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DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

STORAGE, PRESERVATION, PACKAGING, PACKING, MAINTENANCE AND SURVEILLANCE OF MATERIEL—MEDICAL ACTIVITIES

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SECTION I

INTRODUCTION

1-1. Purpose and Scope. *a. General.* This publication prescribes the policy and procedures for the cleaning, preservation, packaging, packing, maintenance, storage, and surveillance of medical materiel placed in storage at active, semiactive and inactive Army installations. It provides information and guidance for personnel on the fundamental principles and approved methods and techniques used in the protection of medical supplies and equipment against deterioration and damage during storage. It contains information based on specifications, standards, and other pertinent documents, current as of the date of preparation and coordination of the publication.

b. Applicability. These provisions are applicable to all Prepositioned War Reserve Materiel Stocks maintained at Army installations and meet the requirements of appropriate planning directives. This publication concerns preventive measures to safeguard prepositioned war reserve materiel stocks from deterioration and damage during storage.

c. The storage procedures in TM 743-200 and TM 743-200-1 will be followed except where special storage instructions are described herein.

d. This publication pertains to all National Guard and Army Reserve units responsible for the storage of prepositioned war reserve materiel stocks.

1-2. Forms and Records. Forms and records referenced in this bulletin pertaining to accountability for supplies and equipment are prescribed in AR 40-61 and AR 710-2. Additional references are contained in appendix A.

1-3. Changes and Revisions. *a.* Changes or revisions to this publication, due to major changes in preservation and packaging concepts, policies and doctrine, and revision of specifications, and other official publications, will be made on a continuing basis.

b. Users of this bulletin are encouraged to submit recommended changes or comments to improve the publication. Comments should be keyed to the specific page, paragraph, and line of the text in which the change is recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Comments should be prepared using DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forwarded to Commander, US Army Medical Materiel Agency (SGMMA-LD), Frederick, MD 21701.

1-4. Definitions.
Definitions in AR 310-25 plus the following apply:

a. Emergency Operations Plan. A plan to provide guidance in maintaining operational continuity in the event of an emergency other than partial or total mobilization resulting in an increased workload.

b. Facility. Army health care facility.

c. Health Services Command Mobilization Plan (HSC-MP) (U). A plan to provide for the orderly phased increase of AMEDD health care facilities in Continental United States (CONUS) to support the implementation of any partial or full mobilization.

d. Materiel. All items of equipment and supplies. Dated materiel is used in reference to items which have an expiration date beyond which they normally will not be used.

e. Materiel Readiness. A condition in which required quantities of items, over and above Peacetime Force Materiel Requirements (PTFMR), are prepositioned in strategic locations to insure continuity of operations in emergency situations.

f. Non-POMCUS Operational Projects. Consists of requirements in addition to the initial MTOE, TDA/MTDA, and CTA allowances, allowances contained in (S) AR 11-11, and for support of indigenous forces.

g. Prepositioned Materiel Configured to Unit Sets (POMCUS). To equip specific units upon initial deployment to the theater in which materiel is stored.

h. Prepositioned War Reserve Materiel Stocks (PWRMS). This term refers to items of medical materiel which are authorized to be on hand at (or near) the point of planned use by medical facilities in order to support Army mobilization missions at active, semiactive, and inactive installations.

i. Processing. Procedures for cleaning drying, applying a preservative, cushioning or wrapping, packaging, packing, and identifying (marking) an item preparatory to storage.

j. Reconstitution. The process of revitalizing medical assemblages by replacing outdated or deteriorated items, adding new items and repacking containers where appropriate.

1-5. Logistics Assistance, The US Army Medical Materiel Agency (USAMMA) is tasked in accordance with section VII, chapter 2, AR 40-61 to provide customer assistance relative to this publication.

1-6. Current List of Processing Materiels and Equipment. Materials and equipment for processing prepositioned war reserve materiel are listed in appendix B. Many of the processing materials and equipment are nonstandard. Additional processing materials and equipment will be published in SB 8-75 series.

1-7. Objectives. *a.* To provide the guidance required to ensure that quality items in sufficient quantities are available to accomplish the Army Medical Department mission.

b. To have prepositioned war reserve materiel stocks ready to expand operations rapidly at active facilities and to place inactive facilities into operation rapidly.

c. To provide efficient and economical protection to materiel, from physical and mechanical damage during handling and storage until usage is required.

d. To assure maximum life, utility, and performance of materiel, through prevention of deterioration.

e. To facilitate efficient storage, inventory, transfer and issue.

f. To assure the greatest practicable uniformity in the development of requirements for preservation and packaging of the same or similar items.

1-8. Prepositioned War Reserve Materiel Stocks. *a. Policy.* The policy for prepositioned war reserve materiel stocks is prescribed by (S) AR 11-11, AR 40-61, and AR 710-1. Storage policy for this materiel is prescribed in section II.

b. Need for Prepositioned Ware Reserve Materiel Stocks. Mobilization or emergency requirements necessitate the maintenance of prepositioned war reserve materiel to permit the expeditious activation and expansion of health care facilities.

1-9. Materiel Readiness. Materiel will be stored at each facility to assure accessibility and timely implementation of:

a. Local emergency operation plans, Medical Materiel Program for Defense Against Biological and Chemical Agents (MMPDABC).

b. Blood Donor Program, as applicable.

c. Prepositioned War Reserve Materiel Requirements—Medical Facilities (PWRMR-MF) program.

d. Supplemental Medical Materiel Program (SMMP).

SECTION II

STORAGE OF PREPOSITIONED WAR RESERVE MATERIEL STOCKS, POMCUS, AND NON-POMCUS OPERATIONAL PROJECTS

2-1. **Responsibilities.** *a.* Major commanders and Department of the Army staff agencies will insure the establishment of cleaning, preservation, packaging, packing, storage, maintenance, and surveillance programs for prepositioned war reserve materiel stocks, POMCUS and Non-POMCUS operational projects at installations and activities under their jurisdiction and will establish reviewing methods for controlling such a program. Plans and operations should be realistically tailored to each activity's capability and sufficiently flexible to permit timely adjustment.

b. Installation commanders will insure that sufficient storage and maintenance facilities are available to provide adequate protection for mobilization medical materiel. MEDCEN/MEDDAC commanders will identify their storage and maintenance facility requirements to the installation commander whenever existing facilities are inadequate or where facilities assigned to the medical facility exceed requirements.

2-2. **Reports.** Prepositioned war reserve materiel stocks will be reported in accordance with AR 40-61. These reports, by reflecting requirements, assets, and deficiencies at medical facilities, assist in the preparation of appropriate plans, programs, and budgets.

2-3. **Basic Requirements.** *a. General.* Each item identified as prepositioned war reserve materiel stocks must be —

(1) Authorized for reserve purposes.

(2) In a serviceable condition.

(3) Stored to provide adequate protection and care.

b. Expendable Items. Expendable items of medical materiel on hand for the MMPDABC, SMMP, Blood Donor, and PWRMR-MF program will be commingled with operating stocks to facilitate rotation.

c. Potency Items. Potency period items stocked for mobilization, disaster, and special purposes will be rotated with regular stocks to avoid loss due to deterioration. When stocks are commingled, stock record accounts must differentiate between operating stocks and prepositioned war reserve materiel stocks.

d. Medical Equipment. Medical equipment in PWRMS will be—

(1) Rotated, when feasible, with operational stocks to preclude loss through deterioration.

(2) Complete with accessory or component parts kept with the end item.

(3) Modified, if necessary, to conform to current directives.

(4) Subjected to either cyclic surveillance (visual) or periodic serviceability inspection and performance tests as follows:

(a) Medical equipment not in level A pack will be subjected to surveillance at 6-month intervals and serviceability inspection and performance tests outlined in TM 8-605 at annual intervals. Periodic scheduled services are only required prior to equipment use.

(b) Medical equipment in level A pack will be inspected in accordance with paragraph 6-9 of this bulletin and appendix M, TB 740-10. Items in level A pack will not be disturbed to perform periodic scheduled services, but such services shall be required prior to equipment use.

(c) Medical equipment stored in assemblages that have been prepared for long-term storage and medical equipment packed in level A packaging and stored in medical assemblages will not be subjected to a cyclic surveillance program as prescribed in appendix M of TB 740-10. Instead, this equipment will be inspected and administered serviceability testing upon reconstitution of the medical assemblage at the end of the designated storage period. Items of equipment in this category will not be disturbed to perform periodic scheduled services, but such services shall be performed after serviceability inspection and performance tests prior to reconstitution of the medical assemblage.

e. Temporary Use of Inventories.

(1) Occasions may warrant the withdrawal of certain items from storage for temporary use. This is a "temporary loan" transaction. Such items must be properly processed before being returned to storage.

(2) Issues, loans, and replacement of prepositioned war reserve materiel is governed by chapter 5, AR 40-61.

2-4. Areas for Consideration. The following areas require consideration when establishing or maintaining prepositioned war reserve materiel stocks:

a. Materiel Requirements for Medical Support of Authorized Mission. These requirements must be properly computed utilizing appropriate planning factors and the provisions of chapter 5, AR 40-61.

b. Acquisition and Retention of Materiel.

(1) Only materiel classified (appendix AB, AR 725-50) as condition code "A" or "B" will be acquired or retained as PWRMS-MF.

(2) Equipment which can be repaired economically to meet this criteria will be retained and upgraded to satisfy these requirements.

(3) Technical equipment, as defined by TM 8-605, that cannot be provided the full spectrum of logistics support should not be retained in PWRMS-MF.

(4) Materiel for MMPDABC must be condition code, A, B, or C.

c. Patient Care Items. Only items concerned with patient care should be acquired or retained as PWRMS-MF. Specific guidance governing selection of items is contained in AR 40-61.

d. Stockage. The number of line items acquired should be kept to a minimum. Personal preference on the part of professional personnel will not be the deciding factor for acquiring several line items when one line item serves the purpose.

e. Nonstandard Commercial Type Items. These items should be kept to a minimum.

f. Rotation of Items. Items should be rotated to the maximum extent. This may be done by issuing from prepositioned war reserve materiel stocks and replacing with line items from operational stocks.

g. Storage.

(1) Storage capacity will be utilized to fullest advantage. Whenever possible, like items should be stored together.

(2) Medical equipment in PWRMS must be stored to allow for surveillance and inspection.

2-5. Blood Donor Center. Items comprising a blood donor center are commingled with regular stocks to ensure rotation. The supply catalog for blood donor centers (SC 6545-8-CL-C09) will be used as the basis for determining blood donor center requirements. For information and guidance, refer to AR 40-3, AR 40-61, and TM 8-277-11.

2-6. Medical Materiel Program for Defense Against Biological and Chemical Agents (MMPDABC). The stockage, storage, and control of medical materiel for this program is prescribed by AR 40-61 and CTA 8-100.

2-7. Supplemental Medical Materiel Program (SMMP). The guidance for requirements computation, acquisition, and retention for SMMP is contained in chapter 5, AR 40-61.

SECTION III

STORAGE OF MEDICAL ASSEMBLAGES

3-1. General. *a. Medical Assemblages Program.* The provisions of chapter 5, AR 40-61 govern all aspects of the Medical Assemblages Program.

b. Major Assemblages. Major assemblages contain an aggregation of supplies and equipment. Each assemblage is designed and developed for a specific purpose and identified by a single national stock number. The national stock number, nomenclature, and descriptive data of all medical assemblages are listed in the Federal Supply Catalog, Medical Materiel C-6545-IL, volume I. Sufficient repair parts are included to maintain the equipment for the length of time specified in the assemblage directive. Some assemblages contain potency dated items and items requiring special storage or handling. A list of initial shortages is furnished with the assemblage.

c. Initial Preservation, Packaging, and Packing. The initial preservation, packaging, and packing of items are done at an assembly depot. Packaging is in accordance with level A military packaging requirements prescribed in TM 38-230-1 and TM 38-230-2, and the materiels used conform to military specifications (para 5-2). The methods used for packaging and packing provide ready accessibility to facilitate use or to maintain the assemblage in a serviceable state by supply and maintenance personnel. Generally, all major medical assemblages (except those for general and station hospitals and convalescent centers) are packed in reusable containers.

d. Maintenance Principles.

(1) Medical components of major assemblages will be inspected periodically. Additions, deletions, and revisions to authorized assemblage components will be announced in the SB 8-75-series.

(2) The commander of a TOE unit issued a medical assemblage is responsible for necessary surveillance, maintenance, and updating to insure a constant ready-for-use condition. To preclude loss by deterioration and to assure maximum serviceability, commanders will arrange for rotation of consumable items with installation medical supply officers.

(3) Installation medical supply officers are responsible for surveillance inspection and equipment maintenance of prepositioned assemblages at installation on an as-required basis to insure availability for complete functional utilization. Particular attention will be given to deteriorating and potency dated items.

(4) The accounting, control, and physical security of controlled substances and injection devices will be in accordance with AR 40-61 and TB Med 291.

e. Surveillance Program. A surveillance program will be initiated. This bulletin, AR 40-61, and TB 740-10 will be used for guidance in establishing a comprehensive and effective program.

3-2. Storage and Maintenance of Medical Assemblages and Miscellaneous Medical Materiel. *a. General.*

(1) Installation commanders are responsible for storing and maintaining medical assemblages for TOE type units and organizations training in the continental United States. Utilization of this materiel is facilitated if it is stored by functional units. Responsibility for equipping certain type medical units (convalescent center, general dispensaries, general and station hospitals) and issue of medical assemblages is prescribed in chapter 5, AR 40-61.

(2) Assemblages stored at installations for active Army units organized at zero strength will be accounted for in accordance with AR 710-2. The equipment will be inspected periodically and kept in a usable condition. Maintenance will be performed in accordance with prescribed ARs. A control system will be established which identifies such stocks under their appropriate designations. Deteriorating items will be rotated or exchanged with the installation's stocks.

b. Long Term Storage (LTS).

(1) LTS is defined as the degree of packaging required to protect a medical assemblage in a field environment for 5 years. The degrees of protection required for LTS are within the definition of level A—maximum military protection (TM 38-230-2).

(2) Medical equipment stored in assemblages that have been prepared for LTS will be packed in level A packaging and will not be subjected to a cyclic surveillance program as prescribed in appendix M of TB 740-10. Instead, this equipment will be inspected and administered in accordance

with table 3-1. As long-term storage prototypes of major medical assemblages are developed, USAMMA will publish availability in the SB 8-75 series. Requests for long-term storage prototype packaging procedures should be submitted to US Army Medical Materiel Agency, ATTN: SGMMA-IDI, Frederick, MD 21701. If assemblages meet the standards of level A packaging then this equipment will be inspected and administered serviceability testing upon reconstitution of the medical assemblage at the end of the designated storage period. Items of equipment in this category will not be distrubed to perform periodic scheduled services, but such services shall be performed after serviceability inspections and performance tests prior to reconstitution of the medical assemblage. For information pertaining to level A (LTS) packaging of individual medical line items, refer to paragraph 5-2c.

Table 3-1. Packaging and Storage Requirements

	Open	Shed	Noncontrolled temp. warehouse	Controlled temp. warehouse	Controlled humidity
Packaging	Level A	Level A	Level A	Level A	Level A
Surveillance frequency (months)	6	12	24	30	60

c. Procedures. General information on supply procedures for the storing and handling of major medical assemblages, items requiring special storage or handling, and deteriorating-type items in kits, chests, sets, and outfits is contained in AR 40-61 and TB 740-10. Installation commander's policy for handling medical assemblages and miscellaneous medical materiel, as well as necessary guidelines, should eliminate multiple storage locations for items requiring specific types of storage. It should also provide for arrangements between the medical supply officer and active TOE units for rotation of stocks, facilitate the storage and care of items belonging to inactive units, and establish a system which can be used as a basis for determining future requirements. The following guidance is for active TOE units:

(1) System for surveillance. A system for surveillance of medical assemblages will be established to insure a constant ready-for-use condition. This may be done by use of a visible index file, using stock record forms and procedures outlined in chapter 3, AR 710-2. Unit assembly listings, available from the US Army Medical Materiel Agency, ATTN: SGMMA-LDC, Frederick, MD 21701, will be used to assure up-to-date component listings for each assemblage.

(2) Additions, deletions, and revisions to authorized assemblage components will be announced in the SB 8-75-series. USAMMA will, upon request, furnish up-to-date unit assemblage card decks or listings to medical facility or unit commanders which reflect the latest assemblage configuration as approved by The Surgeon General.

(3) Supplemental records will be prepared and maintained for each potency dated component stored in an assemblage. At a minimum, these records will reflect information pertaining to NSN, nomenclature, manufacturer, lot number, expiration date, and location of each potency dated item within the assemblage. Supplemental records will also be maintained for all suspended items. Such records will facilitate identification of potency dated materiel reaching the end of its assigned expiration date and requiring replacement or suspended items which also require replacement action. Supplemental records may be prepared by using DA Form 1296 (Stock Accounting Record), DA Form 3862 (Controlled Substances Stock Record), DA Form 3318 (Record of Demands—Title Insert) or locally developed mechanized listings or forms.

(4) Items requiring special handling. To insure rotation and adequate protective measures, certain items require special handling. See AR 40-61 and TB 740-10 for provisions to preclude losses by deterioration and to assure maximum serviceability.

3-3. Reconstitution of Medical Assemblages.
a. Responsibility. Reconstituion of medical assemblages will be accomplished in accordance with chapter 5, AR 40-61 or as instructed by The Surgeon General in the SB 8-75-series.

(1) Major commanders are responsible for insuring compliance with instructions for reconstituting medical assemblages, and for providing funds.

(2) Custodians of stored medical assemblages are responsible for their reconstitution.

(3) Commanders of TOE units in possession of their medical assemblages are responsible for reconstitution on a continuing basis.

(4) US Army Medical Materiel Agency (USAMMA) is responsible for furnishing the latest component listings, providing advice and

assistance, and coordinating shipping dates of materiel.

b. Procedures. When it is determined that reconsitution of assemblages is required as prescribed in chapter 5, AR 40-61, or per instructions of The Surgeon General, the procedures outlined below will be followed by Agencies responsible for reconstitution of assemblages:

(1) Minor medical assemblages. Reconstitute using the most current listing of components of minor medical assemblages listed in the Federal Supply Catalog, DOD Section, Medical Materiel 6545-II, volume 2 and applicable IL change bulletins. Cognizance will be taken of the fact that many major medical assemblages contain minor assemblages as components.

(2) Major medical assemblages. Obtain up-to-date unit assemblage listings which reflect the latest assemblage configuration as approved by The Surgeon General from USAMMA. The listings will include all published and schedule changes to be published in the SB 8-75-series.

Note. The SC 6545-8-CL-series will not be used by the unit reconstitution.

(3) Physical inventory and inspection of materiel.

(a) To determine the completeness of a major assemblage, USAMMA components listing will be used to make a complete physical inventory and inspection of all materiel presently on-hand within the assemblage. The listings may also be used as inventory work sheets and as a basis for submitting requisitions for shortage. However, the current listing will not be used as the basis for determining the need for reports of survey.

(b) For purposes of reconstitution, minor assemblages (components of major medical assemblages) will be handled separately from other line items.

(c) Upon completion of the physical inventory and inspection, requisitions will be submitted to the appropriate supply support activity for components that are missing and/or needing replacement. The submission of such requisitions is contingent on the availability of funds at the requesting unit. Requisitions will be prepared in accordance with AR 725-50 and AR 710-2. Requisitions, in addition to all other required entries, will have the appropriate signal code entered in card column 51 to ensure requested materiel is delivered to the appropriate consignee designated in the requisition.

(d) Prior to initiating the reconstitution, target dates should be established to insure that actions will be accomplished expeditiously. The unit commander or supply officer monitoring or coordinating the reconstitution should establish target dates and advise all concerned personnel. The following example may be used for guidance:

D—USAMMA furnishes listings.

D+1 to D+60—Unit inspection and inventory, ascertaining shortages and submitting requisitions.

D+90—Materiel shipped.

D+100—D+120—Final reconstitution by unit.

3-4. Processing and Handling of Medical Materiel at Unit Level. *a. Medical materiel should be appropriately preserved* to facilitate the preparation of this materiel for use. Commanders of units, in addition to adhering to applicable requirements in paragraphs 3-1 through 3-3, will establish a system for handling medical materiel for which they are responsible. The following may be used for guidance in formulating standing operating procedures: Upon receipt of their assemblages, commanders of all TOE active units will—

(1) Unpack and inspect each item to determine completeness and serviceability. Do not break the sterile barrier or manufacturer's seal on items such as dressings to perform this inspection.

(2) Remove heavy duty preservatives applied to items in original packs. Following this, repack the items in such a way that processing, other than simple cleaning and sterilizing, will not be required prior to use.

b. Maintaining Medical Materiel. Section IV concerns processing of broad categories of items stored at inactive facilities. The basic principles and the inspecting, cleaning, and drying operations are appliacble at unit level.

(1) Rubber goods which are folded (aprons and sheeting) will be refolded periodically to prevent cracking. When refolding, care will be necessary to insure that folds are not made on the previous fold lines.

(2) Frayed or broken canvas straps will be replaced. Fasteners, including rings, snaps, slide fasteners, buckles, and metal tips on straps should be in place, in serviceable condition, and free of rust or other contaminants.

(3) Finishes will be maintained as "like new" as possible. With the exception of compressed gas cylinders and litter handles, all items originally issued with a paint or enamel finish will be spot painted or repainted, as necessary, with materiels approximating the original color and quality. Bare metal surfaces will be lightly oiled with type P-9 lubricating oil except when contraindicated because of the nature of the item. (Reference will be made to

paragraph 2-9 and table 2-2, TM 38-230-1 for information and guidance in selection of the appropriate metal preservative.)

(4) Bearings on electric motors will be oiled only as required; excessive oiling is as detrimental to the motor as is insufficient oiling.

(5) Batteries will be checked for leakage and tested periodically under load to determine serviceability. Unserviceable batteries will be replaced with new ones. Batteries will be stored in a cool dry place and packed to prevent damage to other materiel in the event of leakage. Wet cell batteries which are "dry and charged" will not have the electrolyte added solely for the purpose of load testing. The electrolytes will be added only at such time as the battery is to be put in service.

(6) Labels will be clearly legible, and care will be exercised to preserve the manufacturer's name, lot number, date of manufacture, and expiration date, when applicable.

SECTION IV

STORAGE OF PREPOSITIONED WAR RESERVE MATERIEL STOCKS AT MEDICAL FACILITIES, INACTIVATION AND REACTIVATION PROCEDURES

4-1. **General.** These policies and procedures govern the in-place storage of prepositioned war reserve materiel stocks so as to facilitate the inactivation and reactivation of health care facilities.

a. Objectives. When a facility is scheduled for inactivation, planning for in-place storage of medical materiel must be premised on two specific objectives—

(1) That the facility possesses the capability of being readied for complete use within the time period specified in planning documents.

(2) That each item of mecial materiel stored in the facility be usable for the purpose intended following reactivation. In addition, circumstances may necessitate readying an inactive facility for partial use at any time. The degree of partiality with which an inactive facility can be readied for use is dependent primarily upon the care exercised during the in-place storage operation and the degree of surveillance and inspections during its inactive state.

b. In-Place Storage Operation Phases. The in-place storage operations may be considered in six broad phases:

(1) Planning which includes—

(a) Surveying of buildings.

(b) Physical inventory of assets and adjustment of property records.

(c) Condition code classification of materiel.

(d) Computing requirements for processing of items.

(e) Coordinating with other support services.

(2) Selecting, testing, and processing items.

(3) Storing items and maintaining appropriate records.

(4) Cleaning up following completion of storage project.

(5) Conducting a final inspection and physical inventory of assets.

(6) Securing the facility to include key control to prevent entry except when coordinated by the responsible medical materiel manager, emergency crews (firemen, policemen, etc.) and vermin control parties.

c. Planning. Planning begins when major commanders or heads of Department of the Army Staff agencies are notified that a facility under their command is to be placed on standby status. The in-place storage of medical materiel is completed when the final inspection indicates that all items are properly preserved and housed in buildings affording adequate protection; the property records accurately indicate the quantity of each item and storage location; and the areas housing the items reflect practices of good housekeeping.

4-2. **General Principles.** *a. Inactive Facilities.* Materiel at inactive facilities will be completely preserved (sec V). Consideration should be given to climatic conditions peculiar to the geographic location of the facility; e.g., high humidity, proximity to salt water.

b. Personnel.

(1) The project officer (para 4-4) will be responsible for the in-place storage operation's accomplishment in accordance with these provisions and/or special instructions contained in planning documents.

(2) Processing of items will be accomplished by or under the supervision of trained medical supply personnel. Biomedical equipment repair personnel will assist when processing equipment of a technical nature.

(3) Condition code classification, serviceability testing, repairs, and processing of technical equipment will be accomplished only by technically qualified personnel.

c. In-Place Storage Operations.

(1) The buildings housing the materiel must provide adequate protection. AR 210-17 governs inactivation of installations and contains policies and procedures regarding vacated buildings.

(2) The type and quantity of stored items will be in accordance with the facility's mobilization plan.

(a) Items locally packed or in original depot pack (sealed containers) that meet the requirements for in-place storage need not be reprocessed. The containers will be thoroughly inspected. Indications of tampering, infestation, damage, age-deterioration, or other signs causing doubt as to type, quantity, or serviceability of items, require opening the container and completely processing the contents. The date of packing will have a bearing on whether or not to open the container and reprocess items.

(b) Excess and unserviceable items will be processed and disposed of in accordance with AR 40-61 and/or AR 710-2.

(c) Requisitions for components of end items will be initiated to fill shortages. Upon receipt, the component parts will be stored with the end items. Repair parts, tools and the maintenance library shall be managed in accordance with current directives and inspected annually for serviceability and need.

(d) Normally expendable nonmedical items will not be stored, except for those items required by medical equipment maintenance personnel (para 4-12). AMEDD accountable officers will insure that supportive, nonmedical mobilization materiel is provided for by appropriate installation commodity managers.

(e) Medical repair parts will be managed and inspected in conjunction with other medical materiel. Repair parts should be transferred and stored with the end item unless sufficient density of end items and other parts justify proper storage in a medical maintenance shop repair parts area. Repair parts records will be retained. Diligence must be exercised to dispose of deteriorated or obsolete repair parts and records annotated.

(3) The Army Maintenance Management System (TAMMS) records will be utilized, prepared and distributed in accordance with the provisions of TM 38-750 and TB 38-750-2.

(a) DA Form 2409 (Equipment Maintenance Log Consolidated) will be initiated and maintained for all medical equipment indicated in TM 8-605 and comparable nonstandard equipment which are maintenance significant and meeting the criteria established in TB 38-750-2. The DA Forms 2409 will be maintained by the assigned maintenance personnel or the MEDCEN/MEDDAC furnished medical maintenance support at the inactive facility. Results of all subsequent actions will be recorded on these forms. DA Form 2409 will be annotated in pencil for equipment in level A pack or locally packed to in-place storage requirements to preclude disturbing such equipment solely to complete information for section A. DA Form 2409 will be annotated either with "Surveillance" or "Technical Inspection" when the applicable inspection is performed.

(b) DA Form 2404 (Equipment Inspection and Maintenance Worksheet) (in duplicate) will be utilized to maintain the requirement for repair services to preclude open maintenance requests for extended periods.

(4) Periodic scheduled services will be performed for equipment being placed into mobilization storage.

(5) Newly acquired items of technical equipment except those in level A pack will be serviceability tested in accordance with TM 8-605, and all deficiencies corrected. The equipment will be checked to insure that all modification work orders have been accomplished. Shortages will be noted on DA Form 2404 (Equipment Inspection and Maintenance Worksheet) (in duplicate). One copy of the form will be affixed to the exterior of the prepared equipment and the other copy placed with DA Form 2409. This will provide the medical equipment repairman with an accurate record of the maintenance status of the item. Items received to fill shortages will be placed with the end item and the shortage notation lined cut on DA Form 2404.

(6) The maintenance technical library (technical manuals, manufacturer's literature, repair parts publications, modification work orders, supply bulletins, technical bulletins pertinent to maintenance, and other current references) will remain intact and will be maintained by the medical maintenance personnel responsible for providing support.

(7) Medical assemblages will be disposed of in accordance with instructions from major command headquarters or Department of the Army Staff Agency.

4-3. Need for Planning. Planning begins on receipt of notification that a facility is to be inactivated. The instructions issued by The Surgeon General, the major command headquarters, or the Department of the Army Staff Agency must be supplemented with detailed information and a realistically phased work schedule. Surveying the buildings; coordinating with other support services, repairing and modifying buildings prior to storing the items; determining the manpower, materiels, and equipment requirements to place the items in standby storage, as well as insuring availability when needed; ascertaining the disposition of unserviceable or excess materiel including a determination whether assemblages are to be handled as

single line items or stored by functional components; and requisitioning parts, tools, and components authorized for issue with end items, all represent areas requiring early attention.

4–4. Project Officer. It is mandatory that the facility commander designate a qualified individual with supply or maintenance experience as the project officer and that the assignment be made at an early date. This provides the officer an opportunity to participate in the various aspects of planning and allows ample time for him/her to become thoroughly grounded in the in-place storage procedures at a particular facility. The project officer should be assigned staff responsibility for coordination and supervision of the entire operation. He/she should remain at the facility until the in-place storage operation is completed to include the final inspection and the completed report in letter format. A concurrent action is that the project officer is to prepare the reopening plan for the facility specifically noting all signficant factors to be considered in the reopening effort.

4–5. Manpower, Materiel, and Equipment Requirements. *a. Manpower.* Based on an estimate of manpower requirements, action will be taken to insure that sufficient trained and qualified personnel (supply, maintenance, surgical, medical, technical, and labor) are retained or assigned to the facility so work may be done expeditiously.

b. Materiel and Equipment. The materiels and equipment required to process and store items should be approximated and requisitioned in sufficient time to insure that they are on hand when the processing is scheduled to begin. Early action is necessary because many of the materials and equipment are not stocked in the supply system and must be purchased locally. Activities where processing items is a major function (depots) should be contacted to obtain equipment on a loan basis. However, sufficient materiel must be obtained for retention at the inactive facility to enable the medical maintenance personnel to function effectively. Appendix B contains a list of materials and equipment needed for accomplishing the in-place storage operation. The information should be used as a basis for computing the requirements for individual facilities.

4–6. Coordination with Other Support Services. *a.* The overall plan for the in-place storage operation, as well as the projected activities during a facility's inactive status, must be coordinated with the appropriate accountable commodity officer at the earliest date possible. This provides these officers with information necessary for their own planning purposes and insures their ability to provide supportive functions.

b. The project officer is responsible for the following actions:

(1) Reviewing assets on hand.

(2) Adjusting quantities of items due in and due out.

(3) Clearing property book officer(s) and hand receipt holder(s). This action requires close supervision since activities can close out and personnel and depart prior to completion of this operation. In many instances, the assistance of surgical technicians will be required to adequately identify and classify surgical instruments.

(4) Inspecting, repairing, or turning in items of equipment to appropriate commodity managers.

(5) Requesting disposition instructions for all excess materiel.

(6) Reviewing contracts and making maximum efforts to eliminate unnecessary costs being assessed against the government as a result of premature termination.

(7) Cleaning and repairing linens prior to processing for storage.

(8) Accomplishing appropriate inventories of materials to be retained at the inactive facility.

(9) Preparing listings of materiel with quantities on hand, locations and dollar value.

(10) Turning buildings over to the post engineer to permit his compliance with AR 210–17.

4–7. Storage. *a. Installed Equipment.* Installed equipment will remain in the area of normal operation. As far as practicable, all other items will be stored in areas of intended use. In this connection, paragraph *b* below provides further guidance.

b. Consolidation of Items. To facilitate surveillance, inspection, and readying a facility for use, certain items should be stored together in one area. As a guiding rule, such consolidation should be limited to large quantities of similar type small sized items and those requiring sterilization or laundering prior to use. An area near the central material service (CMS) should be designated for storage of items requiring sterilization or processing by CMS personnel before use. Technical equipment items should be stored, to the extent possible, in a location(s) where the necessary utilities (water, steam, electricity) are available to perform the serviceability tests as required by paragraph 4–2*c*(5) of this bulletin.

c. Wards. Depending on local circumstances and

available space, ward furniture should be left in place on the ward. The maximum feasible number of beds should be made ready for occupancy, as explained in section V. The primary difference between a set-up ward at an active facility and an inactive facility is that at an inactive facility, the set-up ward will not have the patient care items included. Other ward furniture and equipment will be processed in accordance with applicable procedures in section V.

d. Medical Maintenance Shop. All equipment in the medical maintenance shop, repair parts, technical publication references, and parts lists will be stored in the medical m aintenance shop. The shop will be used during the facility's inactive period by the medical maintenance personnel assigned to the responsible MEDCEN/MEDDAC.

4–8. Preparation of Storage Areas. Prior to storing the materiel, the storage areas will be inspected by the project officer to ensure that—

a. All repairs and modifications have been accomplished by the post engineer, and that the buildings comply with the requirements of AR 210–17.

b. Cleanliness prevails. The storage areas should have been thoroughly cleaned by vacuum cleaning or another suitable method.

4–9. Completion of Storage. *a.* Processing materials, scraps, and litter will be promptly removed and, if necessary, the areas cleaned (para 4–8*b*).

b. Interior doors (room and closet) will be left open or closed in conformance with local fire regulations.

4–10. Review and Report of In-Place Storage Operations. The project officer will—

a. Inspect all storage areas to see that the requirements of AR 210–17 have been met.

b. Prepare a completion report and/or an after action report in accordance with instructions and format provided in the inactivation directive received from the major command headquarters of the Department of the Army Staff Agency subject to the provisions of requirement control, AR 335–15.

c. Transfer stock records to the accountable officer designated in the inactivation directive.

4–11. Support Requirements. An inactive facility will have a continuing and recurring requirement for materiel inspections and maintenance. The size of the facility should determine the number of logistics personnel to accomplish support.

a. In the event that materiel/repair parts shortage cannot be filled prior to or during the in-place storage operation, prepositioned requisitions for such shortages will be maintained by the MEDCEN/MEDDAC assigned logistics responsibility based upon the latest report of medical materiel in storage at the facility. MEDCEN/MEDDAC will maintain liaison with USAMMA in resolving materiel/repair parts deficiencies.

b. Deficiencies found during in-place storage operation will be reported to the MEDCEN/MEDDAC commander.

c. Logistics personnel will:

(1) Conduct periodic inspections, as directed and/or deemed necessary, of each area of the facility where items of medical materiel are stored. In addition to instructions furnished by the major command headquarters or Department of the Army Staff Agency, logistics personnel should:

(a) Observe containers for holes, tears, signs of tampering or other types of damage.

(b) Look for evidence of infestation by rodents, insects or vermin.

(c) Check for indication of weather damage such as broken window panes and waterstained walls and ceilings.

(2) Coordinate, prior to the onset of freezing weather, with the engineers to insure the purging of water from utility lines and equipment.

(3) Accomplish required surveillance and inspections of all materiel.

4–12. Logistics Personnel. Logistics personnel should be physically assigned when practicable or be furnished from MEDCEN/MEDDAC designated to furnish logistical support. The size of the facility and scope of work should determine the personnel required to accomplish support.

a. Supply Personnel.

(1) *Qualifications.* Supply personnel assigned to mobilization materiel support duties should be proficient in their MOS and have a working knowledge of storage and preservation and packing procedures.

(2) *Duties.* Perform such duties as required to accomplish surveillance, materiel inspections and associated actions.

b. Biomedical Equipment Specialists.

(1) *Qualifications.* Maintenance personnel assigned to mobilization materiel support duties should be proficient in their MOS and have a

working knowledge of preservation and packing procedures for in-place equipment and technical medical equipment.

(2) *Duties.* Perform such duties as required to accomplish surveillance and serviceability and inspection tests of medical equipment and associated actions.

(3) *Authorization of Direct Communications.* Direct communication between the medical maintenance personnel and the major command headquarters or Department of the Army Staff Agency is encouraged.

4-13. Pre-Reactivation Procedures. In essence, the operation of readying items for use upon reactivation of a facility is the reverse of the in-place storage operation. It should be considered in two broad phases:

a. Planning. This includes the designation of a project officer; coordination with other activities for support functions; determination of manpower, materials, and equipment to remove containers and preservatives from items in storage and for serviceability testing of technical equipment; and preparation of a work schedule.

b. Readying Items for Use. This phase must assure that the facility is ready for complete use within the time specified in appropriate mobilization plans.

4-14. Reactivation Project Officer. The project officer will be responsible for the orderly flow of work necessary to ready items from in-place storage for use. He/she will be responsible for accomplishing the operation and for the submission of a report of completion in accordance with instructions provided in the reactivation directive subject to reports control AR 335-15.

4-15. Health Care Logistics Officers and Required Specialized Personnel. Permanent party personnel at the reactivated facility should perform specific duties in the "readying-for-use-operation."

a. The health care logistics officer should insure continuity of supply functions.

b. Maintenance personnel should install, reconnect, and perform serviceability testing of technical equipment.

c. Wards, operating rooms and the hospital food service area should be readied next. Nursing service personnel will prepare ward areas and operating rooms augmented by CMS personnel as necessary. The Chief, Food Service Division is responsible for readying the food service facility. As a rule, that service responsible for the operation and management of a given area of the facility is also responsible for preparing that area for operations.

d. **X-ray and dental technicians ar responsible for activation of their respective clinics.**

4-16. Removing Items from Storage. *a.* Each item in storage will be removed from its container and inspected. Preservatives will be removed and items thoroughly cleaned in accordance with applicable procedures outlined in chapter 1, TM 38-230-1. Technical equipment will be serviceability tested by qualified personnel. Repairs, if required, will be accomplished. If an item cannot be repaired prior to reactivation date, it will be properly tagged utilizing DA Form 2402 (Exchange Tag).

b. DA Form 3239-R (Materiel Inventory Surveillance Record), paragraph 5-20*b*, will be used to verify contents and will be annotated by the individual checking the contents indicating completeness and serviceability. DA Form 3239-R should then be used by the project officer as a basis for the completion report. It may also be of use to supply personnel for record or planning purposes.

c. **Containers and cushioning materials will be promptly removed from the user areas.**

4-17. Sequence for Readying In-Place Items (By Activity Area). If the personnel reactivating the facility are divided into subteams, two or more activity areas may be readied for use simultaneously. The following is a suggested sequence which should be used as guidance when preparing the master work schedule:

a. The medical maintenance shop should be readied for complete operations before beginning on other areas. This is necessary to expedite serviceability testing of equipment.

b. The Central Material Service (CMS) should be prepared for operation as soon as possible. This will enable CMS personnel to use the equipment for readying items for patient care functions. As noted in paragraph 4-15*c* the unpacking of various small items may be accomplished by these personnel, thereby expediting the use of the facility for patient care activities.

c. Wards, operating rooms and the hospital food service should be readied next. Nursing service personnel will be required to properly prepare the wards and operating rooms for patient care purposes. The food service facility must be readied under the supervision of the Chief, Food Service Division.

d. The preparation of the dental clinic, x-ray section, and other hospital areas for complete

operations will probably be accomplished, on a partial basis, concurrent with the activities listed in paragraphs *b* and *c* above. Readying the equipment of the dental clinic and the x-ray section will be time consuming because of the technical nature of the items and the requirement for qualified technical personnel to accomplish the work.

4–18. Reactivation Requisition. Instructions for requisitioning materiel over and above stored quantities will be provided inactive facilities in the activation directive.

SECTION V

PROCESSING OF ITEMS FOR IN-PLACE STORAGE

5-1. General. *a.* This section concerns the processing of items for in-place storage at medical facilities. This information should be supplemented by TM 8-605, TM 38-230-1, TM 38-230-2, military specifications, and manufacturer's literature.

(1) Paragraphs 5-1 through 5-10 contain basic military packaging and packing information for processing medical materiel for standby storage by facilities. More detailed information will be found in TM 38-230-1 and TM 38-230-2. These publications contain information on the fundamental principles and approved methods and techniques used in the protection of military supplies and equipment against deterioration and damage during shipment and storage.

(2) Paragraphs 5-21 through 5-34 contain guidelines and specific requirements for the handling and storing of a wide variety of items by type or material. The preparation of equipment for in-place storage is covered by TM 8-605, which contains a chart for each item of medical equipment having maintenance significance.

b. Storage differs at inactive facilities from that at active facilities. The basic principles for protecting an item apply at both, but the actual packaging and storing differ widely. Illustrative of this is the following: The majority of items at active facilities are new and stored in original depot-pack containers, or, if removed from containers, still have the benefit of any preservative applied. By contrast, the processing of materiel at inactive facilities concerns the preparation of a vast number of used items for storage at the facility.

c. Discretion must be used at active facilities in the selection of proper protective measures when processing items for indefinite storage. For example, it may be more practicable to package textiles in cartons or by some other means rather than in accordance with the method outlined in paragraphs 5-28 through 5-32. However, the preprocessing inspections and tests; the cleaning and drying processes, including the safety precautions; the processing of surgical instruments; and the principles regarding the care of items have general applicability and will be closely followed.

5-2. Specifications and Standards. *a.* A specification is a clear, accurate description of the technical requirements for a material, product, or service, Federal specifications and military specifications (identified by the symbol "MIL") are the two types commonly used in the Army.

b. Standards are documents that establish engineering and technical limitations and applications for items, materials, processes, methods, designs, and engineering practices. They may be issued in either the Federal or military series. Standards are identified by the symbol "STD" preceded by "MIL." Sometimes the symbol "MS" is used, generally when the standard consists of one page only and covers design features.

c. The broader concepts, requirements, and specific processes and methods, utilizing the proper materials for effective preservation of items, are contained in MIL-P-116. Federal and military specifications are not intended for use as standards for indefinite storage activities at facility or unit level. However, personnel handling materiel for indefinite storage should be familiar with the specifications and their content should be applied where applicable. Additionally, information pertaining to the proper packaging of line items can be found in the Packaging Segment of the Army Master Data File. This segment will provide interested activities with the Packaging Data Sheet Control Number. Detailed information pertaining to the control number can be obtained from the US Army Development and Readiness Command, Packaging, Storage, and Containerization Center, ATTN: SDSTO-TP-P, Tobyhanna Army Depot, Tobyhanna, PA 18466.

d. The Naval Publications and Forms Center (NPFC), 5801 Tabor Avenue, Philadelphia, PA 19120, is the distribution point for standards and specifications adopted by the military services. The Department of Defense Index of Specifications and Standards, parts I and II, lists current specifications and standards and is the guide for identifying the title and number of the desired standard or specification. DD Form 1425 (Specifications and Standards Requisition) should be used for requesting specifications/standards.

5–3. Deterioration and the Causes. AR 740–3, Care of Supplies in Storage (COSIS) establishes the US Army COSIS Program to assure that the true condition of materiel is known, properly recorded, and that materiel is maintained in a condition to meet supply demands at a minimum cost in funds, manpower, facilities, equipment and materials. The procedures therein should be followed except where special instructions are necessary and described herein. Individuals engaged in processing, storing, and inspecting materiel must understand the causes of deterioration, as well as the materials and operations employed for its prevention or retardation.

a. General. Deterioration of material denotes loss of quality, strength, value, or usefulness. When considering deterioration of an item, the material used in its constuction is of primary concern. Materials may be divided into two general headings, organic and inorganic.

(1) *Organic material* is derived from living organisms, for example, rubber, plastic, wood, and fabric.

(2) *Inorganic material* is composed of matter other than animal or vegetable; for example, metal, glass, quartz, and silicate.

b. Causes.

(1) ***Physical damage.*** Any form of physical damage may be a cause of deterioration or a contributing factor.

(2) *Corrosion.* The destructive breaking down of metals into their oxides. Types of corrosion are—

(a) Oxidation. The reaction of metal with oxygen in the presence of moisture causes about 70 percent of all corrosion.

(b) Chemical. The reaction of metal with chemicals, such as acids, alkalies, or salts, in the presence of water results in pitting and etching. Salt has a tendency to hold water to the metal surface, thus accelerating the reaction.

(c) Electrolytic or Electochemical. The reaction of metal placed in contact with a dissimilar metal in an electrolyte results in electrolytic or electrochemical corrosion.

(3) *Microorganisms.* Moist places on organic material may form breeding areas for mold and other fungi. Fungi may even grow on organic dust collected on metal or glass.

(4) *Other contributing factors:*

(a) Effects of sunlight, moisture, oxygen, and other weather.

(b) Effects of pressure or temperature extremes (fabric, plastic, rubber).

(c) Effects of solvent vapors (plastic, rubber).

(d) Separation of fractions and phases (oil, grease).

(e) Age-hardening (rubber, plastic, metal).

5–4. Prestorage Processing, *a. Objectives.* The objectives of prestorage processing are—

(1) To assure maximum life, utility, and performance of items through prevention of deterioration.

(2) To protect items from physical and mechanical damage.

(3) To provide identification and marking to facilitate efficient storage, inventory, and surveillance activities.

b. Sequence of Operations. The first five operations listed below must follow one another as closely as possible to avoid recontamination of the item.

(1) *Cleaning,* to remove any contamination on the item (required for all items).

(2) *Drying,* to prevent corrosive action or the growth of mold due to residual cleaning moisture (required for items cleaned with liquids).

(3) *Applying a preservative material,* to protect the clean, dry surface (required only for some items, primarily metals).

(4) *Wrapping or cushioning,* to protect the preservative coating and the item from physical damage (required only for some items).

(5) *Packing to protect* the item and to facilitate identification, handling, and storage (required for all items).

(6) *Identifying,* to provide the container with a description of its contents (required for all items).

5–5. Cleaning. *a. Importance.* Thorough cleaning of an item by an approved method and proper materials is the first step in any preservation process. Improper cleaning makes all subsequent processes ineffective. Preservative applied to a dirty surface will not protect an item. Surfaces must be free of contaminants or contaminating residues, such as corrosion, soil, grease, fingerprints, adhesive or masking tape, perspiration, or other acid and alkali residues. Items that do not require a preservative material must be thoroughly cleaned to prevent contaminants from "eating" into the material, marring the appearance or function, or becoming so tightly attached as to preclude later removal.

b. Choice of Method and Materials. Basic cleaning requirements are listed in Specification MIL–P–116. There is not one cleaning method or material that can be used for all items. Two general requirements are that cleaning must be thorough and the process must not injure the item. The choice will depend on material composition, surface, construction, assembly, size, and shape; type and

degree of contamination; availability of cleaning materials, and equipment; and hazards, involved.

c. Cleaning Processes. Cleaning processes are classified as either chemical or mechanical. Paragraph 1-4, TM 38-230-1 provides information and guidance on approved methods and techniques of cleaning processes.

(1) *Chemical* processes are acid, alkaline, and detergent cleaning.

(2) *Mechanical* processes generally consist of using abrasive materials, pressure and power tools in the removal of tightly adhering contaminants.

d. Health and Safety Hazards. The cleaning processes have health and safety hazards that must be recognized. Cleaning processes must comply with the requirements of the Occupational Safety and Health Act (OSHA) of 1970, or Executive Order 11612, as applicable. Furthermore, prior to performing the cleaning processes the following sections of title 29, Code of Federal Regulations (CFR), part 1910, should be reviewed:

(1) Ventilation.
(2) Flammable and combustible liquids
(3) Spray finishing.
(4) Dip tanks containing flammable or combustible liquids.
(5) General requirements.
(6) Eye and face protection.
(7) Respiratory protection.
(8) Hand and portable power tools and equipment-general.
(9) Air contaminants.

e. Cleaning Inspections. **Cleaning inspection insures proper cleaning before the item is processed further. Cleaning inspection prevents inadequate cleaning with the attendant losses in time, labor, and materials. Effectiveness of the cleaning process can be determined by three tests. The first two are applicable to any item and cleaning process, whereas the third has limited application. Paragraph 1-13, TM 38-230-1, provides detailed information and guidance on cleaning inspections** and performance of required tests.

(1) *Visual test for cleanliness.* This test visually determines freedom from, or the presence of, foreign materials or corrosion.

(2) *Wipe test for cleanliness.* This test determines freedom from foreign material and corrosion that was not discovered in the visual test.

(3) *Test to determine freedom from alkalies and acids.* This test determines if alkalines or acids remain on the item in quantities that would endanger the preservation of the item.

5-6. Solvent Cleaning. Solvent cleaning makes use of several solvents, utilizing processes known as C-3, Solvent Cleaning; C-8, Fingerprint Removal; and C-5, which is a combination of C-3 followed by C-8. See paragraph 1-5, TM 38-230-1 for detailed guidance and instruction.

a. Materials for Solvent Cleaning. Solvent cleaning materials are: Drycleaning solvent; paint thinner; corrosion preventive, fingerprint remover compound; trichloroethylene; tetrachloroethylene; and trichloroethane (methyl choloroform).

(1) *Drycleaning solvent (P-D-680).* This is a water-clear liquid that is neutral to metals and only slightly irritating to the skin. It may be mildly nauseating when excessive vapors are breathed. It evaporates quickly without leaving a corrosion inducing film on metal surfaces. It is used especially for removing oils and greases from metal surfaces by brushing, wiping, spraying or immersion. Dry cleaning solvent has a flash point (the point at which there are sufficient vapors from the solvent to ignite in the presence of a flame or spark) of 100 degrees Fahrenheit, or higher. The material must be used only at room temperature, since heating greatly increases the fire hazard.

(2) *Volatile mineral spirits, paint thinner (TT-T-291).* Paint thinner is supplied as two grades of petroleum distillate. Only grade I (light thinner) is used for petroleum solvent cleaning as specified in Specification MIL-P-116. It is an excellent solvent for oils and greases. It is similar to dry cleaning solvent (P-D-680), having the same flash point and degree of toxicity, but is more highly refined.

(3) *Fingerprint remover corrosion preventive compound (MIL-C-15074).* This is a homogeneous, stable mixture of solvent, soap, and water. It is capable of removing fingerprints, suppressing perspiration corrosion, and temporarily protecting steel surfaces. It is nontoxic and free from disabreeable or offensive odors.

(4) *Technical trichloroethylene (O-T-634).* **Type I trichloroethylene is intended for use in dry cleaning and for general solvent purposes.** Type II trichloroethylene is intended for vapor degreasing of metals. This is a clear, nonflammable solvent for oil-soluble contaminants. It may be used either in its liquid state or, as a result of heating, in vapor form in which form it has a chloroform-like odor. This solvent can produce serious side effects and is suspected of being carcinogenic. Therefore, it is recommended that exposure be limited and that a substitute be utilized whenever possible. Type II, with a boiling point of 188 degrees Fahrenheit is specially procured for vapor degreasing. Trichloroethylene will not remove fingerprints, rust, scale,

and other insoluble contaminants. It does not mix readily with water. It is 1 1/2 times heavier than water, making water separation rather simple. It is nonexplosive at ordinary working temperatures. The low boiling point makes it an economical solvent to use. Its vapor is 4 1/2 times heavier than air. This tends to keep the vapor confined even in an uncovered cleaning chamber (see app C for detailed information).

(5) *Technical tetrachloroethylene (perchloroethylene) (O-T-236).* Tetrachloroethylene is similar to trichloroethylene and the same precautions should be taken when utilizing this solvent. Its differences make it the preferred solvent in some situations. It is completely insoluble in water. Any water that condenses in the degreaser at night is soon evaporated to steam before the solvent reaches its boiling point (250 degrees Fahrenheit). This high boiling point also permits a longer cleaning cycle than possible with trichloroethylene because of the longer time required to reach temperature equilibrium. The vapor of tetrachloroethylene is six times heavier than air, thus restricting the loss of vapor. This permits construction of portable, air-cooled degreasers. Tetrachloroethylene is less toxic than trichloroethylene, but it must be handled with reasonable care. Strong vapor concentrations will result in symptoms similar to those caused by trichloroethylene. Tetrachloroethylene is more stable and requires no stabilizers. It is nonflammable and will only decompose at extremely high temperatures. Like tetrachloroethylene, it does not remove fingerprints, rust, or scale (see app C).

(6) *Technical inhibitive trichloroethane (methyl chloroform) (O-T-620).* The material covered by this specification shall be of one grade and three types: Type I, regular; type II, with Dauber; type III, Aerosol. Type I material is intended as a solvent for cleaning operations and for cleaning degreasing electrical equipment. Type II material is intended as a solvent for cleaning operations and for cleaning and degreasing electrical equipment. Type II material is intended for removing residue from type faces of typewriters. Type III material is intended for cleaning assembled electronic equipment. Care should be exercised when used on synthetic materials since it may affect certain synthetic products. Each container is prominently labeled with instructions that must be strictly observed (see app C).

(7) *Inhibited trichloroethane (methyl chloroform) MIL-T-81533).* The material covered by this specification is intended for use where pollution regulations preclude the use of other materials. Each container is marked with instructions that must be strictly observed (see app C).

b. Equipment Used in Solvent Cleaning. The equipment required for solvent cleaning includes petroleum solvent tanks, portable solvent degreasers, and solvent spray washers. Personnel should insure that if respiratory protection is required it should be utilized in accordance with TB MED 223.

(1) *Solvent tanks.* Solvent tanks are simply constructed, but must be capable of holding the solvent. Where cleaning is conducted at an established installation, special safety features are required in the tank design. Tanks are constructed of low-carbon steel and are welded at the seams. A typical solvent tank with safety features consists of rectangular compartment, with a tight fitting cover held open during cleaning operations by means of a chain containing a fusible link. This is held together by a low-melting solder. Should the solvent catch fire, the heat evolved melts the solder and allows the lid to close and smother the fire. For this reason, it is important that the fusible link should always be in an operable condition. The lid should never be wired or fastened so that it cannot close automatically in case of fire. Tanks must be provided with a ground connection to carry off any static charges of electricity.

(2) *Improvised tanks.* In the absence of approved cleaning equipment, solvent cleaning can be done in drums, pails, cans or other containers. Fifty-five-gallon drums split in half make suitable tanks for field expedience. Regardless of the container used, provision must be made to keep it closed when not in use.

(3) *Spray cleaner machines* are available in a variety of types; such as, the single-stage spray, spray cabinet with automatic fire extinguisher, and the streamlined machine using monorail conveyor.

(4) *Wire baskets* are suitable for dipping small items.

c. Procedures. The detailed procedures outlined in paragraph 1-5, TM 38-230-1, will be followed in accomplishing solvent cleaning (procedures C-3, C-5, and C-8).

5-7. Drying. Specification MIL-P-116 directs that immediately after cleaning, items will be thoroughly dried to remove cleaning solutions as residual moisture. Selection from fine drying processes (compressed air, heated oven, infrared lamps, wiping, and draining), will be determined by facilities and equipment available. The process must not be injurious to the item. In some instances two

processes may be necessary. Refer to paragraph 1-14, TM 38-230-1, for drying procedures.

5-8. Applying a Preservative. *a. General.* **Preservatives are materials that are applied to, or come in contact with items to protect them from deterioration resulting from exposure to environmental conditions. Some preservatives protect items by providing a barrier against moisture, air and other agents of corrosion. These are contact preservations. Other preservatives protect items by releasing vapors which deposit an invisible protective film on the items. These materials are called volatile corrosion inhibitors (VCI).**

b. Types. Preservatives are available for protection against penetration of water, corrosion, mildew, fungi, insects, and other types of damaging forces. Some preservatives protect against one type of damage, others have a multipurpose. Some can be used on one type of material only, others can be used on several types. Generally, preservatives may be classified as permanent (usually applied by the manufacturer) or temporary, and as designed for use on metal or nonmetal items. Chapter 2, TM 38-230-1, contains detailed information on types of preservatives, methods of application and removal, uses and other pertinent data.

c. Local Limitations. The application of an appropriate preservative to metal surfaces constitutes the major concern at facility and unit levels. Generally, the use of preservatives is contingent on such factors as the protection afforded an item by its container, the frequency of an item's use (unit level), and the geographical location of the facility. For example, a facility located near large bodies of salt water must exercise additional precautions in the preservation of metals.

5-9. Packaging and Packing. *a. General Principles.*

(1) *Unit Protection*, or preservation, is the application of adequate protective measures to prevent deterioration from exposure to atmospheric conditions. It includes, as applicable, cleaning and drying the item, applying a preservative material, and packaging.

(2) *Packaging* is the provision of an appropriate wrapping, cushioning, or container for a single item or multiple items. The first tie, wrap, or container constitutes a unit package.

(3) *Packing* is the assembling of items or packages in an exterior container and includes blocking, bracing, cushioning, weatherproofing, exterior strapping, and exterior marking. Where only one item is packed, the exterior container is the unit container also.

(4) *Cushioning* controls movement of the item within the container by means of compressible or resilient materials.

(5) *Blocking and bracing* prevent free movement of an item within a container.

b. Methods. The methods of preservation are established by Military Specification MIL-P-116, and consist of six basic methods. These basic methods are: Method I, preservative coating (with greaseproof wrap as required); method IA, water vaporproof enclosure (with preservative as required); method IB, strippable compound coating (hot or cold dip); method IC, waterproof barrier (with preservative as required); method II, water-vaporproof barrier with desiccant (with contact preservative when required); and method III, packaged for mechanical and physical protection only. Detailed procedures for accomplishing the methods of preservation are found in chapter 3, TM 38-230-1.

c. Materials. A complete coverage of materials, factors and determining use, methods of application, and containers is found in TM 38-230-1. Personnel should be familiar with the following terms describing certain materials used in packaging, as well as with the methods of packaging:

(1) *Barrier materials* are used for such purposes as protecting a preservative, barring contact between surfaces, preventing the entry of water, and cushioning to guard against physical forces. Some of the barrier materials are designed for immediate wrap of an item, some for exterior wrap, and some for added protection or cushioning. Others are designed for specific purposes, such as the waterproof type to prevent the entry of water.

(2) *Volatile corrosion inhibitors (VCI)* are chemicals which inhibit corrosion and neutralize the effects of moisture-laden air within a package. Among the forms are coated or impregnated materials, crystalline solids, and treated lubricating oils. Precautions in the use of VCI are stated in paragraph 2-19, TM 38-230-1.

(3) *Desiccants are dehydrating agents.* Activated desiccants are furnished in bags for use as a static dehumidification agent in method II packaging.

5-10. Marking (Identifying). *a. Marking* is the application of number, item description, or symbol stamped, printed, or painted on the container, the tag, or the item itself. Table 3-7, TM 38-230-1

gives instructions on the marking and labeling of unit packages.

b. Marking materials may be divided into three broad categories:

(1) Lacquer, paint, enamel and ink.

(2) Tags.

(3) Labels.

c. Standard Markings. Marking of unit and intermediate packages will be done in accordance with Military Standard MIL-STD-129, which requires the following information to appear on all unit and intermediate packages:

(1) National stock number.

(2) Item description.

(3) Quantity and unit.

(4) Level of preservation/packaging and date.

(5) When applicable, the manufacturer's name, model numbers, serial numbers, and other special markings are included.

d. Special Marking. Special markings will be in accordance with the requirements of MIL-STD-129.

(1) Requirements for the use of method II labels are given in paragraph 3-25, TM 38-230-1.

(2) Interior packages containing radioactive material will be marked in accordance with Military Standard MIL-STD-1458.

5-11. Dehumidified Storage. Dehumidified buildings provide the ideal means for long-term storage of items. The initial costs for dehumidification are high; however, these costs amortized over a period of years result in low cost protection. Under dehumidification a minimum of preservation and packaging is necessary, reducing the need for preservation compounds and the degree of unit protection. Direct savings are realized in terms of manpower needed to ready items for storage and materials required for processing. Inspection intervals for items are extended, repackaging almost eliminated, and maintenance work readily accomplished. Items are either immediately ready for use or can be readied in minimum time with little expenditure of manpower.

5-12. Packaging Materials. *a. General.* Among the most commonly used packaging materials are adhesives, bags, sacks, envelopes, barrier and wrapping materials (opaque and transparent), cushioning materials, desiccant, labels, and tapes. A general knowledge of the composition, characteristics, intended uses, and methods of application of these materials is very important from both the engineering standpoint and the performance standards required of military packages. See chapter 3, TM 38-230-1 for detailed guidance and instruction of packaging materials.

b. Adhesives. Adhesives is a general term which includes such materials as cement, glue, muscilage, paste, thermoplastic adhesives, etc. Adhesives may be procured through the General Services Administration. National stock numbers may be found in the Federal Supply Catalogs. Information concerning specification symbols, nomenclature, uses, and methods of application of the most commonly used adhesives is given in table 3-2, TM 38-230-1.

c. Bags, Sacks, and Envelopes. Bags, sacks, and envelopes are especially adaptable for the packaging of small, lightweight items. The fact that they can be manufactured from transparent stock, can be made waterproof, vaporproof, and greaseproof, can be lined or treated with corrosion inhibiting materials, and can be provided with cushioning effects broadens their application to a large number of items of various types and characteristics. Bags, sacks, and envelopes are generally procured prefabricated and can be stored in a minimum of space. For specific sizes and properties required, the pertinent specifications should be consulted. Available national stock numbers for these containers can be obtained from the following documents: Federal Supply Catalogs of the 6850, 7510, 8105, and 8135 series, and the General Services Administration stores stock catalog. Basic information concerning the most commonly used bags, sacks, and envelopes can be found in table 3-3, TM 38-230-1.

d. Barrier and Wrapping Materials. A barrier material is a paper like or film material designed to withstand, to a given degree, the penetration of water, water vapor, grease, or certain gases. Barrier materials may serve to exclude or retain such elements within or without the package. A wrap is simply a sheet of flexible material, usually fed from roll stock, and formed around the item or package to exclude dirt and facilitate handling, marking, or labeling. Barrier and wrapping materials may be divided into two general categories: Opaque (nontransparent) and transparent.

Opaque barrier materials are specially manufactured papers made to resist puncture or tear in shipping and handling, be flexible, waterproof, vaporproof, greaseproof, or gasproof or be resistant to flame, tarnish, or mold, if so specified. Some must prevent corrosion, provide protection against penetration by insects, or be nontoxic, odorless, and tasetless. Practically all must be capable of accepting markings for identification and some must be heat sealable.

Transparent films are unsupported, nonfibrous, thin, flexible, basically organic plastic materials, that due to their clearness, protective and shelf-like characteristics, are highly desirable in preservation and packaging operation. Examples of these materials are polyethylene, cellulose acetate, polyester, polystyrene, rubber hydrochloride, vinyl chloride, and chlorotrifluoethylene.

***Correct handling* of barrier and wrapping materials is a great factor in avoiding inefficient wrapping operations. It is extremely important to receive, store and handle barrier and wrapping roll stock according to recommended practices. Specification symbols, nomenclature, available types, grades, and classes, and intended uses of the most common barrier and wrapping materials are given in table 3-4, TM 38-230-1.**

e. Desiccant (Activated). Desiccants are used in connection with method II preservation and must conform to the requirements of Specification MIL-D-3464. Desiccants are available in three types: Type I—General Purpose; type II—Nondusting; type III—For Specific Conditions (8 and 16 units only). The type II is intended for use in critical packaging applications where dusting cannot be tolerated. The type III is intended for use where a danger exists of accidental flood by water. The durability of the bag material and seams should be sufficient to prevent contamination of a system by accidental dispersal of desiccant material. Desiccants are furnished in bags of unit size 1, fractional sizes of 1/6, 1/3, and 1/2 of a unit, and multiple sizes of 2, 4, 8, and 16 units. A unit size is that quantity of desiccant which will absorb, at equilibrium with the air and at 77 degrees Fahrenheit temperature at least the following quantity of water vapor: 3.00 grams at 20 percent relative humidity, and 6.00 grams at 40 percent relative humidity. Desiccant bags shall be secured to prevent movement, possible rupture of bags or barriers or damage to the item. Securing may be accomplished by tying, storage in specially provided baskets, taping, or other approved means. Desiccant bags should be located uniformly throughout the package and in such a manner that all voids are exposed to the dehydrating action of the material. It is recommended that the total amount of desiccant be in as small unit bag sizes as possible without increasing the cube of the package. Desiccant bags will not be placed on, or permitted to come in contact with critical surfaces of the packaged item. It it becomes necessary to place bagged desiccant in contact with a preservative coated part, the bags shall be isolated by wrapping the coated part with greaseproof barrier material. The minimum quantity of desiccant for use per package is determined in accordance with formula I or formula II of table 3-8, TM 38-230-1, as applicable.

f. Inspection Windows. Windows are installed, unless otherwise specified, in the barrier material of some packages to permit inspection of the interior of the package. These windows shall conform to specification MIL-W-10434 or type I of MIL-B-22191 and, when in place, should coincide with the location of a removable inspection part when provided in the exterior container. See paragraph 3-4g, TM 38-230-1 for information and guidance.

5-13. Packaging Guidelines. *a.* Polyethylene should be used to the maximum extent to protect items. Items should be completely encased whenever possible. Exceptions, for which shrouds may be indicated, include items too large to encase, items attached to the floor, wall or ceiling and for which detachment is not feasible; and those which may require air. Polyester film tubing of 4 1/2-mil wall thickness will be used for packaging surgical instruments (para 5-34). Polyethylene containers and polyester film bags will be closed by heat sealing. Refer to chapter 3, TM 38-230-1, for detailed guidance and instruction.

b. Normally, metal surfaces will be cleaned by process C-5 (para 5-6) using Stoddard solvent (NSN 6850-00-281-1986) and fingerprint remover corrosion preventive compound (NSN 8030-00-252-8300). With certain exceptions (paras 2-9 through 2-11, TM 38-230-1), a P-type preservative general purpose lubricating oil (NSN 9150-00-281-2060), will be used for this purpose. See table 2-2, TM 28-230-1 for application data.

c. An item which is treated with a corrosion preventive will be wrapped in greaseproof barrier material (table 3-9, TM 38-230-1) if the item is to be overwrapped, cushioned, or shrouded with a hygroscopic material. Wrapping will be secured.

d. **Clean cotton goves (NSN 8440-00-160-0875)** or their equivalent will be worn at all times during any drying process to prevent contamination of cleaned surfaces. When cleaning with petroleum solvents, oil resisting synthetic rubber gloves (NSN 8415-00-261-6661) will be worn during the cleaning and all subsequent processes, to protect the worker and prevent contamination of cleaned surfaces.

e. **Cushioning material will be used to protect items from physical and mechanical damage. Several factors must be considered in selecting the appropriate cushioning material for a given application. Cushioning materials normally used will**

conform to Federal Specifications PPP-C-1120 (bound fiber cushioning materials) or PPP-C-843 (cellulosic cushioning material) or PPP-P-291 (cushioning, wrapping paperboard). See paragraph 3-5, TM 38-230-1, for detailed guidance and instruction on use and application of cushioning material.

f. Fiberboard or V3C containers (chap. 5, TM 38-230-1) will conform to Federal Specification PPP-B-636. They do not require a waterproof overwrap.

g. Pressure-sensitive tapes (PPD-T-60 or PPP-T-76) will be used to seal cartons and to tape shrouds for items not requiring air. See paragraph 3-4*i* and table 3-6, TM 38-230-1, for description and use of the tapes. Care will be exercised when using tape or shrouds to insure that the tape is not in contact with the item (to preclude removal difficulty when readying the item for use).

h. Items such as textiles or cartons containing surgical instruments will be stored on pallets. Whether a forklift type pallet or another type is used will depend on accessibility of the forklift ot the storage area. Refer to paragraphs 3-11 through 3-14, TM 38-230-2, for a description of pallets.

5-14. Safety Precautions. All safety precautions will be observed during the preservation and packaging operations.

a. When using petroleum solvents, special precautions are necessary. These solvents may cause skin irritation, and high vapor concentration may cause nose and throat irritation. Solvent vapors are also highly flammable. The following safeguards will be observed:

(1) Stoddard solvent is to be used cold at all times.

(2) Oil-resisting synthetic rubber gloves will be worn during the entire cleaning process and all subsequent processes until the item is packaged. Aprons and goggles will be worn when indicated.

(3) Cleaning with solvents will be done in areas adequately ventilated.

(4) Tanks or improvised containers used for cleaning solvents will be covered when not in use.

(5) Carbon dioxide fire extinguishers will be placed in pertinent locations and processing personnel instructed in their use.

(6) "No Smoking" rules will be established and enforced to minimize the danger of fire.

b. When using the oven-drying method (1-14*b*, TM 38-230-1, process D-2), flammable vapors in the area will be removed by forced ventilation.

c. When spraying paints or corrosion preventives, the spraying areas will be well ventilated and personnel will use respirators.

5-15. Polyethylene. The characteristics of polyethylene make this a favorable packaging and shrouding material for in-place storage purposes. It withstands the effects of a wide range of temperature extremes from 860 degrees Fahrenheit to +180 degrees Fahrenheit. It is a strong, durable material. Precaution must be observed, such as use of cardboard cushioning, to prevent contact of sharp edges or points which may rupture the material. In addition to providing protection to items, polyethylene facilitate surveillance and inspection activities because of its transparency. Refer to paragraph 3-4*d* and table 3-4, TM 38-230-1, for information and guidance.

a. Sizes and Uses. A variety of sizes and forms of polyethylene is necessary, the intended use determining both size and form. The primary requirement is that it be sufficiently large to completely encase the item or unit, permit heat sealing, and allow for at least two additional seals for subsequent inspections.

(1) Sheets (precut from rolls) are used for such purposes as encasing a made-up bed unit, textile unit, or individual items of equipment.

(2) Bags or tubes are used for such purposes as encasing mattresses, pillows, or a variety of individual or multiple small-sized items.

(3) Shrouds may be used—

(a) As covers to permit circulation of air. When used as a cover, approximately 3 inches will be allowed between the bottom edge of the shroud and the floor.

(b) Taped to the floor.

(c) Taped to the item's supporting member. This holds true for items not detached from the ceiling or wall. For example, the shroud should be taped to the supporting rod of an operating room lamp (ceiling). Whenever a shroud is used, the item is exposed to air. For example, air will enter through the rod of the shrouded operating room lamp.

b. Fabrication of a pocket or envelope for DA Form 3239-R. A pocket or envelope to hold the item or unit identification data should be affixed to the polyethylene container. The top edge of the pocket should be heat sealed onto the closure seal of the container. Using a sheet of polyethylene approximately 12 by 27 inches, a pocket may be fashioned. The completed pocket should be approximately 10 by 12 inches, allowing 2 inches for heat sealing the two sides of the doubled polyethylene and leaving 3 inches (single sheet) for attachment to the container.

5-16. Heat Sealing. A discussion of the basic requirements, methods, and equipment necessary to obtain good heat seals is found in paragraph 3-6, TM 38-320-1.

a. Procedures.

(1) Close polyester film tubes and polyethylene tubes, bags, or sheets by heat seal.

(2) Place the seal about 1 inch from the aligned edges of the polyethylene. Be sure there is sufficient space between the seal and the item encased to permit at least two additional seals for subsequent inspections.

(3) Be sure that the proper amount of air has been vacuumed out of the package before sealing the remaining open space.

(4) The manufacturer's recommendations furnished with each roll of barrier material should be followed as a general guide for the heat range, dwell time and pressure to use for sealing. The requirements for sealing various types of material vary so widely that a heat range between 310 degrees Fahrenheit and 325 degrees Fahrenheit will not always produce a satisfactory seal.

b. Equipment.

(1) Heat sealers should be of the continuous type, suitable for handheld operation to insure satisfactory sealing of polyethylene enclosures requiring relatively long seals, such as the made-up bed unit. NSN 3540-00-505-4785 listed in appendix B is the item of choice.

(2) An electric clamp type sealing iron (NS 3540-00-222-4336) or an electric pressure type sealing iron (nonstandard) may be used to seal polyester film tubes.

5-17. Evacuation of Air from Polyethylene Containers. The rule of thumb for determining the amount of air to withdraw from polyethylene containers is to withdraw air until the polyethylene is snug against the item.

5-18. Composition and Identification of a Unit. *a.* The container is the outer form of protection given a single item of multiple items. It may be a wrap, bag, carton, or box or it may be one of the several forms fashioned from polyethylene. The carton, for example, constitutes the container whether it contains one item or multiples of individually wrapped or bagged items. By contrast the polyethylene sheet, when heat sealed to encase a bed unit or textile unit, constitutes the container.

b. The term "unit" generally denotes a single complete item, whether in one or several containers. Exceptions to the single item include the made-up bed unit (para 5-32) which is comprised of a number if different entities. Other exceptions are the mattress, pillow, and textile units, each unit having numerous like items packaged in one container.

c. "Special Marking" includes markings for kits, sets, outfits assemblages and precautionary markings such as "FRAGILE" or "THIS SIDE UP."

MATERIEL INVENTORY SURVEILLANCE RECORD (TB MED 1)
(Complete in duplicate applicable portions of Parts I and II during the in-place storage operation. Complete Part III during regularly scheduled inspection)

PART I - IDENTIFICATION DATA

SECTION A - EQUIPMENT, FURNITURE AND ITEMS (Other than in Sections B and C)

NATIONAL STOCK NUMBER	ITEM NAME	DESCRIPTIVE DATA

UNIT OF ISSUE	QUANTITY	NOMENCLATURE OF COMPONENT	NAME	MODEL

SERIAL NUMBER	MANUFACTURER	SET, KIT, OUTFIT, ASSEMBLAGE MARKINGS (Specify)

SECTION B - MAKE-UP BED UNIT/PREPACKAGED PATIENT CARE SET — UNIT ____ OF ____ UNITS

QUANTITY	LIST OF CONTENTS	ITEM NAME
	BED	
	MATTRESS	
	PILLOW	
	SHEET	
	PILLOW CASE	
	BLANKET	
	SPREAD	
	BEDSIDE TABLE	
	LAMP	
	CHAIR	
	OTHER	

SECTION C - TEXTILE UNIT

UNIT ____ OF ____ UNITS	ITEM NAME	TOTAL QUANTITY

PART II - IN-PLACE STORAGE DATA

DATE	LOCATION	NAME & GRADE OF WAREHOUSEMAN

NOTES (Include pertinent information such as method of processing, special materials or equipment used)

PART III - REGULAR SCHEDULED INSPECTIONS

NO	TYPE (Other than visual)	DATE	NAME AND GRADE OF INSPECTOR
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

DA FORM 3239-R, 1 Apr 67

Figure 5-1. DA Form 3239-R

5-19. Marking of Sets, Kits, or Outfits. When a set, kit or outfit is placed in two or more containers each container will bear a set number and, in addition to its own number the total number of containers making up the set, kit or outfit. For example, if four containers comprise one set, kit or outfit. The containers will be marked as follows:

SET 1	SET 1	SET 1	SET 1
1/4	2/4	3/4	4/4

5-20. Marking Containers. *a. Identification of Contents.* The exterior of each container will have affixed thereto content identification. DA Form 3239-R (Materiel Inventory Surveillance Record) will be used for this purpose. Except for a make-up bed unit, if multiple items having different national stock numbers are placed in a single container, a separate DA Form 3239-R for each number will be prepared.

b. Preparation, Use and Disposition of DA Form 3239-R. DA Form 3239-R will be reproduced locally on 8 1/2x11-inch paper (fig. 5-1). The title, form number and date will appear on each reproduced copy. The applicable section of part I—Identification Data, and all of part II—In-Place Storage Data, will be prepared in duplicate for in-place storage. Part III—Regular Scheduled Inspections, will be posted at the time of subsequent inspections.,

(1) Part I, section B—Make-up Bed Unit/Prepackaged Patient Care Set and section C—Textile Unit are given separate coverage on the form because of their unique characteristics.

(a) Each made-up bed or prepackaged patient care set comprises one unit and requires a list of its contents. The units should be numbered in sequence beginning with the number 1. The unit number and total number of units will be indicated in section B.

(b) Textile units will contain like items only. The units for each type of textile item will be numbered in sequence beginning with the number 1. The unit number and the quantity in the unit, plus the total number of units of like items will be indicated in section C.

(2) The original copy of DA Form 3239-R will be affixed to the container. The carbon copy will become a part of the master file. This data, ascertaining storage locations, inventories, and inspections will be maintained during the facility's inactive status by the Logistics personnel of the MEDCEN/MEDDAC assigned support responsibility.

c. Method of Affixing DA Form 3239-R to the Container.

(1) Insert form, faceup, in the pocket provided on polyethylene containers.

(2) Attach the form, faceup, on the cartons or other types of wrap by means of pressure-sensitive tape. Apply a strip of tape across the top and bottom edges of the form.

5-21. Corrosion-Resisting Metals. *a.* Special care must be exercised to prevent scratching stainless steel surfaces. Scrapers, wire brushes, files, or other common steel or nonferrous tools may mar or embed particles in the metal surface. Scratched stainless steel surfaces may rust or foster corrosive electrolytic attack. All rubbing, polishing, or buffing motions on this type of metal must be parallel to the original lines of polish to prevent marring the surface. Should marring occur, the surface must be refinished.

b. Removal of discoloration by iron rust or baked-on deposits may require special procedures. Baked-on deposits may be removed by applying a nongritty abrasive paste made of water and ammonia, as the liquid base, and magnesium oxide, grade FFF Italian pumice, or French chalk as the abrasive solid. Heavily encrusted surfaces may require rubbing with stainless steel wool (00 or 000) in conjunction with the paste. Remove the paste with clear water, then thoroughly clean with Stoddard solvent.

5-22. Care of Corrodible Metals. Select an appropriate cleaning process (chap. 1, TM 38-230-1) and thoroughly clean uncoated, unplated, or untreated metal surfaces subject to corrosion. Preserve in accordance with procedures outlined for surgical instruments.

5-23. Care of Plated Metals. When equipment is stored in areas with extremely high humidities or salt laden atmospheres are encountered, all nickel or chromium plated surfaces may be treated with a corrosion preventive to preclude pitting or flaking.

5-24. Care of Wood, Aluminum and Painted Metals. *a.* Remove all free dirt or dust from the exterior of painted metal, wood and aluminum surfaces with a vacuum cleaner. Thoroughly clean the surface with a mild solution of warm water and soap or detergent if water or moisture will not adversely affect the item. Surfaces must be thoroughly dried following washing.

b. Brush coat with appropriate paint, areas requiring repainting because of chipping or peeling.

5-25. Care of Upholstery. *a. General Instructions.*

(1) Upholstery will be inspected for tears, holes,

worn areas, and, if applicable, tensility. In addition, upholstery materials which require dry cleaning will be inspected for excessively soiled spots such as grease which has permeated the fabric. Soiled upholstery will be dry cleaned.

(2) No item will be stored on upholstery, whether part of furniture or equipment, since this results in permanent "sets."

b. Processing Procedure.

(1) Use a vacuum cleaner to remove all free dirt or dust.

(2) Wash plastic or plastic-coated cloth upholstery with a mild solution of warm water and detergent. Dry by wiping with a cloth.

(3) Items of upholstery (e.g. chair cushion) which are not attached to furniture or equipment should be inserted in appropriately sized polyethylene bags, if the parent item is shrouded. The heat sealed bag should then be stored with the parent item. If the parent item is encased in polyethylene, then such items as cushions should not be encased separately. The cushions should be placed in normal use position and encased with the parent item.

5-26. Care of Leather, Rubber, Plastics, and Synthetic Materials. *a. General Instructions.*

(1) Leather, rubber, plastics, and synthetic materials are much more vulnerable to age hardening than are other materials. Leather is subject to drying, cracking, and is conducive to the formation of mildew; rubber tends to lose elasticity, and plastics may warp or melt. Avoiding high temperatures, direct light (sunlight or artificial), static pressure, contact with strong chemicals, and exposure to solvent vapors will extend the life of such items. Ideally, these items should be stored in cool, dark, dry areas. Storage in a dark, dry area is mandatory for all in-place stored items but storage in a cool area can only be partially accomplished unless the facility is equipped with a refrigeration system.

(2) Items constructed of leather, rubber, plastic or synthetic material require special handling. If parts comprised of leather, rubber or plastic are readily detachable and detachment appears feasible, they should be removed from the parent item, processed and packaged separately, but stored with the parent item.

b. Processing Procedures.

(1) *Leather.* Avoid the use of water when cleaning leather. However, it may be necessary to scrub leather with a damp cloth to remove adhering particles. Apply leather dressing (NSN 8030-00-260-0736). Package when feasible, in polyethylene and heat seal.

(2) *Rubber, plastic, and synthetic materials.*

(a) Do not use oil, grease, or oxidizing agents on these materials.

(b) Do not soak in water and do not wash in hot water. Clean thoroughly with detergent solution especially formulated for cleaning rubber, plastic, canvas, and other materials. Rinse in cold water. Dry thoroughly.

(c) Wind rubber tubing into a coil of such diameter that the tubing will not kink or acquire a permanent set.

(d) Interweave rubber mats, if stacked, with kraft paper. When stacking, the weight of the mat determines the number of mats per stack.

(e) Sprinkle all rubber goods with talcum powder.

(f) Package these items in polyethylene, heat sealed, to the maximum extent possible. Never place a desiccant in these packages.

5-27. Glassware and Mirrors. *a. General Instructions.*

(1) All glassware and mirrors will be inspected for breakage, chipping, and cracking. In addition, mirrors will be checked for peeling or flaking of plating.

(2) Normally, mirrors will be left in place. See TM 8-605 for handling of mirrors which are part of technical equipment.

(3) Glassware items (except when part of equipment) will be segregated by type.

b. Processing Procedures.

(1) Use an automatic washer-rinser, if available, for cleaning bottles, jars, glasses, caps, and similar items. Manually wash, rinse, and dry glass components, such as panes, panels, or shelves in cabinets. Certain items of technical equipment having glass parts (for example, microscope lenses) require the use of specific cleaning agents and procedures.

(2) Wash glassware with detergent and warm water; rinse with hot water. Glasses and similar items should be allowed to drain until thoroughly dry. Shelves and similar items must be wiped dry. When washing and rinsing glassware, avoid the use of abrasives and brushes and any sudden, wide variation in temperature. Be sure that glassware is free of oil and grease.

(3) Clean mirrors either with a liquid especially formulated for this purpose (following manufacturer's instructions), or use a mild solution of household ammonia and water. Dry the surface

immediately after using ammonia and water with a soft, lint free cloth to prevent streaking.

(4) Wrap glasses and similar items in kraft paper and pack in a V3C board carton. Provide adequate cushioning to prevent breakage.

(5) Seal cartons with pressure-sensitive waterproof tape.

5-28. Care of Textiles. *a.* Textiles will be inspected for tears, holes, and worn areas. Items of questionable tensile strength will be tested by applying moderate stress. In addition, items of clothing will be checked for completeness. Items will be repaired or disposed of as unserviceable.

b. Textile records will show the date of the most recent laundering or dry cleaning, depending on the requirements of the fabric.

c. Creases or folds will be kept to a minimum.

d. Green linens will be packaged separately.

e. Hospital clothing will be segregated by color, size, and type of fabric.

5-29. Care of Mattresses and Pillows. *a.* A satisfactory method of sterilizing mattresses and pillows does not normally exist at installations. These items should be santitized by placing in the sun for several hours prior to packaging. If lightly soiled, they will be wiped with a mild solution of detergent and water and dried.

b. One mattress and one pillow will be designated for each bed that is to comprise a bed unit in a set-up ward.

c. Mattresses and pillows excess to those required for a bed unit indicated in *b* above will be packaged, marked, and stored as follows:

(1) *Mattress.* Each mattress will be inserted into a polyethylene bag, 8 feet long and 3 feet 8 inches wide (circumference 7 feet 4 inches). The bag will then be heat sealed. The packaged mattresses may be palletized to form a unit. A unit consists of two pallets placed side-by-side. Each pallet should contain five innerspring or 10 regular mattresses for a unit of 10 or 20 each, respectively. Use of hospital bed mattress-size bags or smaller ones for crib mattresses will be contingent on the number required. The number of crib mattresses comprising a unit will also vary from that of hospital bed mattresses.

(2) *Pillow.* Insert two pillows, end-to-end, into a polyethylene bag, 6 feet long and 1 foot 8 inches wide (circumference 3 feet 4 inches). Heat seal. Stack the pillows on a pallet of sufficient size to accomodate the bags in the following manner: Place two bags alonside each other to form the first layer. Place the second layer of two bags crosswise. Continue stacking so that each subsequent layer is crosswise of the preceding: this will preclude their sliding off the pallet. Stacked 20 pillows high, a single pallet will consist of 80 pillows. The storage arrangement should be similar to that for mattresses.

(3) *Item identification.* Select a closure end approximately 5 feet from floor level of the stack. Heat seal the pocket described in paragraph 5-16 onto the right side of the selected closure-end and seal.

5-30. Care of Blankets, Linens, and Hospital Clothing. Blankets, sheets, pillowcases and other textiles will be clean, dry, free from holes, tears, and objectionable stains. These linens will be identified, folded in a manner to minimize creases, packaged in polyethylene and like items packed in manageable containers. Affix DA Form 3239-R with appropriate identification date entered in part I, section C, to the outside of the container.

5-31. Care of Furniture. Furniture other than items comprising a set-up bed unit should be left in place. Each item will be inspected and necessary repairs or refinishing accomplished. Processing procedures are as follows:

a. General.

(1) Clean furniture in accordance with requirements of the type of material or finish. Exercise care to insure that all interiors of drawers and cabinets are thoroughly cleaned.

(2) Oil or grease the mechanisms of adjustable hospital beds, overbed tables, drawer glides, and hinges. Wipe off excess oil or grease.

(3) Encase furniture, whenever practicable, in polyethylene in a manner similar to that for the made-up bed unit. However, in lieu of a V3C sheet, circular disks of V3C should be placed beneath legs of items to prevent rupturing the polyethylene.

b. Bed Frames and Springs. Repaint bed frames and springs (not ends, head and foot), when required, by spraying or brushing with aluminum paint. Where only small areas of the frame, springs, or ends need repainting, such areas may be touched up by brush coating with the appropraite paint.

c. Balkan or Fracture Frames. Disassemble frames and neatly bundle and secure them. Bolts, nuts, screws, clamps, and other loose parts will be packed in cartons or bags, tagged or labeled, and secured to the major item.

5-32. Made-Up Bed Unit. The preparation of the made-up bed unit entails three specific phases. Each

phase must be completed and pass inspection prior to proceeding to the next. This insures serviceability and cleanliness of each item, completeness of the unit, and promotes continuity of operations.

a. First Phase. Each bed, bedside table (cabinet) and chair, lamp, and textile item must be processed in accordance with these provisions. However, no preservative materials requiring removal prior to use will be applied to any item comprising a made-up bed unit encased in polyethylene.

b. Second Phase. Each bed must be made, ready for occupancy, except that sheets and blankets will be draped over the mattress instead of tucked under the mattress. The number of blankets, sheets, and other items will be in accordance with local policy in effect during the hospital's active status.

(1) *Patient care items.*

(a) The following list of *patient care items* is intended for guidance:

Item	Quantity
Coat, pajama	1
Trousers, pajama	1 pr
Jacket, convalescent	1
Trouser, convalescent	1 pr
Robe, dressing	1
Slippers, convalescent	1 pr
Towel, bath	1
Towel, hand	1
Washcloth	1

If items other than textiles are included (e.g., emesis basin or water glass), they should be placed in the drawer of the bedside table (cabinet) and properly protected against breakage or chipping.

(b) Size selection. All garments for a bed unit should be of the same size (small, medium or large). A label of a different color, as indicated below, may be used to specify the size of the garment. The label should be placed in a conspicuous position so that the color code is visible through the polyethylene or the size may be indicated on a card or multipurpose form.

Color Code	Size
Tan	Extra Small
Rose	Small
Yellow	Medium
Orange	Large
Green	Extra Large

(c) Folding and positioning items. **Precautions must be used to prevent, or** reduce, creases or sets in the textiles. Each item should be placed on top of the made-up bed. Do not stack one item on top of another.

(2) *Bedside table (cabinet) and chair.* The bedside table (cabinet) and chair will be placed underneath the made-up bed.

(3) *Bed or table lamp.* The lamp will be disconnected from the electrical outlet, the cord neatly coiled around the lamp, and placed underneath the made-up bed.

(4) *List of contents.* Each item comprising a made-up bed unit should be listed on a card. DA Form 3239-R, discussed in paragraph 5-20, may be used. The unit identification form is then inserted in the pocket or envelope affixed to the polyethylene container. The list of contents facilitates inspection and inventory activities.

c. Third Phase. The third and final phase is that of encasing the made-up bed in polyethylene and identifying the unit. To expedite the third phase, the sheets of polyethylene necessary for encasing made-up bed units should be cut and neatly stacked pending use.

d. Materials. The following materials are normally required for a bed measuring 7 feet 2 inches long, 3 feet wide, and 4 feet high (head end):

(1) One sheet of polyethylene. Size: 14x16 feet.

(2) One sheet of V3C board (the four corners slightly curved to preclude puncturing the polyethylene). Size: 3 feet 4 inches by 7 feet 4 inches.

(3) One identification pocket (para 5-15*b*).

(4) One DA Form 3239-R.

3. Equipment. A heat sealer and a vacuum pump are required.

f. Procedures.

(1) Spread the polyethylene sheet on the floor in the location where the bed is to be placed.

Note. The width of the polyethylene is greater than the length.

(2) Place the V3C board on the polyethylene, centered lengthwise and approximately 3 feet from the centered edge of the right side.

(3) Set the made-up bed on V3C board. Be sure that the legs are on the board and do not extend onto the polyethylene.

(4) Position the bedside table (cabinet), chair, and lamp under the bed and on the V3C board. If practicable, place the lamp between the chair's legs.

(5) Fold the left side of the polyethylene over the bed.

(6) Pick up the right side of the polyethylene and match the edges of the left and right sides. Heat seal.

(7) Match the top and bottom edges of the polyethylene at the bed's head end. Heat seal.

(8) Repeat the procedure at the bed's foot end, but exercise care that enough space is left for vacumming out excess air.

(9) After excess air has been withdrawn and the opening sealed, heat seal a pocket onto the seal at the bed's foot end.

(10) Insert the completed DA Form 3239-R in the pocket.

5-33. Prepackaged Patient Care Items. *a.* An alternative method of preparing equipment for storage in a set-up ward is to *prepackage patient care items.* The preparation of beds for prepackaged patient care items entails the same degree of care specified for the made-up bed units. The quantity of materiel to process is smaller. Wards are maintained in a semioperational condition. Mattresses, pillows, and patient care items are packaged separately in plastic.

(1) *First Phase.* Process a bed, mattress, pillow and appropriate textile items (para 5-28).

(2) *Second Phase.* Protect the mattress and pillow by encasing each in a plastic bag.

(3) *Third Phase.* Place appropriate quantities of patient care items in plastic envelopes (para 5-15*b*). Each package should contain one size of garments. The size identification should be visible through the plastic. The sealed patient care items should be placed on the bed, or where security precludes, placed in linen closets, nurses' offices, or other available areas near the point of planned use.

b. Material and Equipment. The following material and equipment is required for packaging patient care items:

(1) Clear pollyethylene 0.004 inch.

(2) Heat sealing iron.

5-34. Surgical Instruments. *a. All surgical instruments* should be in a serviceable condition and *closely inspected* by CMS personnel for defects. Many instruments are extremely delicate and must be handled with care. Sharp edges, points, teeth, jaws, hasps, and hinges require special protection against damage. Instruments made of soft metals (brass, copper) or carbon steel are usually chrome plated. Cuts in the plating subject the item to corrosion. Inspection check points include the following:

(1) Are there nicks or cuts in the plating?

(2) Are jaws even, smooth, of equal thickness, and do serrations mesh evenly?

(3) Are the edges of jaws and handles smooth?

(4) Do scissors close smoothly, evenly?

(5) Do ratchets or locks glide smoothly, hold firmly, and open easily?

(6) Are points intact?

b. Processing Procedures.

(1) *Cleaning and Drying.* Instruments will be cleaned and dried in either the surgical instrument washer-sterilizer or the ultrasonic instrument cleaner. Only if such equipment is not available at the facility will the manual method outlined below be used. For additional information concerning the cleaning process (C-5) see paragraph 5-6; for the drying processes (D-1, D-2, D-3 and D-4), see TM 38-230-1.

(a) Step 1. Place instruments in a wire basket and completely submerge in a tank of Stoddard solvent. Agitate the submerged instruments a minimum of 5 minutes. If the instruments are grossly dirty, scrub them with a clean hand brush. It is important to remove dirt, corrosion, or corrosive agents in the joints, box locks, eyes, or teeth of the instruments. When cleaned, drain the instruments thoroughly. Assure that a minimum of carry-over solvent is taken into the second tank.

(b) Step 2. Submerge the basket of drained instruments in a second tank containing clean Stoddard solvent. Duplicate step 1. Drain the basket of instruments thoroughly in a draining tank.

(c) Step 3. Place the basket of drained instruments into a tank of corrosion preventive compound (fingerprint remover). Completely immerse and constantly agitate the instruments at least 2 minutes. Drain.

(d) Step 4. Place the basket of instruments into a third tank of Stoddard solvent (clean). This serves as a rinse and is necessary to remove any film remaining from the fingerprint remover. Drain thoroughly.

(3) Step 5. Dry instruments by compressed air (D-1), oven drying (D-2), infrared drying (D-3), or wiping (D-4). The method will be determined by facilities and equipment available.

(2) *Applying a Preservative.* Place completely dried instruments in a wire basket and submerge in a tank containing P-9 preservative (lubricating oil, general purpose, special preservative). Remove the basket of instruments from the oil bath, place on a drainboard, and drain completely. The wire basket permits the excess oil to drain off, precluding the use of cloth, gauze, or other material.

(3) *Packaging.* Preferably only one instrument should be packaged to a bag. Close the instrument so that minimum tension is placed on the jaws. Insert the instrument into a polyester film bag (para 5-13), expel excess air, and heat seal.

(4) *Marking.* Print the national stock number and a short nomenclature of the bag's contents on a pressure-sensitive addressograph label (nonstandard) approximately 2 by 3 1/4 inches in size. Attach the label to the outside corner of the polyester bag.

(5) *Unit Identification.* Bags containing instruments may be packed in V3C cartons. If this is

done, make sure there is proper cushioning. Packing must be done in such a way as to preclude sharp edges of instruments rupturing the polyester bags. The DA Form 3239-R (para 5-19) may then be attached to the sealed carton.

(6) *Equipment.* The instructions in paragraph 5-21 through 5-26 concerning surfaces and finishes, upholstery, and specific types of materials are applicable to medical equipment. Medical items should be processed for in-place storage in accordance with requirements of TM 8-605.

5-35. Electrically Operated Equipment. *a. Disconnect* (do not cut) electrically operated equipment from power source. Disconnect equipment which obtains power through line fuse boxes on individual circuits by removing fuses. Protect, identify, and store fuses in a convenient location so that they will be readily available when required. (The removal and storage of fuses is for safety reasons.)

b. Remove all cables or extension cords from outlets. Neatly coil and secure them to the related equipment.

c. Clearly tab interconnecting cables within unit to insure ease and accuracy of reassembling.

5-36. Plumbing for Operating Technical Equipment. *a. General.* Disconnect, drain, and clean all air, steam, water, or waste lines on the equipment. (Capping the lines is an engineer function and appropriate coordination is necessary to insure that it is accomplished.) Remove and identify all fittings; tie them to the unit. Care must be used to insure complete drainage. It is imperative that the lines and traps of sterilizers and the water reservoirs, hoses and syringes on dental operating units be thoroughly drained.

b. Lubrication. Fill oil reservoirs to the proper level. Oil or grease equipment, including casters of mobile equipment, in accordance with the requirements for normal operations. Wipe off excess oil or grease.

c. Tension Release. Remove or release tension on equipment which is operated by a combination of pulleys and belts, and secure to the equipment.

d. Hydraulic Lifts. Inspect and thoroughly clean hydraulic lifts. Refill with hydraulic fluid in accordance with requirements for normal operations. Lower equipment to the lowest operation position.

e. Batteries. Remove batteries, dry or wet cell, from equipment prior to preparation for storage and transfer them to the appropriate property officer. Accumulation of alkalies or acids on the equipment will be appropriately neutralized with the proper acid or base solution. Equipment will then be cleaned, dried, and, if necessary, refinished.

f. Gas Cylinders. All gas cylinders will be removed from equipment and bled in conformance with procedures outlined in AR 700-68, except that the valve will be closed just before the cylinder is completely emptied. This will maintain a slight pressure in the cylinder to prevent the entry of dust and/or moisture through the valve. The empty cylinders will be appropriately marked or tagged and stored in designated areas. Cylinder storage areas will be conspicuously posted with "No Smoking" signs.

g. Cooling units. In cooling units or other equipment using a refrigerant, the refrigerant will not be removed from the system.

h. Equipment or Accessories in Carrying Cases. Place all cleaned equipment or accessories for which a carrying case is provided within the case. Utilize slots if they are provided. Place cushioning material, as necessary, between items and the lid of the carrying case. Close lid and secure.

i. Anesthesia or Oxygen Equipment. Corrosion preventive will not be applied to any equipment used in the administration of anesthesia gases or oxygen. It is important that oxygen regulators be wrapped with water-vaporproof, flexible barrier material (NSN 8135-00-282-0565).

j. Miscellaneous Components. Clean all component parts of equipment. Empty all bottles of liquids or powder. Wash and dry all bottles and stoppers. When applicable, replace component parts in their normal operating positions; otherwise, wrap individually and store them with the major item.

(1) *Filters.* Clean and/or replace all filters.

(2) *Soda lime containers.* Empty, clean, and thoroughly dry the soda lime containers.

(3) *Gasoline burners.* Thoroughly drain burners of all gasoline. Clean the burners and tape all apertures.

(4) *Pressure regulators.* Relax spring tension and tape all apertures.

(5) *Condensers* (mechanical refrigerators). Paint condensing unit when necessary, but do not paint condenser coil. Clean condensers with compressed air.

(6) *Lamps.* Replace unserviceable lamps.

(7) *Lenses, mirrors, thermometers.* Protect these items with nonabrasive cushioning material.

(8) *Sterilizer doors.* Close and turn handle until only a slight pressure is felt. This is to prevent the gasket from acquiring a permanent set.

SECTION VI

SURVEILLANCE INSPECTIONS, SAMPLING TECHNIQUE, AND INSPECTION REPORTS

6-1. Surveillance Objectives. The overall objective of surveillance of prepositioned war reserve materiel at both active and inactive facilities is to insure materiel readiness. An effective surveillance system must be premised on a determination of item condition so that proper action may be taken to maintain, preserve, repair, rehabilitate, or dispose of materiel. The surveillance systems provide data for recording status of standby materiel. The data has two specific future uses. First, it reveals variations in deterioration rates under different conditions and may provide a basis for refinement of the standby storage program. Second, the information concerning stability and reliability of materiel and designs may have value in the improvement of future designs and specifications.

6-2. Shelf Life. For the purposes of surveillance, serviceability is the ability of an item or materiel to readily give effective and satisfactory service. Regardless of environment or protection, materiel undergoes certain changes in intrinsic characteristics. Some materiel undergoes these changes much more rapidly than others. Shelf life (TM 8-605, TB 740-10), or the estimated time that an item will retain its serviceable qualities is based on the following criteria:

a. Items have not been used and deteriorated or damaged parts have been replaced or repaired.

b. **Containers of consumable type items have not been opened.**

c. Items are stored under optimum storage conditions and in accordance with special requirements, if indicated. For example, a drug may require a storage temperature above 35 degrees Fahrenheit but not exceeding 50 degrees Fahrenheit.

d. Items on which parts have been replaced or repaired are processed in accordance with applicable requirements.

6-3. Classification of Defects. *a. General.* For surveillance purposes, a defect is any deviation of an item from serviceability requirements; i.e., impairment of function or intended use. Defects are classified as critical, major, or minor.

b. Critical Defects. A defect that could create a hazard to life, health, and/or create unsafe conditions for individuals using or maintaining the product.

c. Major Defect. A major defect is one, other than critical, that could prevent an item from functioning at designed efficiency. Major defects also include—

(1) *Inadequate preservation* or packaging, if it has permitted or will permit any degree of corrosion or deterioration of a critical surface, or if it has allowed heavy corrosion or deterioration of a noncritical surface; in addition, inadequate packaging is a major defect if it fails to provide necessary protection against physical damage that could prevent an item from functioning at designed efficiency.

(2) ***Inadequate packing,*** **if it fails to provide** necessary protection against physical damage that could result from hazards to which the item could be subjected during storage.

(3) *Incorrect marking* or a lack of identification or special markings, if it could result in loss or damage to the item.

d. Minor Defect. A minor defect is one that does not materially reduce the usability of the time for its intended purpose, or is a departure from established standards but has no significant bearing on the effectiveness of the item. Minor defects include—

(1) *Inadequate preservation or packaging.* If it has permitted the onset of light-to medium corrosion or moderate deterioration of noncritical surfaces, providing the presence of such corrosion or deterioration would not adversely affect the item's operatability or efficient utilization; or, it is not in strict conformance with specification requirements but is sufficient to afford the necessary protection to the item.

(2) *Inadequate packing,* if it is not in strict accordance with specifications but is sufficient to protect the item against physical damage.

(3) *Inadequate marking,* if it has improper or missing contractor's name or address, contract number, requisition number, weight, cube, or other markings not indicated in *c*(3) above, provided such defective marking would not result in damage to the item.

e. Application.

(1) *Defects* should be classified as *critical, major,* or *minor* even if they are not considered to belong fully in these classes at the time of inspection but can be reasonably expected to belong fully to these classes prior to the next cyclic inspection. If a defect is of a trivial nature (e.g., dents and scratches that do not break the paint film), it should not be considered a minor defect unless some reduction in the usability of the item can be expected before the next scheduled inspection.

(2) *Classification standards* for specific defects covering all types of nondeteriorating medical materiel provide uniform classification on an Army-wide basis. In the absence of specific standards for use as a gauge, the guidelines in paragraphs 6-3*a* through 6-3*d* above should be applied. Individual judgment will be used to classify accurately any possible defects found.

6-4. Statistical Sampling. *a.* Purpose of Surveillance Sampling. The primary purpose of surveillance sampling is to detect deterioration in stocks. A common accepted means to ascertain the quality or serviceability of stored items is by statistical sampling.

b. Representative Samples. Items will be grouped into large lots so that samples selected will be representative of the homogenous quality of like items. The sampling plan is premised on the quality of a small sample from many lots, rather than a large sample from a few lots. Sample selection must be such that every item has an equal chance of being selected. Biased methods must be avoided when items are selected from the same storage location. The items must not be selected solely because they appear defective; however, this is not to preclude the inclusion of defective appearing items in the sample.

c. Percent Defective. The percentage of defective items will be based on the sample size and the appropriate serviceability quality level. The serviceability quality level assigned in TB 740-10 (measured in terms of percent defective) should be viewed as the poorest average level permitted. A low percentage indicates high quality and, conversely, a high percentage low quality.

d. Equation. To measure statistically the extent of defective items in a given lot, the following equation is used:

$$\frac{\text{Number of defective items}}{\text{Number of items inspected}} \times 100 = \text{Percent defective}$$

However, if an item has two or more defects, the following equation applies:

$$\frac{\text{Number of defects}}{\text{Number of units inspected}} \times 100 = \text{Defects per hundred units}$$

e. For *additional discussion* of statistical sampling, see TB 740-10.

6-5. Mandatory Inspection of Nondeteriorating Type Medical Materiel. All reserve materiel will be inspected in accordance with the provisions of TB 740-10 and this TB. Special inspections may be conducted at the direction of the MEDCEN/MEDDAC commanders. Reserve materiel stored as components of medical assemblages will be inspected during the timeframes established by TB 740-10 or AR 40-61. Components of medical assemblages prepared for long-term storage and equipment packed as level A inside an assemblage will be inspected at the time the assemblage is reconstituted.

6-6. Surveillance at Active Facilities. *a.* Commanders of active facilities will establish a program for accomplishing these inspections. Dated items (including those in medical assemblages under the direct control of the medical activity commander) will be inspected as indicated in TB 740-10. Paragraph 3-1*e* of this bulletin also applies concerning the surveillance program for medical assemblages.

b. Those instructions which govern surveillance activities at inactive facilites should be evaluated for possible application and incorporation in local programs. In addition, facility commanders and, when applicable, unit commanders should use the following material for guidance in establishing an effective program at local level:

(1) The provisions of AR 40-61, AR 710-2 and AR 750-51 will be used as guidance in establishing teams to perform inventory, surveillance, and inspection functions.

(2) TB 740-10 (DLAM 4155.5) (Quality Control Depot Serviceability Standards) for information regarding shelf life of medical and dental items listed in the Federal supply catalog, and TM 743-200 governing the storage of supplies and

equipment. Information concerning sampling techniques, frequency of surveillance, and estimated age of materiel may also be found in TB 740-10.

(3) The SB 8-75 series provides surveillance activity information as well as messages provided by USAMMA. Timely implementation and corrective action concerning information contained in the USAMMA messages and SB 8-75 series is critical to the successful management of PWRMS.

6-7. Inventory and Inspection Team, Semiactive/Inactive Facilities. *a.* An annual or cyclic inventory is required of those items carried on the stock record account as specified in AR 710-2. The purpose of an inventory is to determine condition of preservation and packaging and quantity of stock on hand and to reconcile stock record balances with actual on-hand quantities. Surveillance inspection, as required by TB 740-10, may be accomplished in conjunction with these inventories. The MEDCEN/MEDDAC commanders will appoint inventory/inspection teams as necessary for each semiactive/inactive facility under their jurisdiction.

b. Local experience factors should be used to determine the manpower required to inventory/inspect a given size facility within the required time period. The scope of the inventory/inspection increases commensurate with the number of buildings and storage sites. The expertise of the inventory/inspection team is the dominating factor concerning the composition of the team. A health care logistics officer should be appointed chief of the team. He should be assisted by qualified medical equipment maintenance personnel (military or civilian). Composition of the other team members should be dictated by the discipline to the inventoried; i.e., dental personnel should perform inventory/inspection functions concerning the dental clinics, laboratory personnel for the laboratory, nursing service personnel for OR/CMS, radiology personnel for x-ray, etc.

6-8. Reports of Field Inspections. *a.* Reports of field inspections will be prepared in letter format by the chief of the inspection team. The reports will contain all information required by the MEDCEN/MEDDAC commander. In addition, the following data should be included:

(1) Facts which, when considered along with all other reports, will present meaningful information for changes to the in-place storage procedures.

(2) Climatic effects on material which will substantiate development of detailed instructions for specific geographical locations.

(3) Statements of actions taken within the team's authority and recommendations on those matters which are beyond the team's authority.

b. The report will be forwarded through command channels to the appropriate major command or head of the Department of the Army Staff Agency (exempt report, para 7-2*v*, AR 335-15). Major commanders or heads of Department of the Army Staff Agencies will forward reports which indicate possible changes in policy or procedures, together with appropriate recommendations, to HQDA (DASG-HCL), WASH DC 20310 (exempt report, para 7-2*v*, AR 335-15).

6-9. Types of Inspections. Logistics personnel assigned to the responsible MEDCEN/MEDDAC have the responsibility for providing effective surveillance of medical materiel stored at the inactive facility. In this connection, three distinct types of inspection apply. They are: visual inspection (para 6-9*a*), representative (random) sampling inspection (para 6-9*b*), and technical equipment inspection (para 6-9*c*).

a. Visual Inspection.

(1) *General.* A visual inspection is limited to observation. It is a "forerunner" type of inspection which, depending on the nature or extent of defects seen, may lead to opening of containers and close examination of the items. This type of inspection is applicable for all medical materiel, as well as for the areas. The inspection of made-up bed units, prepackaged patient care sets, and textile units will be limited entirely to visual. Visual inspections will include, as a minimum, the following:

(a) Observation of each item (or unit) that is encased in polyethylene to be sure that the polyethylene has no holes or tears.

(b) Selection of several polyethylene encased items (or units) for close observation. When viewing through the polyethylene, look for abnormalities in appearance such as signs of rust, blisters, or bubbles on metal finishes; changes in color; and crumbling or caking.

(c) Looking for evidence of infestation of the area (and the container) by rodents, insects, vermin.

(d) Looking for signs of weather damage such as water stains or cracks on walls and ceilings and broken windowpanes.

(e) Noting the degree of cleanliness and general appearances of the storage areas.

(f) Noting the appearance of sealing tape (if used).

(2) *Indications which require opening polyethylene containers.* Polyethylene containers will be opened and the contents closely inspected under the following circumstances:

(a) If defects in the item are visible (including infestation by rodents, insects, or vermin), or there are indications of such defects.

(b) If the polyethylene has a tear or hole.

(c) If the item needs to be examined because it is categorized as technical equipment (para 6-9*c*) or is selected under the sampling plan (para 6-9*b*).

(3) *Opening and resealing polyethylene containers.* Except when a new container is indicated, polyethylene containers will be opened as follows: Using scissors, cut the seal from the container. Cut as close as possible to the edge of the seal. Be careful to preserve the identification pocket. Examine the contents. If they are found in a serviceable condition, reseal the container in accordance with procedures in paragraphs 5-16 and 5-17. Make appropriate notations on the DA Form 3239-R and reseal pocket onto the polyethylene container.

b. Representative (Random) Sampling Inspection. Representative sampling is based on the inspection of a certain number of an item in relation to the total number of the item stored. The plan is applicable to all materiel except made-up bed units, prepackaged patient care sets, textile units, and items of technical equipment not in level A pack. Items listed in appendix M, TB 740-10, such as surgical instruments and technical equipment (subject to restrictions of para 2-3*d*(4)) comprise typical types of materiel for this sampling inspection. Table 1, of TB 740-10, will be used for sample size.

c. Technical Equipment Inspection. Inspections of technical equipment are only required under the conditions and criteria established in paragraphs 2-3*d*(4), 3-2*b*(2), and 4-2*c* of this bulletin. The serviceability standards to be applied are as prescribed in TM 8-605.

6-10. Number of Personnel Assigned to Inventory/Inspection Team. The quantity of personnel assigned to the inventory/inspection team will be based on the guidance contained in chapter 3, AR 710-2. An adequate number of qualified personnel to provide technical guidance will be assigned to the team. The quantity of personnel will be adequate to accomplish the inventory, and the inventory time period will not exceed 5 working days.

6-11. Inspection Codes. Inspections codes are contained in paragraph M-203, appendix M, TB 740-10 (DLAM 4155-5). Use of these codes will be of value in classifying and recording critical and major defects. Examining for the more obvious defects and general characteristic deterioration, such as rubber and wood deterioration; physical damage to parts, breakage; identification markings; or improperly sealed containers, etc.; is an inherent part of an inspector's job, and is performed with the use of Military Standards and Specifications, and technical knowledge.

6-12. Corrective Action. Defects found during inventory and surveillance inspections will be corrected by logistics personnel assigned to the responsible MEDCEN/MEDDAC. If the defects are of such magnitude as to preclude corrective action by the MEDCEN/MEDDAC personnel, a request for technical assistance will be submitted in accordance with AR 40-61 for the purpose of correcting defects.

6-13. Disposition of Unserviceable Items. Items which are determined to be unserviceable because they are uneconomically reparable or nonreparable will be disposed of in accordance with AR 40-61, AR 710-2, and major Army command directives.

APPENDIX A

REFERENCES

AR 11-8	Principles and Policies of the Army Logistics System
AR 11-14	Logistic Readiness
AR40-3	Medical, Dental, and Veterinary Care
AR 40-61	Medical Logistics Policies and Procedures
AR 210-15	Activation, Inactivation, or Change in Status of Installations
AR 210-17	Inactivation of Installation
AR 310-34	Equipment Authorization and Utilization Policies and Criteria, and Common Tables of Allowances
AR 310-49	The Army Authorization Documents System (TAADS)
AR 335-15	Management Information Control System
AR 410-17	Real Property and Research Management
AR700-4	Logistic Assistance Program
AR 700-15	Packaging of Materiel
AR 700-68	Compressed Gases and Gas Cylinders
AR 710-1	Centralized Inventory Management of the Army Supply System
AR 710-2	Materiel Management for Using Units, Support Units, and Installations
AR 725-50	Requisitioning, Receipt and Issue System
AR 735-72	Accounting for Industrial Property and Equipment in Place
AR 740-1	Storage and Supply Activity Operations
AR 740-3	Care of Supplies in Storage (COSIS)
AR 740-22	Care of Supplies in Storage, Inspection and Reporting
AR 750-1	Army Materiel Maintenance Concepts and Policies
AR 750-26	Quality assurance Program: Storage/Maintenance of Industrial Plant Equipment
AR 750-51	Maintenance Assistance and Instruction Team (MAIT) Program
TM 8-227-11	Operational Procedures for Military Blood Donor Centers and Army Services Whole Blood Processing Laboratories
TM 8-605	Preventive Maintenance Procedures and Serviceability Standards for Medical Equipment

TM 38-230-1	Packaging of Materiel: Preservation
TM 38-230-2	Packaging of Materiel: Packing
TM 38-750	The Army Maintenance Management System (TAMMS)
TM 38-750-1	The Army Maintenance Management System Field Command Procedures
TM 743-200	Storage and Materials Handling
TM 743-200-1	Storage and Materials Handling
TM 743-200-2	Storage Modernization
TM 743-200-3	Storage and Materials Handling
TM-DPSC-6500-RPL	Medical Repair Parts Reference List
TB 38-750-2	Implementing Instructions for the Army Maintenance Management System for (TAMMS) Army Medical Department Units and Activities
TB 740-10	Quality Control Depot Serviceability Standards (DLAM 4155.5)
TM MED 223	Respiratory Protection Program
SC 6545-8-Series	Sets, Kits, and Outfits Components List
SB 8-72	Inspection of Parenteral Solutions
SB 8-75 Series	Army Medical Department Supply Information
SB 38-100	Preservation, Packaging, Packing and Marking Materiels, Supplies and Equipment Used by the Army
TECHNICAL GUIDE	Evaluation and Control of Vapor Degreasing Operations (US Army Environmental Hygiene Agency), October 1978

APPENDIX B

LIST OF PROCESSING EQUIPMENT AND MATERIALS

The listed items comprise a select few of those required for the in-place storage of medical materiel. Those listed should be used in lieu of other similar types of equipment and meterials. Items needed for conducting serviceability tests of medical technical equipment are excluded. Planners should scan TM 38-230-1, TM 38-230-2 and SB 38-100 for additional supportive items. Heat sealers should be procured, if possible, for retention at the activity to facilitate preservation efforts taken as a part of surveillance inspection actions. Equipment and materials will be added to this list in the SB 8-75-series. Materials which are known and considered desirable for processing medical materiel should be submitted to Commander, US Army Medical Materiel Agency, ATTN: SGMMA-LD, Frederick, MD 21701. Recommendations should include national stock number, nomenclature, and source as applicable.

Equipment for Processing Items for In-Place Storage

Item description	Stock No.	Unit of issue	Quantity	Use
Apron, Impermeable	8415-00-082-6108	ea	.....	Protective apparel during cleaning preservative operations.
Basket, Dipping-Draining	3426-00-522-0951	ea	.....	Dipping of small items in cleaning or preservative operations (for example, surgical instruments).
Cleaner, Vacuum	7910-00-264-4636	ea	.....	Cleaning storage areas, upholstery.
Compressor, Reciprocating, Power Driven	.....	ea	.....	Compressed air (Processing operations).
Degreaser	4940-00-449-6689	ea	.....	Processing incident to preservation of medical items.
Drier, Infrared	4440-00-639-9710	ea	.....	Removing cleaning solutions or residual moisture prior to application of preservatives and/or packaging.
Gloves, Toxicological, Agents Protective	8415-00-753-6550 8415-00-753-6551 8415-00-753-6552 8415-00-753-6553 8415-00-753-6554	pr	.....	Protective apparel during cleaning and preservative operations.
Gloves, Cloth, Cotton, White	8415-00-268-8353	pr	.....	Protective apparel during drying operations.
Goggles, Industrial	4240-00-203-0317	pr	.....	Eye protection during cleaning operations
Sealing Iron, Electric	3540-00-222-4336	ea	.....	Heat sealing polyester film (surgical instruments).
Sealing Machine	3540-00-203-2090	ea	.....	Heat sealing.
Sealing Machine 3/4 Inch	3540-00-505-4785	ea	.....	Heat sealing.

Equipment for Porcessing Items for In-Place Storage—Continued

Item description	Stock No.	Unit of issue	Quantity	Use
Spray Gun, Paint	4940-00-261-8415	ea	.....	Paint spraying.
Stencil Cutting Machine, Hand Operated	7490-00-164-0537	ea	.....	Cutting stencils for marking containers.
Tank, Cold Dip	4940-00-204-3136	ea	.....	Cleaning solvent or preservative tank.
Tank, Improvised, 55 Gallon	**Not applicable**	**NA**	**NA**	**Cleaning solvent or preservative tank.**
Washer-Sterilizer Surgical Instrument	**6530-00-065-6767**	**ea**	.....	**Cleaning and drying instruments.**

Materials for Processing Items for In-Place Storage (Standard Items)

Item description	Stock No.	Unit of issue	Quantity	Use
Adhesive	**8040-00-264-3845**	**can**	**5 gal**	**Sealing fiberboard boxes.**
Adhesive	**8040-00-656-0814**	**can**	**5 gal**	**Applying and protecting label.**
Adhesive	**8040-00-273-8704**	**pail**	**5 gal**	**Applying and protecting label.**
Barrier Material, Grease-proofed, Waterproofed, Flexible	**8135-00-224-8885**	**roll**	**200 yd**	**Wrapping component parts treated with** a corrsosion preventive.
Barrier Material, Water vaporproof, Flexible	**8135-00-282-0565**	**roll**	**200 yd**	**Wrapping items for which a petroleum** base material cannot be used; for example, oxygen regulators.
Barrier Material, Water-proof, Flexible	**8135-00-526-1907**	**roll**	**200 yd**	**Interior wraps.**
Box, Fiberboard (assorted)	**8115-00-183-9500** **8115-00-183-9502** **8115-00-183-9503** **8115-00-183-9504** **8115-00-183-9505** **8115-00-281-3878**	**ea**	.....	**Interior container for packaging repair parts, tools, and similar items.**
Box, Fiberboard (assorted)	**8115-00-183-9492** 8115-00-183-9493 8115-00-183-9494 **8115-00-183-9501** **8115-00-255-1341**	**ea**	.....	**Interior container for packaging repair parts, tools, and similar items.**

Materials for Processing Items for In-Place Storage (Standard Items)—Continued

Item description	Stock No.	Unit of issue	Quantity	Use
Box, Fiberboard (assorted)	8115-00-183-9496 through 9499 8115-00-190-4936 8115-00-190-5012 8115-00-281-3877 8115-00-281-3882 8115-00-281-3886 8115-00-281-3989 8115-00-514-2402 through 2404 8115-00-514-2406 through 2409	ea	.....	Packaging items.
Box, Fiberboard (assorted)	8115-00-281-3876 8115-00-281-3878 8115-00-281-3892 through 3894 8115-00-281-3896	ea	.....	Packaging repair or fragile items when additional protection is needed.
Box, Fiberboard (assorted)	8115-00-132-9540 8115-00-183-9458 8115-00-183-9459 8115-00-183-9461 8115-00-183-9463 8115-00-183-9464 8115-00-183-9467 through 9469 8115-00-183-9471 8115-00-183-9472 8115-00-183-9486 8115-00-222-3037	ea	.....	Miscellaneous packaging.
Cleaning Solvent (Stoddard Solvent)	6850-00-281-1986	.....	.....	Cleaning operations (metals).
Corrosion-Preventive, Fingerprint remover	8030-00-252-8300	can	5 gal	Removing fingerprints from polished cleaned surfaces.
Cushioning Material, Packaging	8135-00-849-7847	roll	100 ft	Packaging.
Cushioning Material, Packaging	8135-00-664-6948	roll	145 ft	Packaging.
Cushioning Material, Packaging	8135-00-183-8814 8135-00-183-8823	roll	165 ft	Packaging.
Cushioning Material, Packaging	8135-00-584-3114	roll	100 ft	Packaging to protect fragile articles against abrasion.
Leather Dressing Mildew Preventive	8030-00-260-0736	can	1 gal	Protection of leather.
Oil Lubricating, General Purpose	9150-00-281-2060	.....	.....	Lubricating and protecting against corrosion.
Paint, Stencil Black (Jet)	8010-00-297-2101	can	1 gal	Stencil brushing, bristle or camel; lettering, brushes or spray gun.

Materials for Processing Items for In-Place Storage (Standard Items)—Continued

Item description	Stock No.	Unit of issue	Quantity	Use
Fiberboard, Corrugated (assorted)	8135-00-242-5610 8135-00-281-3920 8135-00-290-3400 8135-00-664-1376	roll	250 ft	Cushioning or protective wrapping.
Paper, Kraft, Untreated	8135-00-160-7757	pkg	.....	Wrapping.
Paper, Kraft, Untreated (assorted)	8135-00-160-7752 8135-00-160-7753 8135-00-160-7757 through 7759 8135-00-160-7762 8135-00-160-7764 8135-00-160-7766 8135-00-160-7768 8135-00-160-7771 8135-00-160-7772	roll	.....	Wrapping.
Rag, Wiping	8135-00-160-7776	lb	50-lb bale	General Purpose
Remover, Paint	7920-00-205-1711	drum	400-lb	Removing paint, rust, scale.
Remover, Paint	8010-00-227-1693	can	5 gal	Removing paint in scrape operations.
Stencilboard	8010-00-165-4447 9310-00-169-7857	sheet	.....	Stenciling with brush and ink or paint.
Tape, Pressure	8135-00-297-6655	roll	120 yd	Sealing fiberboard containers and taping shrouds.
Blue Bunting Cloth	8305-00-841-2349	bolt	As req.	Covering windows to prevent deterioration by light.
Tacker, Staple Gun	5120-00-250-9137	each	1 ea	Attaching bunting cloth over windows.
Paint, Aluminum	8010-00-079-3751	can	26 oz	Spraying bed frames and springs.
Paint, OD, Lusterless	8010-00-914-8711	can	5 gal	General purpose
Plastic Sheets	8415-00-584-0610	roll	100 ft	Encasing made-up bed units textile units, other items requiring encasement in polyethylene; fabricating pockets or holders for identification data.

Materials for Processing Items for In-Place Storage (Nonstandard Items)

Item description	Use
Fiberboard boxes, V3C board, sizes and styles other than standard.	Packing.
Fiberboard Sheets, V3V board, sizes and styles other than standard.	Supporting items, such as made-up bed unit, encased in polyethylene.
Label, pressure-sensitive, addressograph, 2"x 3 1/4"	Identifying surgical instruments in polyester bags.
Polyethylene bags	Packaging mattresses locally fabricated from plastic sheets, NSN 8415-00-584-0610.
Shrouds	Shrouding of items in lieu of encasing.
Tubing, polyester, film, flat open-ended tubes, 4 1/2 mil wall thickness: 4" wide x 56" long 6" wide x 56" long	Packaging surgical instruments.
Wood	Fabricating pallets for mattresses, pillows, and other items.

APPENDIX C

GUIDE TO SOLVENT SELECTION

*The following information should be reviewed when determining the type of solvent to be utilized during the cleaning process. This information also lists the visual as well as the systemic (system-wide) effects of overexposure and the medical procedures which will identify possible overexposure.

C–1. Trichloroethylene (Syn: acetylene trichloride) ($CHCl = CCl_2$ TLV-TWA—100 ppm (520 mg/m³, TLV-STEL—150 ppm (800 mg/m³)) Toxicology:

a. Local Effects—Liquid or high concentration of vapor may irritate eyes. Repeated contact with liquid or high vapor concentrations can produce a dry, scaly, and fissured dermatitis.

b. Systemic Effects—Trichloroethylene has a narcotic effect on the central nervous system. In acute intoxications from low concentrations, manifestations include drowsiness, giddiness, dizziness, vertigo, fatigue, headache, exhilaration, nausea, vomiting, and incoordination. A characteristic symptom is intolerance toward alcohol. High vapor concentrations also have a narcotic effect and can produce unconsciousness, convulsions, coma, and death from respiratory paralysis. Death can occur from primary cardiac failure, ventricular fibrillation, and annoxia secondary to tachypnea and impaired alveolar ventilation. Reported cases of pulmonary edema may have been due to phosgene and hydrochloric acid, which are liberated when trichloroethylene is decomposed by heat (usually an open flame). A great variety of chronic effects have been attributed to trichloroethylene, such as liver damage, neuritis, and neurotic symptoms. Indication of liver damage is usually limited to abnormal liver function tests, but cases of acute yellow atrophy have been reported. The latter may have been due to contaminants of their decomposition products. Injury to optic and trigeminal nerves has been reported. Neurotic symptoms are more difficult to evaluate and are doubted by some investigators (ref in TECHNICAL GUIDE, app A).

c. Medical Surveillance—Annual physical examination with special emphasis on cardiac and pulmonary status. If there is any evidence of cardiac arrhythmia, followup with EKG to confirm and diagnose the arrhythmia. Also annual liver function tests, urinalysis, blood urea nitrogen, and serum creatinine.

C–2. Perchloroethylene (Tetrachloroethylene, carbon dichloride, ethylene tetrachloride) ($CCl_2 = CCl_2$. TLV-TWA—100 ppm (670 mg/m³), TLV-STEL—150 ppm (1000 mg/m³)) Toxicology:

NOTE. The recent DHEW Publication (ref 4 in TECHNICAL GUIDE, app A) recommends that it is prudent to handle tetrachloroethylene in the workplace as if it were a human carcinogen and that occupational exposure to tetrachloroethylene be minimized.

a. Local Effects—Repeated contact with liquid causes a dry, scaly, fissured dermatitis. High concentrations produce eye and nose irritation.

b. Systemic Effects—Primary systemic effect is narcosis, with symptoms of headache, dizziness, nausea, incoordination, and somnolence. Repeated exposures to high concentrations can produce a mild hepatitis. Animal studies have shown a statistically significant increase in liver tumors in exposed mice when compared to unexposed controls (ref 7 in TECHNICAL GUIDE, app A).

c. Medical Surveillance—Liver function tests annually.

C–3. Methyl Chloroform (1), 1, 1-trichloroethane) ($CH3CCl_3$ TLV-TWA—350 ppm (1,900 mg/m³), TLV-STEL—450 ppm (2,315 mg/m³)) Toxicology:

a. Local Effects—Liquid and high vapor concentrations will irritate eyes on contact. Repeated skin contact will produce a dry, scaly, fissured dermatitis.

b. Systemic Effects—Narcotic effects of dizziness, incoordination, drowsiness, and unconsciousness have been produced by acute exposure to vapor concentrations approaching 1,000 ppm. If the worker is not removed after he has been overcome, death can result from respiratory failure or possible ventricular arrhythmia. Fatty degeneration of liver occured in laboratory animals

*Information for appendix C was extracted from the TECHNICAL GUIDE—*Evaluation and Control of Vapor Degreasing Operations*, published by the US Army Environmental Hygiene Agency, Aberdeen Proving Ground, MD 21010.

undergoing chronic exposure to high concentrations. In human subjects, transient elevation of urinary urobilinogen has been noted following exposure to anesthetic concentrations (ref in TECHNICAL GUIDE, app A).

c. Medical Surveillance—Liver function tests annually.

C-4. Methylene Chloride (dichloromethane, methylene dichloride, methylene bichloride) (CH_2Cl_2; TLV-TWA—200 ppm (720 mg/m³), TLV-STEL—250 ppm (900 mg/m³)) Toxicology:

Note. From ACGIH, Notice of Intended Changes for 1978, the TLV-TWA for methylene chloride is intended to be lowered from 200 ppm to 100 ppm.

a. Local Effects—Repeated contact with the solvent will cause a dry, scaly, fissured dermatitis. Liquid and vapor are irritating to eyes and upper respiratory tract.

b. Systemic Effects—Methylene chloride acts as narcotic in high concentrations causing headache, nausea, vomiting drowsiness, incoordination, paresthesias, and coma. High concentrations may also produce bronchitis, pulmonary edema and liver injury. Recent studies have demonstrated that exposure to levels of methylene chloride near the TWA promptly (1 to 2 hours) initiates the formation of significant quantities of carbon monoxide in human subjects. Evidence suggests that carbon monoxide may be a metabolite of methylene chloride and that exposure to concentrations of methylene chloride below allowable limits may result in the formation of carbon monoxide in amounts that exceed the allowable limit (ref 7 in TECHNICAL GUIDE, app A).

c. Medical Surveillance—Exclude asthmatics and those with chronic cardiopulmonary disease. At exposure levels greater than one-half of allowable limits, consideration should be given to obtaining carboxyhemaglobin levels on exposed personnel at regular intervals. Exposures should be controlled to protect against levels of carboxyhemoglobin in excess of 5 percent in nonsmokers.

C-5. Freon 113, trichlorotrifluorethane (1, 1, 2-Trichloro 1, 2, 2-Trifluoroethane) (TLV-TWA—1,000 ppm (7,600 mg/m³), TLV-STEL—1,250 ppm (9,500 mg/m³)) Toxicology:

a. Local Effects—This fluorinated hydrocarbon may produce very mild irritation of the upper respiratory tract. If halogen-containing compounds, such as the freons, come into contact with an open flame or hot metal, the decomposition products of hydrogen chloride, hydrogen fluoride, phosgene, sulfur dioxide, chlorine, and others may cause severe irritative effects and ultimately the death of the exposed individual.

b. Systemic Effects—Certain of these freons may produce mild central nervous system depression. Systemic effect may be due in part to displacement of air, with resultant hypoxia. Some of these compounds sensitize the myocardium to endogenously-produced epinephrine resulting in a wide gamut of rhythm disturbances; occasionally resulting in sudden death of highly exposed workers (ref 7 in TECHNICAL GUIDE, app A).

c. Medical Surveillance—Physical examination with emphasis on the cardiovascular system on an age-related frequency.

The proponent agency of this regulation is the Office of The Surgeon General. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to Commander, US Army Medical Materiel Agency (SGMMA—LD), Frederick, MD 21701.

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E. C. MEYER
General, United States Army
Chief of Staff

Official:
J. C. PENNINGTON
Major General, United States Army
The Adjutant General

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