			
1 foot	=	30.48 centimeters or 0.305 meters			
39.37 inches	=	1 meter			

TABLE 2. English-metric Conversions

Volume (Liquids):

Gallons	*Liters*
1	3.79
5	18.95
50	189.50
55	208.45

Weight

Ounces	*Grams*
1	28.35
10	283.50

(100 grams = 1 kilogram)

Volume (Solids)

Cubic feet	*Cubic meter*	*Cubic feet*	*Cubic meters*
1.0	0.030	6.0	0.18
1.2	0.036	6.5	0.195
1.3	0.039	8.4	0.25
2.0	0.060	9.0	0.27
2.5	0.075	10.0	0.030
3.0	0.090	12.0	0.36
4.1	0.123	30.0	0.90
4.7	0.141	60.0	1.80
5.3	0.160	66.5	1.995

Pounds	*Kilograms*	*Pounds*	*Kilograms*
1.0	0.45	100	45.4
2.2	1.0	125	56.75
10.0	4.54	144	66.37
11.0	4.99	150	68.10
50.0	22.70	200	90.80
52.0	23.61	500	227.0
65.0	29.61	1000	454.0
75.0	34.05	1700	771.8

Inches = Centimeters

0.0258	0.07
0.03	0.08
0.0625	0.16
0.95 (3/32")	0.24
0.10	0.25
0.125 (1/8")	0.32
0.188 (3/16")	0.48
0.375 (3/8")	0.95

Inches = Centimeters

0.50	1.27
0.875 (7/8")	2.2
0.90	2.29
1.0	2.56
1.5	3.81
2.0	5.08
2.6	6.35
3.0	7.62

Inches = Centimeters

4.0	10.16
5.0	12.70
10.0	25.40

Inches = Centimeters

60	127.0
100	254.0
144	365.76

NOTE: 10 millimeters equals 1 centimeter.

Feet = Meters

1	0.305
3.28	1.0
25	7.62
50	15.24
150	45.73

Temperature conversion:
To change degrees Celsius (C) to degrees Fahrenheit (F), multiply temperature by 1.8 and add 32 degrees F.
To change degrees Fahrenheit (F) to degrees Celsius (C), subtract 32 from the temperature and divide by 1.8.

Degrees Fahrenheit = Degrees Celsius

0	-18
32	0
35	2
46	8
100	38
212	100

APPENDIX H

ACRONYMS

AIN	Ammunition Information Notice
AIOE	Associated Items of Equipment
AMC	Army Materiel Command
AMG	Antenna Mast Group
AMDF	Army Master Data File
AOAP	Army Oil Analysis Program
APS	Army Prepositioned Stock
APU	Aviation Power Unit
AR	Army Regulation
ARCD	Army Reserve Component Database
ARCENT	Army Central Command
ASL	Authorized Stockage List
ASTM	American Society for Testing and Materials
AVLB	Armored Vehicle Launched Bridge
AWRAP	Army War Reserve Automated Process
AWRDS	Army War Reserve Deployment System
BII	Basic Issue Item
CBU	Calibration Before Use
CCSS	Commodity Command Standard System
CEU	Computer Electronic Unit
CFR	Code of Federal Regulations
CGA	Compressed Gas Association
CH	Controlled Humidity
CHT	Collecting, Holding, and Transfer
CJCS	Chairman, Joint Chiefs of Staff
COEI	Component of End Items
COMSEC	Communications Security
COSIS	Care of Supplies in Storage
COTS	Commercial Off the Shelf
CRG	Communications Relay Group
CTA	Common Tables of Allowances
DA	Department of the Army
DDL	Digital Data Link
DEPMEDS	Deployable Medical Systems
DES	Dental Equipment Sets
DODIC	Department of Defense Identification Codes
DSCR	Defense Supply Center Richmond
ECS	Engagement Control Station
ECS	Environmentally Compliant Solvents
EPP	Electric Power Plant
EPU	Electric Power Unit
FAU	Fuel Filtration/Additive Unit
AFSC	Field Support Command
FY	Fiscal Year
GAA	Grease Automotive and Artillery
GSA	General Services Administration
HLPS	Heavy Lift Prepositioned Ship
lAW	In Accordance With
ICC	Information and Coordination Central
ICP	Inventory Control Point
IFF	Identification Friend or Foe

IMRF	Instrument Master Record File
LIN	Line Item Number
LO	Lubrication Orders
LS	Launching Station
LSMR	Large Medium Speed Roll-on/Roll-off
LSTS	Launching Station Test Set
LTI	Limited Technical Inspections
LTS	Long-term Storage
MAB	Mobile Assault Bridge Ferr
MAC	Maintenance Allocation Chart
MCPE	Modular Collective Protection Equipment
MER	Medical Equipment Repairs
MES	Medical Equipment Sets
MHE	Materials Handling Equipment
MLST	Medical Logistics Support Team
MMS	Medical Materiel Sets
MOS	Military Occupational Specialties
MRC	Major Regional Conflict
MRCTS	Missile Round Cable Test Set
MRE	Meals Ready to Eat
MRSL	Medical Recommended Stockage List
MSC	Major Subordinate Command
MTMC	Military Traffic Management Center
MWO	Modification Work Order
NCM	Non-cyclic Maintenance
NICP	National Inventory Control Point
NRC	U.S. Nuclear Regulatory Commission
NSN	National Stock Number
ODS	Ozone Depleting Substance
OPP	Offload Preparation Party
OSHA	Occupational Safety and Health Act
OTSG	Office of the Surgeon General
PLL	Prescribed Load List
PMCS	Preventive Maintenance Checks and Services
POL	Petroleum, Oils, and Lubricants
PSCC	Packaging, Storage, and Containerization Center
QSL	Quality Status Listing
RH	Relative Humidity
RRT	Radio Relay Terminal
RS	Radar Set
RSO	Radiation Safety Officer
SDR	Supply Discrepancy Report
SDS	Standard Depot System
SICC	Service Item Control Center
SICO	System Integration and Checkout Procedures
SPCCP	Spill Prevention Control and Countermeasures Plan
SPI	Special Packaging Instruction
TAC-S	Tactical Auxiliary Crane Ship
TAMMS	The Army Maintenance Management System
TAV	Total Asset Visibility
TBM	Tactical Ballistic Missile
TDA	Table of Distribution and Allowances
TM	Technical Manual

TMDE	Test, Measurement, and Diagnostic Equipment
TWPS	Transmitter Waveguide Pressurization System
TWUD	Tactical Weapon Control Computer Unit Diagnostic
UAL	Unit Assemblage Listing
UHF	Ultrahigh Frequency
UIT	Unique Item Tracking
USAPC	US Army Petroleum Center
USAMMA	US Army Medical Materiel Agency
VCI	Volatile Corrosion Inhibitor

APPENDIX I

RADIATION SAFETY POINTS OF CONTACT

I-1. General

This appendix identifies the AMC Major Subordinate Command's Radiation Safety Officers and web sites, as applicable, for their respective commands.

U.S. Army Communications-Electronics Command
ATTN: AMSEL-SF (Mr. Richard Lovell)
Fort Monmouth, New Jersey 07703-5024
richard.lovell@mail1.monmouth.army.mil
DSN 992-9723
DSN Fax 992-6403
Commercial: (732) 532-
http://www.monmouth.army.mil/cecom/safety/index.html

U.S. Army Aviation Missile Command
ATTN: AMSAM-SF-A (Mr. Keith Rose)
Redstone Arsenal, AL 35898-5130
keith.rose@redstone.army.mil
DSN is 897-2114
FAX: DSN 897-2111
Commercial: (256) 313-

U.S. Army Tank-automotive & Armaments Command
ATTN: AMSTA-CM-PS (Ms. Karen McGuire)
Warren, MI 48397-5000
McGuireK@tacom.army.mil
DSN 786-7635
FAX: DSN 786-5277
Commercial: (810) 574-
http://www.tacom.army.mil/safety/safety.html

U.S. Army Tank-automotive & Armaments Command
ATTN: AMSTA-LC-SF (Mr. Vernon Vondera)
Rock Island, IL 61299-7630
AMSTA-LC-SF@ria.army.mil
DSN 793-1690/6499
FAX: DSN 793-6758
Commercial: (309) 782-
http://tri.army.mil

U.S. Army Operations Support Command
ATTN: AMSOS-SF (Mr. Kelly Crooks)
1 Rock Island Arsenal,
Rock Island, IL 61299-6000
Crooksk@osc.army.mil
DSN 793-0338
DSN 793-2988
Commercial: (309) 782-
http://www.osc.army.mil/

APPENDIX J

PATRIOT MISSILE SYSTEM INTEGRATION AND CHECKOUT (SICO) PROCEDURES

The SICO process is divided into two separate stages. COMSEC must be available for SICO. Selected stage 2 activities (marked with an *) are performed as part of the non-cyclic maintenance exercising.

1. Stage 1- Equipment preparation: Power-off technical inspections will be conducted and results recorded on DA Form 5988E. The equipment will be emplaced and initialized per equipment technical manuals.

2. Stage 2 - Demonstration & Acceptance: The SICO will be conducted IAW the procedures below. The purpose of the SICO is to demonstrate that end items are in an operational status for short-notice handoff.

a. System Baseline Tests. Final hard copy printouts of RS and ECS system baseline tests will be dated, signed, and maintained on location.

(1) ECS / ICC:

i. *Load and run TWUD program in its entirety.

ii. *Hardcopy all ECS/ICC diagnostics results. Verify that all D&C indicators illuminate.

iii. *Establish communication with another ECS/ICC, utilizing all UHF radio stacks. Pass digital data between major end items to ensure equipment operability. Additionally, ICCs are to have modems loop-backed to ensure their operability.

iv. *Load K-7 / System Exerciser and verify communication with radar set.

v. *Establish communication with Launching Station by fiber optic cable and radio. Verify digital data link is operable (Green DDL) on each ECS.

vi. *Integrate ECS/ICC with AMG and verify that interface is functioning properly.

vii. *Remote shut down of the RS, EPPIII, and all LS will be performed and verified.

viii. *A “retrieve and compare” will be performed.

ix. *A correlation with at least two ECS will be performed with the ICC.

(2) RADAR SET:

i. *Perform all radar diagnostics in fault localization and hard copy all tests and results.

ii. *Load K-7/System Exerciser and run in radiate (TBM mode) for two hours in the morning and two hours in the afternoon. Operational assessment and fault data TABs shall be called up and printed to HCU when any change in status occurs.

iii. *Verify TWPS is performing properly.

(3) LAUNCHER STATION:

i. *The 15KW generator will be checked in accordance with pertinent TM.

ii. *Both fiber and radio communication with the ECS will be demonstrated. Green DDL, Fuel, and Operate functions will be verified. Missile Round Simulators will be used on all ports to verify missile count.

(4) AMG:

i. Perform all AMG tests in accordance with pertinent TM.

ii. *Integrate AMG with a CRG, ICC, or ECS and verify that the AMG operates and masts rotate.

iii. Verify that amplifier output is within specification; this requirement includes the final drive.

(5) CRG:

i. *Perform UHF radio integration with ECS/ICC and loop digital data thru all stacks to verify system operability.

ii. *Modems will be placed in loop-back to ensure their operability.

iii. *Integrate AMG with CRG and verify that interface is performing properly.

b. All equipment will be returned to storage configuration at SICO completion.

APPENDIX K

USAMMA MEDICAL LOGISTICS SUPPORT TEAM

1. Representing the AMEDD Class VIII commodity is the USAMMA MLST. This 32-member team is manned by USAMMA. The Team members are a highly skilled group of medical logisticians that perform their MLST requirements in their day-to-day positions. The MLST has medical maintenance, ground maintenance and supply personnel. The MLST can perform its mission in the most austere environments, and is equipped with TEMPER, ISO Tactical Shelters, automation, and communication equipment. Weight and cube requirements for the MLST's deployment is 45,000 pounds or 4,000 cubic feet, which will fit in one C-130 (-) or one C-141 (-).

2. The MLST is a Table of Distribution & Allowances (TDA) organization consisting of Medical Logistics (MEDLOG) personnel (military, Department of the Army civilians, and contractors) from the USAMMA.

3. The MLST normally requires augmentation from the gaining tactical unit (GTU) or a MEDLOG unit to complete its mission.

4. The MLST will normally deploy under the operational control (OPCON) of AMC LSE. The MLST supports the reception, staging and onward movement issue of APS unit sets and sustainment stock pre-positioned in the Area of Operations (AO) or pushed in from the AFLOAT program or Continental United States (CONUS).

5. The MLST will provide medical materiel and maintenance capability, equipment accountability, and transfer support of reception operations at aerial and seaports of debarkation in support of the APS transfer mission. This includes the introduction of additional Class VIII materiel not previously pre-positioned.

6. The MLST remains OPCON to the LSE until the establishment of a Theater Support Command (TSC).

7. The MLST coordinates with the senior medical Command & Control (C2) organization in the theater to determine priorities for transfer and onward movement of medical units.

8. The MLST will transition their mission to the theater MEDLOG battalion or Medical Logistics Management Center (MLMC). Upon completion of the APS transfer mission, the USAMMA MLST will receive assignment instructions from the Commander, USAMMA, in conjunction with the senior medical C2 organization in the theater. When the mission transition is completed, the MLST will be redeployed to CONUS. At the completion of the contingency/operation, the MLST may be redeployed to the AO to support the redeployment of US forces and medical materiel from the AO to follow-on CONUS or Outside Continental United States (OCONUS) locations.

9. The MLST has supported recent contingencies in South West Asia. They routinely execute the sustainment requirements for the USAMMA Strategic Capabilities and Materiel Directorate (SCMD), which manage Class VIII APS items. For further information on the MLST, refer to *FM 100-17-1 & 2,* or contact

USAMMA
Chief, Force Sustainment Division
DSN 343-4356 or commercial 301-619-4356.

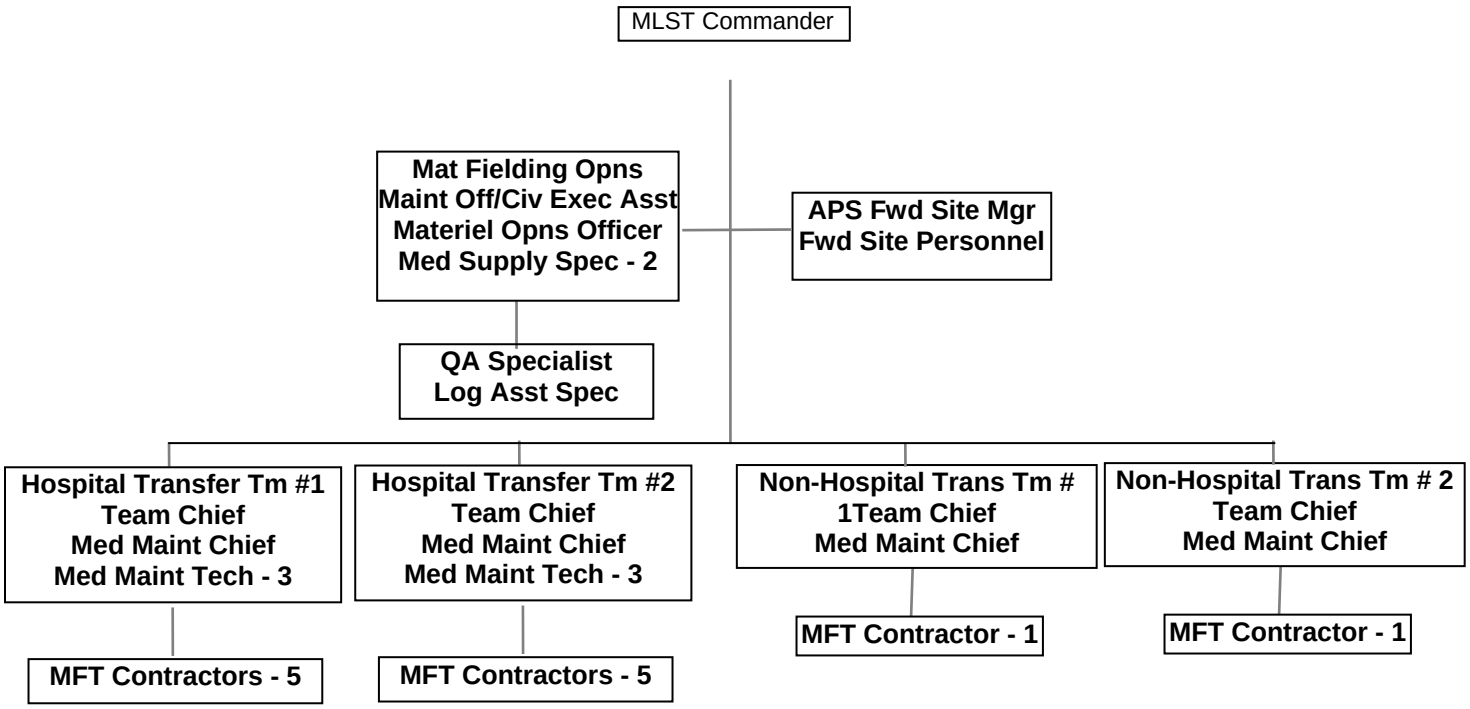

Figure K-1. MLST Organizational Structure

By Order of the Secretary of the Army:

PETER J. SCHOOMAKER
General, United States Army
Chief of Staff

Official:

SANDRA R. RILEY
Administrative Assistant to the
Secretary of the Army
0432302

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TO: *(Forward to proponent of publication or form) (Include ZIP Code)*	**FROM:** *(Activity and location) (Include ZIP Code)*	

PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE

ITEM	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON

** Reference to line numbers within the paragraph or subparagraph.*

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