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Analysis of current procedures and identification of additional considerations that may be required to lay away production facilities and equipment for reliable fast reactivation to meet mobilization requirements.

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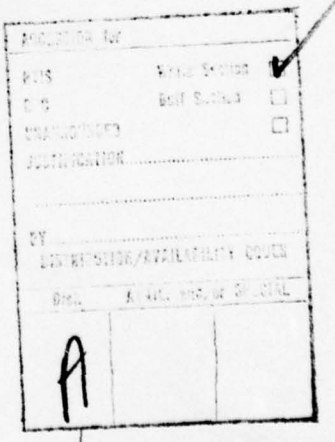
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prepared for
Project Manager
Munitions Production Base Modernization
and Expansion

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In Association with Stetter Associates, Inc.



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I. INTRODUCTION

A. BACKGROUND

In accordance with Department of Defense (DOD) policy, the U.S. Army relies upon private industry, where feasible, to meet wartime mobilization requirements for the production of munitions and munition components.

In order to encourage producers in private industry to be prepared to participate in the mobilization production program, the Government has established plant equipment packages (PEP's) where it has been determined that ownership by private industry of the equipment required in the production of munitions is not economical.

A PEP is a complement of active and/or inactive plant equipment that has been formally approved for retention as part of the munitions production base by the Assistant Secretary of Defense (Installation and Logistics) and which has been assigned a number by ASD(I&L).

In some instances, the PEP supplements producer-owned equipment to form a complete production process for a military item. Most of the current PEP equipment was purchased during or before the Korean conflict. Some of the equipment has been operated beyond its original life expectancy. Some of the equipment has been stored where the maintenance or layaway has been ineffective and thus requires rehabilitation. Voids exist in some of the production lines due to cannibalization or other reasons. As a result, the rated capacity and ability of some munition production lines to respond to mobilization requirements is questionable.

Because of this, Contract DAAA21-75-C-0303 was awarded to Kaiser Engineers in association with Stetter Associates, Inc. to perform a comprehensive and detailed analysis of the munitions production base assigned to private industry. The results of this analysis will comprise a modernization plan for PEP's required to form the mobilization base for munitions production.

A major task in this effort was the analysis of equipment layaway, which is presented in this report. Subsections B and C of Section I present the purpose and scope of the task, and Section II is a

summary of the task effort. Section III contains the statement of current policy and procedures. Evaluations and analyses by the task team are developed in Section IV. Conclusions and recommendations are presented in Section V.

B. PURPOSE

The overall program objective of the PEP Modernization Program is to assure that each production plant in the munitions industrial production base will be capable of meeting mobilization requirements and be consistent with planned appropriation levels over the long range after modernization.

The purpose of this task was to analyze and develop improvements in current procedures to assure that production equipment and facilities are retained to provide responsive production capacity to meet mobilization requirements. Preparation of a detailed plan for the layaway of industrial plant equipment (IPE) by generic type of equipment assigned to the PEP's is not feasible until the modernization analyses of the PEP's (Task B-5) is completed. Task B-5, a follow-on task to Task B-2, will determine IPE retention and rehabilitation requirements and will assign existing IPE to specific end items scheduled for production in the current producer's plant.

Recommendations from the plan will be used to meet the overall program objectives.

C. SCOPE

The investigation included the following:

- Review of current policy concerning IPE.
- Review of methods for identifying items for storage considerations.
- Review of present programs for cleaning and preservation before storage.
- On-site assessment of current Government procedures.
- Evaluation of user storage versus Government storage.
- Identification and analysis of problem areas.

- Determination of the economic feasibility of stockpiling components versus storage of production equipment.

- Development of recommendations for additions, eliminations, and/or changes to current Government programs.

Review of current policy concerning IPE was pursued by screening the publications available from military sources. Department of Defense directives and instructions were reviewed but they are not used as sources for implementing PEP policy for the Army. The most important manuals reviewed included:

- AR 700-90 - Army Regulation, Logistics, Army Industrial Preparedness Program, Headquarters Department of the Army, 15 September 1975.

- DSAM 4215.1; AR 700-43; NAVSUP PUB 5009-AFM 78-9 - Defense Industrial Plant Equipment Center Operations, Department of Defense, Defense Supply Agency, November 1973.

- MIL-STD-107E - Military Standard Preparation and Handling of Industrial Plant Equipment for Shipment and Storage, Department of Defense, 14 June 1974.

- TM 38-260; NAVSUP PUB 523; AFR 71-18; MCO 4870.62; DSAM 4145.9 - Technical Manual, Preparation of Industrial Plant Equipment for Storage or Shipment, Departments of the Army, the Navy, and the Air Force and the Defense Supply Agency, June 1975.

- DSAM 4215.2 - Defense Industrial Plant Equipment, Storage/ Maintenance Activities Operations Manual, December 1973.

- AR 37-13 - Army Regulation, Financial Administration, Economic Analysis and Program Evaluation of Resource Management, Headquarters Department of the Army, 1 June 1973.

- MIL-P-116E - Military Specification, Preservation, Methods of, 18 August 1967.

- TM-DIPEC-FSG-3400 - Defense Industrial Plant Equipment Center, Technical Manual for Maintenance of Metalworking Equipment, November 1974.

- AR 235-5 - Management of Resources, Commercial and Industrial Type Functions, 15 January 1973.

- DOD 4215.18 - Management of Defense-Owned Industrial Plant Equipment, 7 March 1974.

- DODI-4215.1 - Plant Equipment Retention and Maintenance, 22 September 1972.

- Armed Services Procurement Regulation (ASPR) - Appendix B, Government Property in Possession of Contractors, 1 July 1974.

- DSAM 4005.1 - Industrial Preparedness Planning Manual, May 1975.

- H. R. 9286 - The National Industrial Reserve Act of 1948 (62 Stat. 1225; 50 U.S.C. 451), Public Law 93-115 as revised by amendments, 21 September 1973.

- AR 71-6 - Type Classification/Reclassification of Army Materiel, September 1973.

The references cover all IPE with specific sections and paragraphs devoted to PEP's.

Current Defense Industrial Plant Equipment Center (DIPEC) procedures used by the Army for identifying IPE for retention were reviewed to assure their usefulness. These procedures are used to screen the IPE before it is included in the general reserve, after it has become inactive and declared excess. The DIPEC method develops a reutilization value percentage (RVP), which is a value used for comparison purposes and assists in evaluating the technical and economic factors related to the IPE. The use of the RVP to compare equipment assists DIPEC in making qualified choices of equipment to retain for future use.

Other Government and industrial methods for making decisions about equipment replacement or rehabilitation were also reviewed. One of these methods used by the Navy for some projects is outlined in the book "Productivity Criteria Quotient (PCQ): A Guide for Machine Tool Replacement Decisions" by Lawrence C. Hackamack. The method outlined is designed for private industry, where comparison of productivity to competition or to the industry is of importance.

Commercial services, such as Computerized Machine Replacement Services, DeKalb, Illinois, offer valuable assistance to producers to make decisions on machinery retention or replacement. The methods are directed to active equipment used for the prime purpose of economic pay back.

Inactivation procedures established by the Government for IPE were reviewed. Policy covering these procedures stated in Chapter 5, AR 700-90 covers the major considerations when IPE becomes idle. The detailed steps of inactivation and storage preparation are outlined in TM 38-260.

A visit was made to DIPEC headquarters in Memphis, Tennessee and to the Defense Supply Agency (DSA) storage/maintenance facilities, Tracy, California to review the current Government rebuild and layaway procedures. Comparison of the DSA, Mechanicsburg storage/maintenance facilities with the Tracy facilities was made via verbal information provided by an engineer from PMO Office, Picatinny Arsenal, Dover, New Jersey, after a visit by their group to Mechanicsburg.

Storage of IPE in PEP's at Government-owned contractor-operated (GOCO) facilities and Government central storage facilities was reviewed via visitations and references to written policy. Comparison of facilities, equipment reliability for production, and equipment maintenance, as well as potential reactivation speed, were prime considerations.

Attempts to identify problem areas in the system and procedures for layaway of Government IPE were made by visiting various installations where equipment has been stored and by discussing the problems with firms conducting layaway. Regulations and methods, listed previously, were reviewed to assure that policy and procedures were consistent and complete.

In addition to military manuals and instructions, other publications were reviewed. These included:

- Master Layaway Plan - MUCOM/APSA Brochure; Headquarters, U.S. Army Munitions Command; Headquarters, U.S. Army Ammunition Procurement and Supply Agency, September 1972.

- Modernization Study of Naval Ordnance Field Activities, Vol II- Study Description and Methodology by Kearney: Management Consultants for Naval Ordnance Systems Command, 2 March 1974.

- Study of Production-Line Layaway of LAP Operations at NAD Crane by Battelle, 29 September 1972.

- General Criteria and Detail Phasedown Plans--Plant Engineering and Maintenance Division, John F. Kennedy Space Center, May 1974.

- K. R. Bernhardt, Defense Against A Declining Fuze Base, Hamilton Technology, Inc. for 1976 Meeting of ADPA.

- AF Regulation 85-9, Inactive Installation--Inactivation and Maintenance--Department of the Air Force, 1 March 1976.

- Industry Lead Time Survey, Stockpiling of In-Process Inventory With Laid-Away Ammunition Production Lines--American Defense Preparedness Association, 19 March 1976.

Many of the abovementioned articles were oriented to facility layaway rather than equipment layaway. Where equipment was considered, no contradictory approaches from current Army policies or procedures were found. In most cases, the previously noted military sources were referenced and used for detail procedures.

Conclusions in Section V.A, based on the foregoing studies and information, directed the formulation of recommendations made in Section V.B of this report.

D. EXPLANATION OF TERMS

Various terms and their respective explanations used in this plan are contained in the Glossary, Appendix A.

II. SUMMARY

Plant equipment packages are authorized and established in accordance with DOD policy to encourage producers in private industry to be prepared and to participate in the mobilization preparedness program when it is not feasible for private firms to do so on their own. Layaway of IPE from PEP's, when not required for immediate use, has been performed in the past with questionable success as to the ability of the IPE to perform the desired task for which it was retained.

KE/SAI studied the current policies and procedures relating to PEP layaway to develop an understanding of current practices. Visits to central storage depots as well as visits to laid away munitions plants provided first-hand appraisal of preservation techniques and materials. Information was obtained from visits to DIPEC, ARMCOM, and PEQUA.

This layaway report identifies the requirement for additional considerations that may be needed to develop full confidence in each PEP line so that reliable, fast reactivation under mobilization conditions can be achieved. Key recommendations contained in this report include the following:

- Compile into one reference manual all information relative to PEP policies, procedures and management.
- Implement and enforce current and revised PEP policies and procedures to enhance responsive capability.
- Provide bonded storage when storing PEP equipment in producers plants.
- Provide humidity-controlled storage for long term PEP layaway.
- Do not use PEP's that are not assigned to producers (X-facilities) in the production base assignment (PBA) unless complete production lines are laid away.
- Consider flexible environmental containers for preservation of IPE where other facilities are not available.
- Retain certain items other than Government-owned IPE in layaway to provide faster mobilization response. These items include process sheets and production line layout, special tooling, test and inspection equipment, OPE of a special nature, special producer-

owned IPE, inspected parts from each production operation, tool and inspection gage drawings, and special toolroom facilities for production maintenance.

- Revise the PEP recertification process to include certification of PEP capabilities.

- Conduct research and development of new preservation materials and their uses.

- Document actions to be taken to reactivate IPE from idle PEP's during mobilization and establish an efficient method to record IPE reactivation when formalized methods are not used.

- Use available computer programs for economic analysis to develop the least cost of component, end item, and production equipment storage.

- Investigate the development of a Government tool center to provide services for producing, transposing programs and format, and storing numerical control (N/C) tapes to reproduce all Government munitions tooling as well as establishing tooling standards.

- Inaugurate inspection of IPE assigned to PEP's for operating condition while in layaway to provide assurance of production capability.

Details of the foregoing recommendations and less critical recommendations are contained in Section V.

III. STATEMENT OF POLICIES AND PROCEDURES

A. CURRENT POLICIES

U.S. Army preparedness planning is founded on a combination of inventory on-hand and a responsive and committed production capacity. An optimum balance between the two is essential.

The Army Industrial Preparedness Program (AIPP) is established to ensure that the facilities and required IPE are either on hand or attainable within an acceptable time frame. The AIPP acts in peacetime to develop and maintain an adequate mobilization production base that can be rapidly activated or expanded to support increasing mobilization material requirements.

The AIPP plans are based on the maximum use of private industry to produce the required materials. When these facilities are inadequate to meet mobilization production requirements, or when it is otherwise in the best interests of the Government, plans are made to provide for expansion of the industrial production capability. One of these plans is to augment existing industrial capacity with Government-owned IPE.

Because of reduction in current munitions requirements, some Government productive resources are inactive. The Army is responsible for the retention of the production equipment needed to supplement private industry to meet future production requirements.

Retention of IPE to supplement a particular user's equipment for specified products is accomplished by assigning the IPE to reserve. These assigned IPE reserves, when designated a number by ASD (I&L), are then referred to as plant equipment packages (PEP's).

1. Current Directives

The U.S. Army Development and Readiness Command (DARCOM) formerly U.S. Army Materiel Command (HQAMC), under the general guidance of Headquarters, Department of the Army (HQDA), manages, controls, and executes industrial preparedness planning for the Department of the Army.*

*AR 700-90, Subsection 2-7

Army IPP consists of three major activities:

- Industrial Prepareness Planning (IPP) - conducted to ensure that an adequate industrial base is established, maintained, and retained to be responsive to military material requirements in the event of an emergency.
- The Production Base Support Program (PBSP) - provides support for the development, maintenance, and retention of an efficient and effective industrial base.
- Industrial Preparedness Operations (IPO) - conducted to sustain the industrial base.

Industrial production planning is involved in:

- Computing mobilization materiel requirements
- Planning with industry
- Preparing the Industrial Prepareness Planning List (IPPL)
- Maintaining an updated end item and component applications master file
- Preparing the Production Base Plan (PBP)
- Developing Industrial Preparedness Measures (IPM's)
- Exchanging IPP information among DOD components

The operational aspects of IPP are delegated within DARCOM to the:

- Directorate for Requirements and Procurement (DRP)
- Industrial Management Division, DRP
- U.S. Army Production Equipment Agency (PEQUA)
- Commodity Divisions, DRP

- Plans and Programs Division, DRP
- Directorate for Supply
- Directorate for Maintenance
- U.S. Army Major Item Data Agency (MIDA)

2. Definition of Layaway

Layaway, as defined in AR 700-90, is the process of retaining and storing industrial facilities that are no longer required to support current production, but are required to support approved forces in an emergency.

3. Policies

Policies include the following, as established in AR 700-90.

Industrial facilities no longer required to support current production but required to support approved forces in an emergency are placed in layaway to meet mobilization production requirements.

Maintenance of excess facilities is performed only to the extent necessary to prevent deterioration, pending completion of disposal action.

Contracts in which Government-owned IPE is furnished to producer-owned plants include provisions for a maintenance program and adequate storage.* Projects requesting funds for layaway of IPE are submitted far enough in advance of contract termination to ensure that necessary layaway or plant clearance can be initiated before the contractual storage period has expired. Interim storage charges should not to be incurred.

HQDA approval is required whenever total rehabilitation cost exceeds 30% of equipment replacement cost. Projects that include rehabilitation of IPE should list each item, current replacement cost, and estimated rehabilitation cost.

*ASPR, Appendix B-101, B-201, B-601, and B-604

Priority for rehabilitation is to be in accordance with readiness levels.

Where applicable, layaway provisions are to be included in facility contracts with the producer.

Layaway projects that include IPE are not executed without prior ASD(I&L) approval (Format A - using supportive documentation including Exhibit P-17) of the plant equipment package. A copy of Format A is included in Appendix H, at the end of this report.

Contracts for maintenance of facilities being placed in layaway are for a period of 1 year, with an option for yearly renewal for a maximum of 4 additional years. These contracts can be amended to reflect any changes in the scope of work or services to be performed.

Initial layaway costs are limited to 10% of current replacement value of industrial facilities included in the project. First year and subsequent annual costs for storage and maintenance should not exceed 5% of current replacement value of plant equipment in the plant equipment package.

Layaway of producer-owned facilities are not authorized unless the Government can establish a proprietary interest in the facilities either by purchase or lease agreement. Requests for layaway of producer-owned facilities at Government expense are submitted through channels with detailed justification and require approval of HQDA.

Plant equipment packages are not authorized to support military hardware that has not been type classified during the current budget year in accordance with AR 71-6.

Three states of mobilization readiness are considered in layaway planning and identified in layaway projects.*

- High - Facilities in layaway that are required to rapidly initiate production operations within 90 days after declared M-day.

*AR 700-90, Subsection 5-8

- Medium - Facilities in layaway that are required to initiate production operations between 90 days and 180 days after M-day.

- Low - Facilities in layaway that are required to initiate production operations after M + 180 days.

Preservation, maintenance, and surveillance of plant equipment in high and medium readiness is in accordance with MIL-STD-107.

Consideration is given to dispersion and protection of vital production capacity in determining layaway sites.* The determination of locating plant equipment packages is based on dispersion, the time required for reactivation, losses that could result from moving the equipment, and comparison of costs of on-site and other types of storage. The final decision must be consistent with attainment of maximum economy, essential state of mobilization readiness, and the best interests of the Government. Preference is given in the following order to:

- Storing the equipment in-place and in the facility where it is last operated.

- Holding the equipment on-site or adjacent to the point of last use.

- Storing the equipment in DOD and/or Government-owned space, to include IPE storage sites under the DSA.

Other essential equipment, such as special tools (ST) and special test equipment (STE), training aids, materials handling equipment, and office equipment of a capital nature is placed in layaway only when the lack of this equipment will impair the lead time for reactivation. This equipment is processed and stored as part of the plant equipment package in accordance with Section III of AR 700-90.

A layaway project justification is initiated by the activity involved when planning has progressed sufficiently to allow identification of industrial facilities has been

*AR 700-90, Subsection 5-9

accomplished, including plant equipment packages required for PBSP support and preliminary contractual planning. Such project justification will be finalized and submitted as shown in Appendix D, AR 700-90.

Omnibus projects cover:*

- Packing, crating, handling, and transportation (PCH&T) and layaway costs for processing idle or excess Government equipment to be shipped to selected storage sites from Government-owned plants.

- Plant clearance of excess items of producer inventory (including PCH&T) and layaway processing costs for equipment shipped to DIPEC where such plant clearances do not constitute substantial or complete removal of a Government-owned plant equipment package from a producer's plant, thus requiring a formal and separate project.

Funding of layaway projects is accomplished through the following directives:**

- Layaway of Industrial Plants (P-1494, 2494, 3194, 3294, 4921, 5194, 5294, 5394) - The PBSP provides plant clearance and layaway (or portions thereof) at both Government-owned Government-operated (GOGO) and Government-owned contractor-operated facilities and necessary rehabilitation in conjunction therewith when required for future production. Included are the preparation and movement of permanently installed equipment from a plant to a disposal point or to a storage site.

- Layaway of Production Equipment (P-1495, 2595, 3195, 3295, 4922, 5195, 5295, 5395) - These funds provide for layaway, rehabilitation, redistribution, or disposal of Government-owned industrial plant equipment and other essential equipment nonpermanently installed, located in GOGO's, GOCO's, and COCO's (contractor-owned contractor-operated). Included are the removal, packaging, packing, crating, handling, and

*AR 700-90, Subsection 5-9
**AR 700-90, Subsection 5-10

transportation of this equipment from a plant to a disposal point or to a storage site. Also included are the acquisition, construction, and rehabilitation of facilities required to store this material for GOCO and COCO operations. Acquisition and construction of facilities at GOGO plants will be funded by MCA.

Care and maintenance (C&M) do not commence prior to 100% completion of authorized layaways. C&M projects are funded as follows:

- Charge to OMA 728011.1000 the cost of care and maintenance of idle reserve industrial facilities, or portions thereof, being retained for future production, and idle production equipment that is being retained at plants to support future production programs directly.

- Charge to OMA 728011.2000 the cost of caring for and maintaining plant equipment packages that are not an integral part of a reserve industrial plant, including idle special tooling and special test equipment that must be retained to provide direct support of plant equipment packages or indirect support of future procurement programs.

- Except as provided in the two preceding paragraphs, the cost of maintaining and caring for other idle or partially idle items of installation-owned, mission-oriented equipment of plant facilities that have not been approved for retention will continue to be charged to those mission or direct (i.e., operating) overhead accounts that supported such items or facilities while in an active status. These mission-oriented equipment and facilities include such equipment and facilities engaged in depot level maintenance, manufacture and fabrication, or reconfiguration activity, warehousing, supply processing, or minor assembly/disassembly activity involving commodity command controlled inventory, or research and development activity.

- Care and maintenance for production equipment reported as excess to DIPEC will be charged to the active and

most recent production program until DIPEC provides disposition instructions.

- Care and maintenance for in-use, idle, or partially idle nonmission-oriented equipment and facilities employed in support of housekeeping, administration, or direct and general support facilities that have not been approved for retention as part of a plant equipment package are properly chargeable to the Z accounts (e.g., C1X00) prescribed in AR 37-100-FY or as Army Industrial Fund overhead to be assessed to customers.

The appropriate procurement appropriation end item code (hardware) will be used to finance the cost of activating a plant equipment package or facility in layaway at a Government-owned or producer-owned plant, provided the scope of work is limited to deprocessing, checkout, startup, and minor arrangements and repair.

B. MANAGEMENT OF THE INACTIVE BASE

Headquarters, U.S. Army Development & Readiness Command (HQ DARCOM), the Directorate for Requirements Procurement controls the programs and budgets for layaway of the DARCOM segment of the Army's production base and provides guidance and administrative control over the inactive industrial production base.*

U.S. Army Production Equipment Agency (PEQUA) provides technical assistance and engineering support to HQ DARCOM, DARCOM major subordinate commands, and other DA/DARCOM activities.

HQ DARCOM major subordinate commands (MSC's) and activities reporting directly to HQ DARCOM program, budget, manage, and maintain the inactive industrial production base under their jurisdictions. They also determine specific retention requirements for facilities, including retention of IPE in status codes 3H or 4F. The MSC is also responsible for identifying and reporting IPE to DIPEC. A list of current status codes is included at the end of this report in Appendix I.

*AR 700-90, Subsection 5-3

Status code 3H includes IPE from the departmental reserves in GOGO installations or activities, subject to intermittent use, but required to remain in place to support the current assigned mission of the installation or activity.* Status code 4F includes idle IPE in the general reserve certified by the Armed Services Procurement Planning Officer (ASPPO) and the Procuring Contracting Officer (PCO) that mobilization base requirements are being developed in support of a planned emergency production schedule or that the equipment will be required to support foreseeable future military production.

These requirements are based on mobilization production requirements reflected in the most current Production Base Plan (PBP).

The chief of engineers has overall responsibility for construction performed as part of the layaway program.

Commanders have the responsibility for establishing the following management programs and controls on plant equipment:**

- Provision for screening DIPEC for IPE prior to procurement, rebuild, and repair and to fill voids or replace unserviceable or obsolete equipment in PEP's.
- Annual plant equipment package review to determine if retention criteria are met. Plant equipment packages not meeting these criteria are discontinued.
- Testing programs to determine the actual operating capability (condition code) of each item of equipment before layaway or after exposure to adverse storage conditions.
- Programs to assure that plant equipment retained by the Army in a plant equipment package is stored in accordance with TM 38-260 and MIL-STD-107.
- Records of maintenance costs for use in preparedness planning.
- Preventive maintenance programs.

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* AR 700-43, Appendix 1-C

**AR 700-90, Subsection 5-12

Prior to being stored, equipment in plant equipment packages is to be placed in satisfactory operating condition. Technical assistance is available from DIPEC for inspection of IPE to determine its condition, if necessary. Commanders of Army installations and activities are to take the following actions with regard to Army-managed plant equipment and ST/STE under their jurisdiction being utilized in a production operation nearing completion:

- Evaluate and record the condition and operating capability of each item of equipment beginning not later than 30 days prior to the end of production, based on the following:
  - Analysis of the inspection, production, and maintenance records pertaining to the equipment.
  - Visual inspection of the equipment.
  - Analysis of the performance capability of the equipment.
- Accomplish cleaning and preservation as prescribed in MIL-STD-107 on each item of equipment. This action is to be initiated within 48 hours after the item is no longer needed for the production operation being completed.
- Record the condition code and supplementary information on the operating capabilities for each item of equipment. A copy of this record will be affixed to each item being placed in layaway.
- Process for layaway in accordance with the requirements of MIL-STD-107 and the following:
  - If the condition and operating capability were not recorded prior to shutdown, each item of equipment is to be inspected and tested to determine whether it has the required operating capability. In the case of machine tools, testing includes both static and dynamic testing. Equipment previously stored in a plant equipment package without records indicating a

satisfactory operating condition is to be tested and repaired or replaced as necessary.

- If testing indicates that the condition of the equipment precludes satisfactory performance, one of the following actions is to be taken:

  = The equipment is replaced with equipment from unassigned reserves or excess inventories.

  = The equipment is repaired or rebuilt to the extent necessary to perform the operation satisfactorily for which it is retained.

  = The equipment is laid away with deficiencies, but in such cases, the deficiencies are identified and recorded. Followup plans and actions are taken to replace or rehabilitate the unserviceable equipment.

o Report IPE that is excess to Army layaway line requirements to DIPEC for redistribution or disposal as prescribed in AR 700-43.

o Initiate a Format A for equipment to be retained to meet Army mobilization requirements.

o Request PEQUA assistance when guidance is required on layaway cost estimates, preparation of exhibits, evaluation of layaway methods, procedures and materials, or to effect coordination with DIPEC.

C. RETENTION PROCEDURES*

At least 60 days before the end of production, the need for retention must be established, based on mobilization production requirements. Inactive plant equipment and other essential equipment, including ST/STE, to support emergencies is retained only as approved plant equipment packages. The following procedures establish plant equipment packages.

*AR 700-90, Subsection 5-14

Format A and supplemental data sheets are submitted to obtain authorization for the retention of IPE.

When a plant equipment package is required that includes equipment shortages, a request for a "conditional" plant equipment package may be initiated. In such cases, the Format A is supplemented with:

- A justification of the need for the proposed plant equipment package.
- A list of available IPE.
- A list of IPE proposed for subsequent acquisition.
- A time-phased plan for the acquisition of needed equipment.

The Format A will be signed by the commander or the deputy of the preparing command. Six copies of the Format A and supplemental data sheets are submitted through PEQUA to HQ DARCOM for review and approval before forwarding through HQDA to ASD(I&L) for final approval. DIPEC and the applicable contract administration services agency are provided copies of the Format A and enclosures except for the supplemental data sheet. The transmittal letter to PEQUA on Format A reflects that information copies have been provided DIPEC and the cognizant property administration/contract services office.

After receipt of the information copy of the Format A, DIPEC assigns a temporary four-digit number to the items and notifies the preparing command and activities listed in the previous paragraph.

Upon receipt of notification of approval of the Format A and the number assigned by ASD(I&L), the preparing command processes equipment for long term storage and submits to DIPEC a DD Form 1342 (DOD Property Record) annotated with the ASD(I&L) number for each item of IPE retained in the line.

In the event the Format A is disapproved by any of the reviewing levels, the preparing command ensures that PEQUA, DIPEC, and the cognizant property administration/contract service offices are

notified. The reporting procedures and time periods established for Format C then apply.

Industrial plant equipment held at its present location pending completion of emergency production planning with the producer, or to support foreseeable future military production contracts, is reported to DIPEC under status code 4F. All IPE at GOGO installations that are required to support the currently assigned mission is reported to DIPEC under an appropriate status code (App 1C, AR 700-43). ASD(I&L) approval is not required for retention of this equipment in instances where the GOGO has been selected as a mobilization planned producer for a specific mobilization end item.

Government funding of packages containing producer-owned equipment will be considered only as a last resort to preserve an essential production base. Format A procedures are used to establish plant equipment packages in these instances. Detailed justification is required to obtain necessary approval prior to funding such layaway.

D. INACTIVATION PROCEDURES (SHUTDOWN, STORAGE PREPARATION, AND STORAGE MAINTENANCE)

As mentioned previously, the commanders of the Army installations and activities in the production base are responsible for IPE that is not required for current production but which is desired to be retained as a PEP for future mobilization requirements. TM-38-260, Chapter 3, established the procedures to be followed at the time of IPE shutdown so that a uniform policy is available. Other plant equipment (OPE), special tooling, and special test equipment are included in the procedures.

1. General Shutdown Maintenance Procedures

Appendix B, Armed Services Procurement Regulation (ASPR) sets forth binding contractual requirements related to preventive maintenance of Government property in the possession or control of the producer. Included under the preventive maintenance clauses are provisions for preservation of equipment that will not be used for a period of time and accessories and special tools furnished with an item of industrial plant equipment but not regularly used with it.

When metalworking machinery and related plant equipment are allocated for storage following the end of production, the time element between shutdown and processing for long term storage is referred to as interim storage. During interim storage, grit, grease, fingerprints, and any acid and alkali residue may cause considerable damage to critical functioning or close tolerance surfaces. These residues form a coating or crystallized sediment. Once this coating or sediment has formed, considerable disassembly may be required to accomplish its removal and the removal of resultant corrosion. Therefore, it is paramount that established shutdown procedures are followed.

As production is phased down, either using activity, producer or Government, is responsible to evaluate the production capability of each item of IPE, other plant equipment, special tooling, and special test equipment.

The operating capability (condition code) of the item is based on its general purpose utilization. A list of condition codes is included in Appendix I, at the end of this report. Both static and dynamic (analytical) testing are intended to be performed. However, each item to be laid away should be mechanically capable of performing the required operation for which it is retained. In addition to condition coding, unusual circumstances are noted, i.e., missing parts, defective components, even though not utilized for last production, erratic operation, etc. These data provide backup permanent records maintained by the producer, e.g., DD Form 1342 (DOD Property Record). A sample is included in Appendix H, at the end of this report.

Shutdown maintenance procedures are to begin as soon as the IPE becomes idle and to continue down the production line until the last item is turned off. Every effort is intended to be directed toward initiating these progressive maintenance actions within 48 hours of first machine shutoff. The procedures represent the minimum cleaning and preservation operations to be performed on plant equipment. They do not, however, release any responsibility for disassembly when disassembly is required to meet the minimum requirements of cleaning and preservation for long term

storage. Manufacturing residues are carried by the coolants to cracks and voids throughout the machine, and, to ensure adequate removal of these residues, varying degrees of disassembly are necessary. Under normal atmospheric conditions, it is estimated the procedures provide interim protection for a 30/60 day period, at which time additional cleaning and preservation are mandatory.

The following procedures are to be followed when performing shutdown maintenance on each item of IPE, OPE, special tooling, and special test equipment:

- Remove covers, inspection plates, guards, etc. , as necessary, to facilitate removal of manufacturing residue. Standard accessories and attachments, such as chucks, face plates, steady rests, tool holders, grinding wheels, consumables, dies, jigs, arbors, and fixtures are detached prior to external cleaning.

- Drain the coolant system of all soluble and cutting fluids. Remove residual sediment, sludge, and manufacturing residue from accessible reservoirs, drip pans, and machine voids.

- Clean all exterior machine surfaces (precision, painted, and unpainted), removing manufacturing residue, shop dirt, contaminants, etc. with cleaning solvent, P-D-680. Removal of rust and fingerprints is in accordance with guidelines set forth in Chapter 2 of TM-38-260. Surfaces cleaned with cleaning solvent, P-D-680 are thoroughly dried. A protective coat of preservative oil, P-10, Type I, Grade 30, is then applied to the dried, bare metal surfaces. (Note: Caution is necessary when cleaning with P-D-680 to prevent the solvent from damaging motors, control panels, open bearings, etc.) A list of preservatives is included in Appendix I at the end of this report.

- Install a sufficient quantity of solution A in the coolant reservior(s) to permit free circulation of the solution through the pump and piping system when the equipment is cycled. Solution A is made from one part

lubricating oil P-10, Type I, Grade 30, and nine parts dry cleaning solvent P-D-680.

- If the coolant system is of such size that it would be uneconomical to flush (over 50 gallons), it is normal to open the lines and bleed sufficient flushing solution through the system, lines, etc., to ensure freedom from contamination, sludge, grit, etc. However, if an auxiliary pump is used, the machine pump is removed or disconnected during the cycling operation and disassembled to ensure complete cleaning and subsequent preservation.

- Reinstall covers, inspection plates, guards, etc., removed to facilitate external cleaning to the extent necessary to ensure safe machine operations. All lube systems, gear boxes, oil cups, grease fittings, etc., are checked to ensure each is filled to operating levels. Cycle the machine for approximately 15 minutes or as required to bring operating oils and fluids up to normal running temperature and, at the same time, causing as much grit, dirt, sludge, and residue as possible to be in suspension. During the cycling operation, solution A is permitted to flow freely over machine precision surfaces normally subject to soluble and cutting oils, and back through the reservior to accomplish as much washing action as possible. During the cycling operation, carriages, tables, slides, etc., are manipulated (power or manual) to assist in the washing-down action.

- Immediately following cycling, drain solution A from the coolant system(s). It sometimes is necessary to use a suction pump to ensure complete removal of fluids. Visual inspection of internal and external surfaces and mechanisms verifies the completeness of cleaning and provides a basis for determining whether disassembly will be required for additional cleaning.

- Coat all systems drained and/or cleaned with preservative oil P-10, Type I, Grade 30. This is accomplished by flushing the systems with the

previously mentioned preservative oil. External precision and unpainted surfaces are coated with preservative oil, P-10, Type I, Grade 50. Precision mating surfaces are manipulated manually to ensure coating with preservative. An exception may be systems normally lubricated with high pressure, light viscosity oils, e.g., high speed, close-tolerance spindle assembly, etc. These assemblies are preserved with preservative oil P-9.

- Charge pressure type grease fittings with preservative grease P-11. Fill oil cups with manufacturer's recommended lubricant.

- Clean and preserve accessories and attachments previously removed at the same time as the parent machine using the same cleaning materials, processes, and preservatives.

- Clean and preserve special tooling in accordance with the directives in the preceding paragraph.

- Handle each item of special test equipment on an item-by-item basis, since no specific instructions are provided. However, thoroughly clean the equipment (except electrical or electronic test equipment) with preservative oil P-10, Type I, Grade 30.

- After items of IPE, OPE, special tooling, and special test equipment are cleaned, preserved, and placed in interim storage, cover them with a protective dust cover to prevent recontamination of the item.

2. Records*

All records for each item of IPE, OPE, special tooling, and special test equipment should be updated to reflect all findings and any actions taken during shutdown maintenance.

*TM 38-260, Section 3-2

3. Storage Preparation*

Prior to the storing of IPE retained as a PEP, Army MSC's must ensure that the operating capability (condition code) based on general purpose utilization of each item of IPE being laid away is accurately determined and recorded. The commands are responsible for ensuring that each item of IPE being laid away is mechanically capable of performing the required operation for which it is retained.

4. Rehabilitation of Industrial Facilities**

If the condition and operating capability is not recorded before equipment is readied for layaway, each item of equipment is to be inspected and tested to determine whether it has the required operating capability. If tests indicate equipment cannot perform to requirements, one of the following actions is required:

- Replace the equipment with equipment from unassigned reserves or excess inventories.
- Repair or rebuild the equipment to the extent necessary to perform the operations satisfactorily for which it is retained.
- The equipment may be laid away with deficiencies, but in such cases, the deficiencies are to be identified and recorded. Followup plans and actions are required to replace or rehabilitate the unserviceable equipment.

5. PEP Preservation Level

Plant equipment packages stored in Government central storage are to be preserved and packaged Level A, packed Level B, and skidded in accordance with MIL-STD-107 and MIL-HDBK-7-1 prior to placement in long term, controlled storage.*** Unless otherwise directed by DIPEC, items in storage on aluminum skids being transferred in place to a PEP will remain on the aluminum skids until such time as the item is physically moved, except that the item may remain on aluminum skids for shipment to use. Costs incurred in the removal/replacement

*AR 700-90, Subsection 5-13
**AR 700-90, Subsection 5-13d
***DSAM 4215.2, Chapter 5-E and AR 700-43, Appendix 3-C

of skids being transferred in place to a PEP will remain on the aluminum skids until such time as the item is physically moved, except that the item may remain on aluminum skids for shipment to use. Costs incurred in the removal/replacement of skids are the responsibility of the applicable MSC. Army technical manual TM 38-260 supplements MIL-STD-107 and MIL-HDBK-701 for protection of Army package plant items for other than Army requirements. Level A packaging is designed to provide the required degree of protection under the most severe conditions known, or anticipated.

Preparations for standby-in-place storage are to be made immediately following, or during, shutdown. Equipment is to remain in the original operating position and may be connected to power. Preparations must be in accordance with the applicable requirements of Appendixes A and B of MIL-STD-107E at the level specified. If no level is specified, selection is to be made in accordance with paragraph 4.2.4 of MIL-STD-107E. Exercising of equipment is to be as specified by the cognizant activity to maintain a high level state of readiness when necessary.

When equipment is scheduled to be stored adjacent to or on-site, it is necessary to determine whether any equipment is nonseverable and should, therefore, remain in its installed position. Preparation for such storage is to be in accordance with the applicable requirements in Appendixes A, B, D, and E of MIL-STD-107E at the required levels. If no level is specified, selection is to be made in accordance with paragraph 4.2.4 of MIL-STD-107E.

6. Storage Maintenance*

Equipment in storage is to be kept free of deterioration. This includes the inventory of the DOD general reserve and equipment retained in layaway packages as standby in place, on-site, and adjacent to. An inspection plan, acceptable to the Government, is to be established at each storage location. The plan must contain provisions to ensure adequacy of equipment preservation in each of the types of storage used. The plan is to include inspection of gear cases and other internal mechanisms to ensure that items are

*MIL-STD-107E, Appendix E

properly preserved and free of contamination. Sampling inspection is required in accordance with MIL-STD-105. Inspection results are to be used in determining the frequency of inspections. Corrective action must be taken immediately when unsatisfactory conditions are found.

When a plant equipment package is received into a storage facility, the procedures are the same as for all other IPE except no consideration is to be given to PEP items for analytical inspection/operational testing or repair/overhaul, unless requested by the owning MSC and directed by DIPEC.*

7. Requirements for Shipment and Storage

Certain requirements are applicable to all programs involving shipment or storage of IPE. The following steps are common to and are to be performed under all programs:**

- o Thorough cleaning and preservation, internal and external, immediately following or during shutdown. All rust, sludge, chips, and other contaminants to be removed.

- o Assembly of all manuals, installation drawings, historical records, other documentation, replacement parts, accessories, and attachments.

- o Performance of inspection services to determine compliance with the applicable preservation/packaging and packing requirements of MIL-STD-107.

- o Completion of historical, property, and inspection records.

- o Installation of dust shields when experience or judgment indicates dust or other material accretion on machines is significant.

Plant equipment, component parts, accessories, repair parts, and tools are to be cleaned, preserved, and packaged as specified in MIL-STD-107. All cleaning and preservation to be in accordance with MIL-P-116. All machine tools require

*DSAM 4215.2, Chapter 2
**MIL-STD-107E, Subsection 5.3

thorough cleaning and preservation immediately following shutdown, with special attention to coolant, hydraulic, and lubrication systems to eliminate the necessity for later major disassembly to remove contaminants that may congeal during an idle period.

Preservation/packaging is to be accomplished within buildings that are rainproof and will prevent, substantially, all infiltration of wind-blown dust. The processing area is to be heated and equipped with adequate processing equipment such as spray booths, preservative tanks, etc. Equipment brought into processing areas is to be allowed to reach ambient temperature before processing.*

Materials are to be as specified in MIL-STD-107 or as specified in the referenced packaging or material specifications. All materials are to be free of defects affecting serviceability.

Preservatives specified in MIL-STD-107 and the methods of application are to be in accordance with MIL-P-116.

Thorough cleaning and drying are to be accomplished prior to the application of preservatives. Unless otherwise specified, all surfaces of the item(s) are to be cleaned by process C1, MIL-P-116, and drying is to be accomplished by one of the drying procedures also listed therein. Cleaning, drying, inspections, fingerprint removal, and the application of preservatives should comprise an uninterrupted series of operations, holding the total elapsed time to the absolute minimum. If cleaned surfaces tend to rust before preservation, the entire process from cleaning through preservation is to be confined to small sections, or the solvent used (P-D-680) for final wiping of small cleaned areas should contain about 5% of P-10, Type I, Grade 30 preservative. Prior to cleaning machines with solvents, exposed precision bearings, motors, control panels, other electrical systems, and items containing organic materials are to be covered or removed to prevent damage or contamination.

*MIL-STD-107E, Subsection 20.1.1

After cleaning and drying and before the application of preservatives, critical operating surfaces and other machined surfaces are to be treated to remove fingerprint and perspiration residue. The compound is to conform to MIL-C-15074 and the procedures are to be in accordance with MIL-P-116.

Preservatives are to be applied to clean interior and exterior unpainted surfaces by spraying, brushing, dipping, operating the machine under power at lowest speed for circulating the preservative, or other applicable methods specified in MIL-P-116. Care is to be taken to cover only the required surfaces, with minimum overlap on adjacent painted surfaces. After draining liquid preservatives from internal systems, all trapped pools of preservative are to be removed by suction pump or other appropriate means.

The degree of protection to be applied to plant equipment for shipment or storage depends on the conditions that can be foreseen and which can be reasonably anticipated.* Adequate, but not excessive, protection is to be provided to prevent damage or deterioration. Levels of protection are prescribed with the objective of providing selective standards for preservation/packaging and packing appropriate to the conditions to be encountered. Items are to be preserved/packaged and packed for shipment in accordance with the level/method specified in the shipping document. Items previously prepared to a higher level are not to be reworked to conform to any lower level(s) specified in the shipping document with the possible exception of packing of items for air shipment. Items previously prepared at a lower level are to be reprocessed to conform to any higher level(s) specified in the shipping document. The methods and materials for processing to specific levels are set forth in MIL-STD-107. It is essential that decisions concerning actions in accordance with military standards be made by, or based on recommendations of, qualified personnel thoroughly trained and experienced in this field.

Levels of protection apply equally to preservation/packaging and packing. These levels are:

*MIL-STD-107E, Subsection 4

- Level A - designed to provide the required degree of protection under the most severe condition known or anticipated during shipment, handling, and storage. Normally, Level A protection is provided for overseas shipments of IPE and retention in uncontrolled storage.

- Level B - (applicable to packing only) - designed to provide the required degree of packing protection under conditions known to be less severe than those requiring Level A, but more severe than those for which Level C is adequate. Items packed to level B are intended to be shipped and handled under cover and stored in warehouses or other structures having equivalent weather protection.

- Level C - provides the required degree of protection for known favorable conditions incident to handling, shipping, and limiting tenure in uncontrolled storage.

If no level of protection is specified, selection of the appropriate level is made in accordance with Joint Regulation "Preservation-Packing, Packing and Marking of Items of Supply" (AR 700-15; NAVSUP 4030.28; AFT 71-6; MCO 4030.33; DSAR 4145.7), using the level most suited to the circumstances. When a combination of conditions used for determination of a level falls within more than one level, the highest of these levels apply.

Caution is to be exercised to ensure that the preservative is not rubbed off after application.* Areas with discontinuous preservation are to be recoated with the same type preservative. Where blocking or bracing comes in contact with preserved areas, greaseproof paper conforming to MIL-B-121, Grade A, Type I, is to be inserted, with double thickness fold, at the point of contact. The barrier materials should extend approximately 1/2 inch beyond the edge of the block.

Equipment is to be disassembled only to the extent necessary to permit inspection, cleaning, and preservation/packaging. All disassembly and reassembly are to be accomplished by technically qualified personnel knowledgeable of the types of

*MIL-STD-107E, Appendix B

machines involved. Care should be exercised in the handling of parts to avoid damage and conditions that promote the formation of corrosion. Parts and assemblies removed during disassembly are to be properly identified and matchmarked, when necessary to permit reassembly. Fasteners, including nuts, bolts, washers, and pins are to be reinstalled in their respective locations in one of the mating parts to prevent loss or improper selection during reassembly. Disassembly of high speed spindle heads should not be performed.

Prior to disassembly, each part and assembly requiring reassembly in a precise position with respect to mating part(s) are to be matchmarked. Matchmarked part(s) are identified by use of Type B, Class II, shipping tags, conforming to UU-T-81, attached to the mating parts. When required, the marked tags should be waterproofed in accordance with MIL-STD-129.

Wiring, piping, and tubing should never be cut. All disconnections are to be made at proper disconnect points, e.g., junction boxes, terminals, or fittings. Disconnected wires, pipes, and tubing should be clearly identified to permit proper reassembly.

Furnaces and ovens are to be cleaned and preserved/packaged in accordance with MIL-F-3296.

Prior to movement of any large furnace, an evaluation should be made by qualified Government personnel to determine severability. If movement action is required and inspection has disclosed that movement of the furnace from its installed position is economically feasible, only qualified Government personnel, assisted by a producer's representative when required, should make the decision. Subassemblies, attachments, and accessories are to be removed to avoid damage or to reduce cubage. Major members of a furnace are not to be cut. Ceramic muffle boards and radiant tubes are to be removed, packaged separately, and packed with adequate cushioning. Installation and operating instructions are to be placed in a waterproof and greaseproof envelope constructed of barrier material conforming to MIL-B-121,

Grade A, Class I, marked "Installation and Operating Instructions" and securely attached to the furnace.

All firebrick and insulation in electrode type salt bath furnaces with ceramic pots are to be removed and discarded. Firebricking and refractory lining are to be removed entirely from any other type of furnace that has been in uninterrupted service for 5 or more years if burned, cracked, or deteriorated sections are found. A furnace that has been in service less than 5 years, or has been in interrupted service under constant low heat while idle, and is substantially free from any type of deterioration is to be considered for transportation with its firebricking and refractory lining in place. Blocking and bracing of brick and lining are to be done in accordance with MIL-HBDK-701. Records should indicate whether firebricking or refractory lining has been removed.

Electrical and electronic equipment is to be cleaned and preserved/ packaged in accordance with MIL-E-17555. Electron tubes subject to damage if left in place during transportation are to be removed. Removed tubes and mating sockets should be marked as necessary to permit correct tube installation at time of reassembly.

Gasoline and diesel engines are to be cleaned and preserved/packaged in accordance with MIL-E-10062.

Abrasive items and materials are to be removed from the equipment and, if in excellent condition, are to be prepared in accordance with MIL-A-3816 for shipment with the parent item. For this purpose, grinding wheels in excellent condition mean:

- Sufficient remaining useful life that would justify shipment costs.
- Without damage.
- Without shop-detectable defects.

Hose and hose fittings not installed are to be cleaned and preserved/packaged in accordance with MIL-H-775.

Technical manuals, pamphlets, handbooks, and other documentation are to be packaged by submethod 1C-1 in accordance with MIL-P-116.

Welding equipment and supplies are to be cleaned and preserved/ packaged in accordance with MIL-W-45562.

Details for cleaning and preservation procedures are documented in TM 38-260, latest revision.

Packing includes selection of the appropriate shipping container; interior blocking, bracing, and cushioning; skidding; identification markings; loading; and cost factors necessary to prepare IPE, other plant equipment, special tooling, and special test equipment for storage or shipment.*

Since the requirements for each of the above are dependent upon the type of storage and the nature of the equipment, separate methods and procedures are required for each condition.

Detailed information on packing procedures, operations, and container construction is covered in TM 38-260 and DSAM 4145.2, Vol. II; TM 38-230-2; NAVSUP Pub 503; AFP 71-17; MCO P4030.21A, Preservation, Packaging, and Packing of Military Supplies and Equipment, Packing (Vol. II).

Inasmuch as preservation/packaging alone cannot provide all the protection that IPE and its accessories or attachments require, the selection and application of packing procedures are extremely important. Packing is generally considered to consist of the selection and use of an appropriate shipping container. It is this and more. It is not possible for the exterior shipping container to provide full protection. It is usually necessary to provide additional protection to IPE through the use of blocking, bracing, and cushioning.

*TM 38-260, Chapter 8

All IPE to be packed is to be studied carefully, considering the shape, size, weight, strength, and degree of fragility, in order to determine the packing requirements.

Additional consideration is to be given to the availability of mounting points, the degree of mounting points, the degree of disassembly required, special use requirements, and the handling and storage capacities at destination.

Each step of the packing procedure must be carefully performed to enable the contents to withstand the damaging forces encountered in transportation, handling, and storage.

Most machine tools, disassembled parts, accessories, attachments, or components require some kind of boxing or crating, depending on the level of protection specified. Boxing and crating are more common, however, for smaller tools, and for projecting parts that, due to the difficulty involved in their protection, must be removed from the basic IPE. Examples of these removed parts would be tables, motors, starters, electrical controls, brackets, disconnect switches, and similar items.

There are occasions when military concepts of packing require adjustment due to the specialized requirements of IPE. These should be minimal, so that military concepts can be applied whenever possible to promote standardization with its resultant economy and efficiency.

IPE to be transported by air is to be preprepared for shipment in accordance with specification MIL-A-25175, Packing for Non-Tactical Air Transport. This specification generally restricts weight and cube of material shipped by nontactical air and results in containers of light weight and low cube being used.

Some IPE requires packing in accordance with specific process specifications. The following types of equipment are to be packed at the required level in accordance with the specification cited:

Equipment	Specification
Compressors	MIL-C-3600
Electronic and electrical equipment	MIL-E-17555
Engines, gasoline and diesel	MIL-E-10062
Furnaces and ovens	MIL-F-3296
Grinding wheels and abrasives	MIL-A-3816
Hose and hose fittings	MIL-H-775
Welding equipment and supplies	MIL-W-45562

IPE, except the equipment specified in the two preceding paragraphs, is to be packed to the specified level of protection. If no level is specified, a level is to be selected, depending on the conditions of shipment, handling, and storage.

8. Criteria for the Levels of Protection*

a. Level A

(1) Industrial Plant Equipment Not Exceeding 1,000 Pounds

Each item of IPE, complete with attachments, accessories, and commponents weighing less than 1,000 pounds is to be packed in a PPP-B-621, Class 2, Style 2, 2-1/2, or 3, nailed and lock-corner wood box.

Each box with contents weighing more than 200 pounds is to be modified by the installation of skid runners in accordance with the applicable container specification.

Contents of each box are to be secured, water-proofed, cushioned, blocked, and braced in accordance with military standard MIL-STD-1186, Cushioning, Anchoring, Bracing, Blocking, and Waterproofing with Appropriate Test Methods.

Each box should be strapped with QQ-S-781, Flat Steel Strapping. The size and number of scraps

*TM 38-260, Subsection 8.2b

for each box are to be in accordance with the appendix of the box specification.

(2) Industrial Plant Equipment Not Exceeding 30,000 Pounds

Each item of IPE, complete with attachments, accessories, and components weighing more than 1,000 pounds but not exceeding 30,000 pounds is to be packed in a MIL-C-104, Nailed and Bolted, Lumber and Plywood Sheathed Wood Crate.

Blocking, bracing, anchoring, cushioning, and waterproofing are to be in accordance with MIL-STD-1186.

Closure and strapping are to be in accordance with the appendix to the crate specification except strapping is to be zinc-coated.

(3) Industrial Plant Equipment Exceeding 30,000 Pounds

IPE weighing over 30,000 pounds or in excess of the dimensional limitations set forth in specification MIL-C-104 is to be shipped in accordance with directions issued by the organization directing the shipment.

Blocking, bracing, anchoring, cushioning, and waterproofing are to be in accordance with MIL-STD-1186.

b. Level B (Applicable to Packing Only)

Note: Level B is the most common level of packing used for accessories, attachments, and components when preparing IPE for layaway or long term storage.

(1) Industrial Plant Equipment Not Exceeding 1,000 Pounds

Each item of IPE, complete with attachments, accessories, and components weighing 1,000 pounds or less, is to be packed in either a PPP-B-601 (domestic type) cleated plywood box or a PPP-B-621, Class 1, style as applicable, nailed and lock-corner box.

Each box with contents weighing more than 200 pounds is to be modified by the installation of skid runners in accordance with the applicable box specification.

Contents of each box are to be cushioned, blocked, and braced in accordance with MIL-STD-1186.

Boxes are to be strapped in accordance with the appendix of the applicable box specification.

(2) Industrial Plant Equipment Not Exceeding 16,000 Pounds

Each item of IPE, complete with attachments, accessories, and components weighing more than 1,000 pounds, but not exceeding 16,000 pounds is to be packed in open crates. The open crates should conform to Specification PPP-C-650, Open and Covered Wood Crates, or MIL-C-3774, 12,000 and 16,000 Pound Capacity Open Wood Crates, style optional depending on weight, size, and dimensions of the item(s) to be packed.

Blocking, anchoring, bracing, closing, and strapping are to be in accordance with the appendix to the applicable crate specification.

(3) Industrial Plant Equipment Exceeding 16,000 Pounds

Each item of IPE, complete with attachments, accessories, and components weighing over 16,000 pounds, but not exceeding 30,000 pounds, is to be packed in accordance with the requirements set forth in (2) above.

Equipment weighing over 30,000 pounds or in excess of the dimensional limitations specified in specification MIL-C-104 is to be shipped in accordance with directions issued by the organization directing shipment.

c. Level C

This level provides the degree of protection required when known favorable conditions during shipment, handling, and limited tenure of storage exist. It should be specified for immediate domestic shipment from user to user.

It involves providing the minimum protective measures required to ensure delivery to the first receiving activity without deterioration or damage during shipment and handling.

9. Cushioning, Blocking, Bracing, Anchoring, and Waterproofing

Cushioning, blocking, bracing, anchoring, and waterproofing are covered in detail in TM 38-260 and MIL-STD-1186. These subjects relate to packing for storage as well as packaging for shipment. The publications detail the blocking and bracing of equipment with long overhanging sections to assist in preventing damage to bearings, ways, and casting.

10. Shipping Containers

Shipping containers authorized for IPE include:

- Boxes - wood, cleated plywood.
- Boxes, wood, nailed and lock-cornered.
- Crates - open and sheathed.

Details for containers may be found in TM 38-260, PPP-C-650, MIL-C-3774, and MIL-C-104.

11. Inspection of Equipment

Inspection of equipment prepared for shipment and storage is to be performed in a manner, and to the degree, that will assure acceptance of only approved methods and materials; requirements include complete inspection records.* Inspection is to be performed by qualified personnel who, by training and experience, are familiar with the design, assembly, and operation of the type of equipment involved.

The equipment is to be inspected to confirm that thorough cleaning has been accomplished and that all damaged or missing parts have been or are scheduled to be replaced. Disassembly and cleaning are to be accomplished in accordance with the requirements contained in MIL-STD-107E.

The equipment is to be inspected to ensure that correct reassembly was accomplished after cleaning and that surfaces requiring a preservative have been treated.

Inspection is to be performed to assure that all accessories, attachments, and components have been properly cleaned, preserved, packaged, or installed on the machine on which they are used. When items are not installed on the machine, they are to be packaged correctly, identified with the machine on which they are used, and stored with the parent machine when possible. Packing lists should be checked to ensure conformance to MIL-STD-129. Inspection of the skidding, packing, shrouding, and loading is to be performed to ensure conformance to the requirements contained in MIL-STD-107E.

*MIL-STD-107E, Appendix A

Unless otherwise specified, all containers and packaged material are to be marked in accordance with MIL-STD-129.

12. Historical Records

Historical records should be complete and include all available data pertinent to each item of plant equipment.* Inspection forms are to be available for review of the results of the last inspection and should contain available space to record results of subsequent inspections performed during the storage period. Packing lists are to be utilized in accordance with MIL-STD-129; these are minimum record requirements. When available, photographs, installation, and foundation drawings, producer's parts manuals, and other producer's data related to operation, maintenance, and lubrication are retained with the equipment. These records and data should be shipped with equipment to which they pertain. Plant layout drawings of package lines, when available, are to be retained in accordance with procedures established by the owning agency.

13. Engineering Practices

Sound engineering practices are to be observed in the storage of plant equipment.** In addition to other protective measures, proper support of machine tools base(s) is required to prevent distortion. Skids should provide proper load points for machine support members and load transfer points are to be maintained in storage. Equipment mounted on wooden skids is subject to loads deriving from warping of skid components in varying humidity environments. These loadings can distort precision machinery and in extreme cases, structural damage may occur. Machine anchor bolt holes (when provided) are used to secure machines to skids. After a machine has been located in storage, the machine bolt holddown nuts are to be loosened a minimum of 1/2 inch from the machine base and the bolt threads preserved with P-2 preservative. Other machine-to-skid retention devices should be similarly adjusted. Machines mounted on aluminum skids do not require unloading adjustments of holddown bolts or other retention configurations.

*MIL-STD-107E, Subsection 5.2
**MIL-STD-107E, Appendix E

It is imperative that the machine-to-skid retention devices, whatever the configuration, are properly tightened and secured prior to movement of equipment.

14. Storage Locations*

a. Standby-In-Place

Preparations for standby-in-place storage are to be made during or immediately following shutdown. Equipment should remain in the original operation position and connected to power. Preparations are to be in accordance with the applicable requirements of Appendixes A and B of MIL-STD-107 at the level specified. If no level is specified, selection is to be made in accordance with 4.2.4 of MIL-STD-107. Exercising of equipment may be specified by the cognizant activity to maintain a high level state of readiness.

b. Storage On-Site or Adjacent

When equipment is scheduled to be stored on-site, it is necessary to determine whether any equipment is nonseverable and should, therefore, remain in its installed position. Preparation for storage on-site is to be in accordance with the applicable requirements at the required levels. If no level is specified, selection is to be made in accordance with 4.2.4 of MIL-STD-107.

c. Central Storage

When equipment is stored in Government facilities, it is to be prepared for storage as mentioned in preceding statements to the required level.

15. Controlled and Uncontrolled Storage**

There are two types of storage, controlled and uncontrolled. The term controlled applies only to the levels of relative

*MIL-STD-107E, Subsection 5.8
**MIL-STD-107E, Appendix E

humidity maintained in deterioration-retarding storage climates.

a. Controlled Storage

Controlled storage is designated as follows:

- Type A - controlled humidity storage: dynamic dehumidification, enclosed building or hutment. Relative humidity maintained at 50% or less.
- Type B - heated storage: temperature-regulated relative humidity, enclosed building or hutment, relative humidity maintained at 50% or less.

b. Uncontrolled Storage

Uncontolled storage is a designated area with no relative humidity control and may be as follows:

- Enclosed buildings.
- Outdoors, under cover (shed, lean-to).
- Outdoors, no cover structure or similar protection from the elements.

Outdoor storage is satisfactory for rough items, e.g., tanks, forgings, conveyors, drop hammers, furnace shells, heavy castings, and forgings.

16. Storage Maintenance

Equipment in storage is to be free of deterioration. This includes the inventory of the Department of Defense general reserve and equipment retained in layaway packages as standby in-place, on-site, and nearby. An inspection plan, acceptable to the Government, is to be established at each storage location. The plan should contain provisions to ensure adequacy of equipment preservation in each of the types of storage used. The plan should include inspection of gear cases and other internal mechanisms to ensure that items

are properly preserved and free of contaimination. Sampling inspection is to be performed in accordance with MIL-STD-105. Inspection results are used in determining the frequency of inspections. Corrective actions are to be taken immediately when unsatisfactory conditions are found.

E. PLANT EQUIPMENT IN LAYAWAY

A continuous program should be conducted to improve and maintain plant equipment packages in the highest state of readiness that can be economically justified.* Accurate records are to be established and maintained on the condition and operating capabilities of IPE held as mobilization reserves. The condition is recorded by the last user on DD Form 1342 (DOD Property Record) and verified in block 57 by a Government representative. Items for which such a report are not available will be analytically or operationally tested to the extent economically feasible.

IPE in plant equipment packages that could be loaned to producers is not to be included in contract solicitations without prior approval of HQ DARCOM. Requests for such approval are to be submitted by letter with full justification and should include a listing of IPE. After the award of a contract predicated upon the use of this IPE, the command negotiating the contract is to submit a DD Form 770-1 (Intradepartmental Request for Release of Equipment) in accordance with paragraph 5-18c, AR 700-90.

A copy of the HQ DARCOM approval is to be attached to the DD Form 770-1 and referenced on the request.

IPE in approved layaway lines is not to be inspected by producer personnel or personnel of any Army element without prior approval from the planning element.

Since DIPEC determines retention levels for the DOD general reserve based on demand history, commands at all echelons are to ensure that appropriate screening action and/or requisitions have been initiated to DIPEC for all current and future requirements, including voids and unserviceables in plant equipment packages.

DIPEC issues mobilization shipping orders annually for IPE in plant equipment packages and distributes copies to each mobilization

*AR 700-90, Subsection 5-16

planning activity and PEQUA. Planning activities are to establish procedures to ensure that plant equipment and ST/STE not included on DIPEC mobilization shipping orders are placed on standing mobilization shipping orders. These shipping orders are to be updated annually during the annual recertification of plant equipment packages.

When IPE contained in a plant equipment package is proposed for use in-place or on-site for other than the planned end item(s), a DD Form 770-1 (Intradepartmental Request for Release of Equipment) or a DD Form 770 (Interdepartmental Request for Release of Equipment) is to be processed for approval as a loan in accordance with the procedures contained in paragraph 5-18, AR 700-90.

F. RECERTIFICATION OF PEP'S*

Commanders with jurisdiction over plant equipment packages are to review the items contained therein to:

- Verify annually the mobilization production requirements associated with each plant equipment package.
- Verify annually the quantity and location of all plant equipment and other essential equipment associated with plant equipment package.
- Assess annually the reactivation lead-time for achieving F-day (first production) and P-day for each end item based on the assumption that raw materials, components, and necessary work force will be readily available. If these factors have a critical impact on reactivation, a separate analysis of their effect is to be provided.
- Identify annually equipment voids that exist in each plant equipment package. Voids are computed based on both the minimum investment level and maximum investment level mobilization production requirements. Voids are separated into two categories:
  - Pre-M-day - Voids that will impact on the buildup schedule if not filled prior to M-day.

*AR 700-90, Subsection 5-16

- Post M-day - Voids that will not impact the buildup schedule since the equipment can be obtained in a satisfactory time after M-day.

o Verify biennially the readiness of critical equipment in the plant equipment package through an on-site survey of the equipment.

o Evaluate biennially the readiness of the supporting facilities needed for reactivation of the plant equipment packages to include the physical, financial, and technical capability of planned producers, and the compatibility of equipment furnished by planned producers with the equipment in plant equipment packages.

PEQUA is to participate as an observer on at least one plant equipment package review for each DARCOM MSC annually.

Commanders are to recertify plant equipment packages by submitting a Format B in eight copies to PEQUA on dates established by PEQUA. The signature level specified for submission of Format A is to be followed. The Format B includes a summary of the review findings of each plant equipment package.

Procedures on submission of Provision of Industrial Facilities (PIF) projects for the purpose of filling plant equipment package voids are contained in Chapter 4, AR 700-90.

PEQUA is to review the recertifications and forward six copies to HQ DARCOM and one copy to DIPEC within 30 days of receipt. HQ DARCOM is to forward four copies to HQDA within 15 days of receipt. Commands that recertify plant equipment packages are to provide an extract copy of the Format B to the applicable defense contract administration activity.

The data generated by the plant package reviews is used to provide input for the production base plan as set forth in Chapter 2, AR 700-90.

G. REVISIONS AND CHANGES TO PEP'S (FORMAT A)*

Commanders with jurisdiction over plant equipment packages are to ensure that changes and revisions to Format A are promptly submitted for:

1. Changes in Plant Equipment Packages

Change notices to report a complete activation of plant equipment package, a change in planned producer, or the deletion of end items. A sample change notice is contained in Figure 5-7, AR 700-90.

The signature level, number of copies, and distribution used on an original Format A are to be followed.

2. Revisions

The Format A is to be used to submit revisions when planning requires the addition of new end items to an approved plant equipment package. The Format A is to be marked "revision ----" and numbered serially. The signature level, number of copies, and distribution used on an original Format A are to be followed.

Formal notification of approval of the revised Format A is to be issued by higher headquarters to the submitting command, with information copies provided PEQUA and DIPEC. Submitting commands are to notify the cognizant defense contract administration activity of all Format A approvals.

3. Loans**

All items of IPE comprising the complete complement of equipment retained in an ASD(I&L)-approved plant equipment package in DARCOM are to be retained intact and are not to be allocated to other use without the approval of HQ DARCOM. Loan of IPE from plant equipment packages must meet the following criteria:

*AR 700-90, Subsection 5-17
**AR 700-90, Subsection 5-18

- o End item to be produced is identified in DODI 4410.3, Master Urgency Listing (MUL) or is required to meet a MILSTRIP priority of 01 or 02.

- o Suitable equipment is not available from unassigned reserves or excess inventories.

- o Suitable equipment cannot be procured from industry within the time required to meet production schedules.

- o Funds are available and purchase order or contract for IPE has been issued.

At the time a loan of IPE is being considered, the responsible command is to determine whether the layaway line from which the item(s) is to be loaned is required for retention to meet mobilization requirements. If it is required to be retained, provision is to be made by the borrowing activity for the return or replacement of the borrowed equipment within 1 year. DARCOM loan requests are to be forwarded by the DARCOM MSC to PEQUA for review and further processing.

DD Form 770 and DD Form 770-1 for loans of industrial plant equipment are to be completed in accordance with AR 700-43.

A single DD Form 770-1 may be used for more than one item by attaching a supplemental list, provided all items are from the same plant equipment package, stored at the same site, and planned for use at the same location.

Forms originating from DARCOM activities are to be submitted through the DARCOM major subordinate command with responsibility for the layaway line to PEQUA. An original and two copies are to be forwarded to PEQUA.

Forms are to be signed in Section I by the procuring or administrative contracting officer when the item is for use by a producer, or by the commander or deputy commander of the requesting installation when the item is for use by a military installation.

Section II of DD Form 770-1 originating from DARCOM activities is to be signed by the director or deputy director of the procurement and production directorate of the DARCOM major subordinate command with responsibility for the layaway line.

Section II of DD Form 770 is to be completed by HQ DARCOM for Army ASD(I&L) approved IPE. Approval of the DARCOM MSC is indicated by a signed transmittal letter.

After IPE is shipped on a loan basis from an approved layaway line, the initiating organization of the DD Form 770-1 must immediately submit DD Form 1419 (DOD Industrial Plant Equipment Requisition) to DIPEC, with a copy for the lending command, for screening and replacement of the borrowed item(s). Upon receipt of acceptable replacement item(s), PEQUA is to be notified, and the loaned item(s) is to be permanently transferred to the borrower.

Loans of plant equipment other than IPE and ST/STE are to be approved by the commander or his delegated representative having jurisdiction over the plant equipment package. Such loans are to be properly documented and controls must be established to ensure the prompt return of the equipment.

H. REACTIVATION*

Reactivations of plant equipment and ST/STE are to be approved by the commander or his delegated representative with jurisdiction over the plant equipment package when the following criteria are met:

- Item to be produced is listed on Format A.
- Item to be produced is a follow-on design for which the line was retained and represents an improved type model.
- Item to be produced is an improved type model or a follow-on item for which a revised Format A has been submitted.

*AR 700-90, Subsection 5-19

Requests to reactivate equipment in plant equipment packages are to be documented on DD Form 770-1 in accordance with the following procedures.

- Item 9 is completed to reflect which criteria apply.

- Item 9 is to include master urgency list priority number or MILSTRIP priority number; statement that requiring activity or producer will finance all transportation costs to and from the storage location as well as reprocessing costs; and fund citation of packing, crating, handling, and transportation (PCH&T) to ship the item to requestor.

DD Form 770-1 is to be signed in Section I by a procuring or administrative contracting officer when the item is for use by a producer or by the commander or his delegated representative of the requesting installation when the item is for use by a military installation.

Section II of DD Form 770-1 for DARCOM activities is to be signed by the director or deputy director of the procurement and production directorate of the DARCOM major subordinate command with responsibility for the layaway line. Information copies of the approved DD Form 770-1 are to be provided PEQUA and HQ DARCOM immediately upon approval.

The movement of all DOD-owned, idle IPE is authorized by DIPEC per Chapter 4, DSAM 4215.1/AR 700-43. Redistribution or movement of PEP items is to be made only with approval of the cognizant DOD component. DIPEC, in coordination with DOD components, will prepare and maintain plans for emergency movement of equipment from central storage sites to scheduled usage points in the event of a national emergency or mobilization. DIPEC is also responsible to:

- Compile cost data for transportation between DSA storage sites.

- Maintain liaison with the DOD components and GSA to provide assistance and resolve problems relative to IPE movements.

Funding for transportation costs of DOD-owned IPE and associated packing, crating, and handling (PC&H) costs is the responsibility

of DSA for movement of IPE assigned to DSA-owned PEP's from any source. The military departments are responsible for movement of IPE assigned to service-owned PEP's from any source.

As described in Section A3, Chapter III, the appropriate procurement appropriation end item code (hardware) is used to finance the cost of activating a plant equipment package or facility in layaway at a Government-owned or producer-owned plant, provided the scope of work is limited to deprocessing, check-out, startup, and minor arrangements and repair.

I. DISCONTINUANCE OF PEP'S*

Format C is to be prepared at the time a mobilization package no longer meets the retention criteria. The Format C is to be signed by the commander or his delegated representative with jurisdiction over the plant equipment package. For DARCOM activities, the Directorate for Requirements and Procurement, HQ DARCOM, is the approving authority. Six copies of the completed Format C are to be forwarded to HQDA.

The Format C is to be submitted to PEQUA by DARCOM activities with the disposition report required by AR 700-43. The disposition report reflects the commodity code, identification number, and recommended disposition for all of the items of IPE assigned to the line involved. In instances where reassignment of the assets is desired, the report is to be annotated to reflect that DD Form 1419's (citing the numbers) are being prepared.

PEQUA is to review the Format C and disposition report and forward them to the Requirements and Procurement Directorate, HQ DARCOM. The disposition report is to be retained by PEQUA pending notification of the Format C approval. Upon receipt of Format C approval from HQ DARCOM, PEQUA is to forward it to the owning command and request acknowledgement within 30 days that DD Form 1419's have been forwarded to the cognizant storage of contract administration services activity. Copies of the approved Format C and disposition report are to be forwarded by PEQUA to DIPEC within the time prescribed in AR 700-43. The submitting command is to notify cognizant DCAS activities and any non-DIPEC storage activities.

*AR 700-90, Subsection 5-20

Owning commands are to assure timely completion and distribution to DIPEC of DD Form 1342's (DOD Property Records) and DD Form 1419's. When required actions cannot be completed in 60 days, the owning command is to provide DIPEC a forecast of completion dates, with an information copy to PEQUA.

Submitting commands are to ensure prompt disposition of all equipment associated with the plant equipment package.

During the time that approval of Format C is pending, the command with jurisdiction over the line selects items for tentative reassignment to other lines meeting the retention criteria or to lines supporting active production. The total continued Army requirements, including DD Form 1419's as required, are to be transmitted to the cognizant administrative contract services office for transmittal to DIPEC with the idle report.

J. PEP STATUS REPORT*

DA Form 3353-R (Management of Defense-Owned Industrial Plant Equipment Package Status Report), also referred to as Reports Control Symbol DD(I&L) (AR)-642, is to be submitted annually with quarterly changes. The information submitted furnishes the status of the plant equipment packages on a quarterly reporting cycle. The report is used in conjunction with the plant equipment package review, the Production Base Plan, and the DIPR/NIPR Report.

The annual report is to be submitted in January and includes a complete listing of all plant equipment packages under the supervision of the reporting command in numerical sequence by command. Applicable Format B and the results of the plant equipment package review are to be attached to this report.

Reports submitted in April, July, and October are to include changes only to the January report. Each change is to be fully justified in the remarks section. Negative reports are required.

DARCOM MSC's are to prepare and submit 10 copies of the plant equipment package status report to the Director, Production Equipment Agency, Rock Island, IL 61201 by the first workday of January, April, July, and October of each year.

*AR 700-90, Subsection 5-28

PEQUA is to consolidate the reports and forward six copies to HQ DARCOM by the tenth workday of January, April, July, and October of each year, and forward two copies of the report to the Defense Industrial Plant Equipment Center, Memphis, TN 38114 at the same time the copies are forwarded to HQ DARCOM.

HQ DARCOM is to forward four copies to HQDA by the twentieth workday of January, April, July, and October of each year.

Plant equipment package status reports are required for the following items:

- Change of end item to be produced with the package.
- Change in the name and/or location of facility where the equipment would be used upon mobilization.
- Change in number or type of items due to modernization of the layaway package.
- Activation of the last item of Army-owned equipment in the layaway line reducing the total number reported on line 7 of the Format A to zero.
- All changes must be fully justified in the remarks section of the plant equipment package status report.
- On change reports, each change entry is to be prefixed by one of the following entries: An A for additions; a C for changes; a D for data to be deleted.
- Format and detailed instructions of the plant equipment package status report are shown in Figure 5-12, AR 700-90. A sample format is included in Appendix H, at the end of this report.

IV. EVALUATION AND ANALYSIS

A. CURRENT PEP POLICIES AND PROCEDURES

Current policies relating to industrial plant equipment used by the Army in the manufacture of ammunition metal parts is outlined in AR 700-90. The policies relating to plant equipment packages are inserted in the various sections that apply. Procedures covering IPE, both regular and PEP, are dispersed through many publications, such as AR 700-43, TM 38-260, MIL-STD-107, and others. Again, the procedures relating to PEP's are mixed with the procedures for regular IPE.

The policies and procedures appear to have been developed over many years and appear to be well established, with authority vested in logical places, responsibilities assigned and clearly stated, and general topics well covered.

Even though general policies and procedures are well established, it is difficult to locate the specific areas that apply to plant equipment packages. It is sometimes difficult to determine what policies or procedures apply to PEP, and thus, confusion is possible. Quick reference for specific procedures or policies as related to PEP's is not possible. A number of publications are required to obtain complete information, and since the publications have varying publication dates, the question of which authority is to be used is always present.

B. MANAGEMENT OF THE INACTIVE BASE

Management of the PEP's is clearly delegated to the DARCOM, Major Subordinate Commands (MSC's). This includes PEP IPE while actively used, during inactivation, and also in storage.

Since general policies and specific procedures detail that IPE designated to PEP is to be maintained while in use, repaired, or rehabilitated before it is stored, properly coded for its operating condition before storage, and inspected and maintained while in storage, all IPE in PEP's should be in ready condition with full confidence that they can produce the product for which the PEP was retained. Unfortunately, full confidence in each PEP's capability is not a reality. Industrial plant equipment retained in most cases is well preserved but apparently is questionable as to its operating capabilities.

Review of typical condition assessments conducted from June 1975 to May 1976 reveals that the original condition codes were not correct. Over 70% of the equipment in the PEP's at Kisco Company, Inc., St. Louis, Missouri was downgraded during the assessment. About 5% of IPE examined at the Ravenna Army Ammunition Plant, Ravenna, Ohio, was downgraded with almost 54% considered not comparable in coding because of revisions to the code designation. At Temco, Inc., Nashville, Tennessee, 24% of the equipment checked was downgraded, 7% of the IPE listed on the DIPEC listing was not in the PEP, and about 24% used in the PEP was not previously listed.

C. INACTIVATION AND STORAGE

The procedures relating to the actions during shutdown for both regular IPE and IPE assigned to PEP's are similar. If the current procedures are followed using the specified materials and the operations are performed by knowledgeable workers in a conscientious manner, the equipment can be retained in good condition.

Use of controlled storage is essential for long term storage. Controlled storage is defined as humidity control of 50% or less or temperature control so that relative humidity of 50% or less is maintained. Without controlled storage, long term preservation is considered adequate for approximately 3 years as stated in 5-13, TM 38-260. With controlled storage, no time limit is established.

Preservation maintenance on a statistical basis, as established, is necessary to assure continued confidence in the original preservation and to correct any problems that occur during storage.

The three types of storage available for PEP's are established as in-place, on-site/adjacent to site, and Government central storage. When PEP's are stored in-place or on-site/adjacent to site, they have a facility in which to operate. The producer is definitely established resulting in a greater opportunity for retaining the necessary skill base. Producer's equipment that is complemented by the Government IPE has greater possibility to be retained and available again in the future along with the producer's processes and methods. Materials handling equipment that is essential in the production process has greater chance of being available when reactivation is necessary. When IPE from PEP's is placed in Government central storage, these benefits are or can be lost. Under such conditions, the value of PEP retention is questionable

if the PEP is not a complete line. Even with a complete line, a PEP has limited value without a facility in which to operate and without a producer's skill and materials handling ability.

Even though on-site/adjacent-to-site storage appears to be the best choice for speedy reactivation of PEP equipment, the equipment is more vulnerable to cannibalization when stored in this fashion. If cannibalization does occur, the equipment involved loses its ability to perform as expected and creates a significant loss of responsiveness to mobilization.

D. PLANT EQUIPMENT IN LAYAWAY

The choice of which PEP equipment to store is determined by the product need, the producer's ability to provide his own equipment, equipment availability, and equipment condition. Screening for PEP retention can only be performed by the MSC owning the PEP, according to the command's requirements. Screening of the IPE in the individual PEP is outlined in the equipment rehabilitation plan, Volume 2, PEP Modernization Program, issued under this contract. In general, a modified version of the reutilization value percentage (RVP) method currently used by the DIPEC for evaluation of equipment retained in the general reserve is suggested to be the best basis for rehabilitation and retention of IPE in PEP's. The modified RVP method is outlined in the equipment rehabilitation plan, as well as in Appendix G of this report.

The modified RVP method uses criteria such as useable equipment life, equipment design, ability to comply with new safety regulations, and original as well as equivalent replacement costs for evaluation. The equipment's ability to perform the operations for which it is to be retained is of prime importance for PEP's. Other considerations such as improved capabilities, productive ability compared with competition, and economic payback are of little interest for equipment in established PEP's. During modernization or establishment of new lines, these criteria should be considered, but they are not required for equipment already assigned to a task.

Currently, equipment in the mobilization base is of conventional design and was purchased with no consideration for eventual storage of the equipment. Because of this, preservation to prevent deterioration while in long-term layaway is more complicated than it need be. With the advent of new designs, new materials, and integrated electrical circuits, production equipment can be manu-

factured so that it can be easily retained in a stored condition when required, with confidence that deterioration will not happen. Equipment in the system can be modified during rebuild and upgrade to include the newer materials and electrical systems before they are laid away. Manufacturers and rebuilders of equipment should be required by the purchase specification to establish the major points on the equipment that require special care during deactivation and preservation for long-term storage.

Equipment rehabilitated for PEP use will usually be candidates for storage. Equipment retained at the facilities of the last producer, either in-place or on-site/adjacent to site, should be laid away until required or until the PEP line is discontinued.

Equipment alone is of limited value when starting the production of munitions metal parts. During reactivation, the knowledge of how a piece part has been made previously will reduce the time needed to reinitiate production. Such knowledge can be acquired from previously used process sheets, method sheets, and even a piece part from the operation performed. In some instances, useable information is lost if the equipment is separated from its original location. The original producer may retain such records but copies and piece parts are seldom included with equipment during layaway.

PEP's by definition are not complete lines. In most cases, PEP equipment supplements private producer's equipment and may be limited to a few pieces of Government equipment. When layaway occurs, other plant equipment owned by the producer that may be special purpose equipment can be lost to the manufacturing process if not purchased or leased by the Government for inclusion with the PEP package. Such a loss can create problems during reactivation because of the time for replacement during a period when time is critical. Single purpose, special IPE used for making munitions metal parts and not owned by the Government could create a similar problem during mobilization if it is not retained with Government-owned IPE in PEP's.

E. RECERTIFICATION OF PEP'S

Each year on the first working day in January, all PEP's must be recertified as to their need and their ability to fill the need per 5-16, AR 700-90. Recertification is necessary, but it has to be meaningful and produce the desired results. Unfortunately, the process appears to be a paper exercise to validate a need without

verification of the operational condition of PEP's. This includes the lack of operational inspection of PEP's in storage.

Currently, PEP's are inspected for preservation only while in storage. There appears to be no established procedure to confirm, on a regular basis, the operational characteristics of IPE in PEP storage. Paragraph 5-15, AR 700-90, states, "A continuous program will be conducted to improve and maintain plant equipment packages in the highest state of readiness that can be economically justified." Economic justification for inspection of operational characteristics of IPE in storage is difficult to develop since the IPE is assumed to be in good condition before storage. Deterioration during long term storage and incorrect condition codes, as mentioned previously, are possible, and only verification could determine this. Continuous review of previous condition assessments could produce greater confidence in PEP productive ability. The additional cost to develop such assurance should be justifiable if the cost to retain the PEP can be justified.

The recertification of PEP's to meet industrial preparedness planning requirements without assurance that the PEP's have the ability to meet the requirements is difficult to justify. Operational condition to a predetermined standard for IPE in PEP's should be assured before a PEP recertification is allowed.

F. PRESERVATION (MATERIALS AND METHODS)

During storage of IPE, the equipment must be preserved against elements that are hostile to the materials from which the equipment is made. Hostile elements include humidity, temperature, dirt, light, and gases. Of these, humidity is found to be the greatest cause for deterioration.

Currently, basic materials used to preserve IPE against the hostile elements include oil, grease, paint, rubber, paper, cloth, plastic, wood, and desiccants. These materials are used with methods established in TM 38-260 for preparation before shipment and storage. Both the materials and methods, when applied in a conscientious manner, provide adequate protection to the metal parts of IPE. In addition, controlled storage where relative humidity is maintained below 50% is also necessary. Without controlled storage in hutments or temperature controlled buildings, maintenance of preservatives on IPE becomes difficult and expensive and the preservatives are less effective.

Customized environmental containers such as Driguard flexible packaging systems by Enviropak, Inc., El Segundo, California were explored as an additional possibility for controlled storage. Detailed information about the containers can be seen in the Appendix of this report.

Containers of this type were originally developed as alternatives to large, bulky metal containers. Currently, the flexible containers are being used to protect diesel engines, large gear drives, electronic equipment, space vehicles, and other large precision equipment. Flexible containers can be provided with an extruded vapor-sealed zipper feature that is operable between minus 50 F and plus 140 F and which allows convenient inspection accessibility. A variety of flexible barrier materials is available to meet all requirements of MIL-C-9959 standards for outdoor exposure and for lining other containers. The manufacturer claims the containers are weatherproof, field repairable, reuseable, and can be folded into a small package for easy storage. Humidity inside the containers can be controlled by the use of forced air dehumidifiers or silica gel desiccants, depending on the requirements.

Some IPE or parts of equipment currently are cleaned but are not preserved. These include control circuits in electrical control enclosures, supply circuits, and electric motors. Examples of such were examined at Gateway Army Ammunition Plant and St. Louis Army Ammunition Plant in St. Louis, Missouri. Copies of trip reports are found in the Appendix of this report. Gateway equipment is stored in humidity-controlled hutments without temperature control. Some St. Louis equipment is stored in temperature-controlled buildings that do not directly control the humidity. Both PEP's are examples of long term storage. In both cases, deterioration of electrical connections in control enclosures and electrical motors was observed.

It may be possible that deterioration of electric motors and controls can be prevented or at least reduced by treatment with materials currently used in private industry to protect printed circuit boards and other electronic parts. Such materials were not commerically available until recently but can now be evaluated for PEP storage. Such materials could be applied during PEP inspection on previously laid away IPE as well as to newly laid away PEP's.

Examples of such materials are described in Appendix B of this report.

IPE to be retained and rehabilitated that has obsolete or deteriorated electrical controls and systems should be rewired using current technology, including solid state components. Preservation of the new electrical systems can then utilize the recommended preservation materials or be retained with no additional preservation materials than that included with the new materials. Complicated electrical controls should not be allowed to deteriorate with the intention of replacing them when needed because of the low readiness posture inherent with such practice.

G. HYDRAULIC SYSTEMS

Hydraulic systems are more difficult to preserve than the metal parts of IPE, because of problems generated by leakage, by the difficulty in assessing the system wear before storage is attempted, and by deterioration of the components during storage. Maintenance of hydraulic components as well as methods for checking hydraulic systems are outlined in TM-DIPEC-FSG-3400, Technical Manual for Maintenance of Metalworking Equipment. TM-38-260, Preparation of Industrial Plant Equipment for Storage or Shipment, outlines the approach to preparing hydraulic systems for storage. MIL-STD-107E, subsections 21.7 and 21.8, specifies what is to be done for Level A cleaning and preservation.

Two types of hydraulic systems must be considered. The first type is an open system. Current preservation and layaway methods appear complete for such systems. The second type is a closed system, either small or large. Current preservation and layaway methods establish cleaning operations for the small closed system similar to an open system. The large closed systems are not cleaned unless disassembly for repair is necessary as stated in TM-38-260.

The current policy is to drain and clean the hydraulic system and then flush and fill the system with a preservative. MIL-STD-107E specifies the preservative as lubricating oil P-10, Type 1, Grade 10. Table I, Preservatives, in MIL-P-116E lists a P-15 hydraulic preservative oil but then further notes that specifications for such an oil preservative are not listed because of variations in system requirements. The hydraulic preservative used is subject to the approval of the procuring agency.

The current testing program at Gateway APP of retaining the hydraulic system filled with its previously used fluid appears to be an acceptable preservation method. Hydraulic fluids retained in storage systems should be tested on a regular basis for acidity,

water content, and any foreign materials and, if necessary, replaced if found to be contaminated. Original fluid testing for foreign materials in filters can assist in detecting unusual wear on components in the system. Excessive flow rates during original tests assist in detecting the need for repair or replacement before storage.

H. INSPECTION BEFORE STORAGE

Current policy establishes requirements for evaluating and recording IPE operational condition before the IPE is inactivated. During inactivation, IPE not in desired operating condition is to be replaced, repaired, or rebuilt before it is preserved for storage. Such policy is outlined in AR 700-90. Inspection or checking of the above procedures, to assure that such action is correctly performed, is not established or designated. The only inspection performed is to check the cleaning and preservation of the IPE. These procedures are established in Appendix A, MIL-STD-107E.

Even though policy and procedures are established to record the operational condition of IPE in PEP's before storage, there are no inspection methods established to assure that what is recorded is factual. If inspection of the preservative is important, the inspection of the operating condition should be of even greater importance.

The usual condition determination (CD) used by DIPEC before rehabilitation can be costly and time consuming. The condition assessment (CA) approach developed during this contract can validate the assigned condition code for IPE without costly equipment disassembly. In addition to operational condition confirmation, more detailed information about the individual IPE in each PEP is obtained and recorded to establish a more complete inventory record of PEP equipment for layaway analysis. These data can be integrated by the IPP section to develop the optimum program for storing productive equipment, end items, and component parts for the quickest response at the least cost.

I. STATE OF READINESS AND ECONOMIC EVALUATION

1. General

PEP's have been established to manufacture metal parts for munitions so that the industrial base can be responsive to

military material requirements in the event of an emergency. Quick reactivation is a requirement in the event of mobilization and such action can be achieved only if PEP's are retained in the state of readiness required.

Three states of readiness established in AR 700-90 are:

- High - mobilization date + 90 days.
- Medium - mobilization date + 180 days.
- Low - mobilization date + over 180 days.

Comparing the three states of readiness from AR 700-90 with the findings in this study it can be concluded that:

- The high state would be equivalent to a hot base.
- The medium state would be equivalent to a warm base.
- The low state would be equivalent to a cold base.

The readiness state of the layaway of a munitions production line can be accomplished in several ways, starting with a line that is laid away in-place under-power to a line placed in Government central storage. The line that is laid away in-place is considered much more responsive than the line laid away in central storage. The lower responsiveness of a PEP in Government central storage must be accompanied by an increase in component and/or end item inventory to meet consumption requirements prior to achieving full production. In general, a line that is laid away in-place with all tooling, etc. should be capable of initial production by the 4th month. Lines laid away in central storage will require at least 9 months for initial production, even though tooling, drawings, etc. are also stored. Therefore, the choice between these two conditions must include at least 5 months of inventory of components and/or end items if Government central storage is the choice.

A line that is laid away in-place under-power (warm base) has a low cost of preservation and depreservation, but the continued maintenance costs are relatively high, particularly if the equipment is exercised on a regular basis. A line in central storage has higher preservation and depreservation

costs plus the added costs of transportation for two trips between the producer and the central storage site. After a period of time, depending on the individual line, the cost for in-place under-power layaway exceeds the central storage costs and continues to diverge past the crossover point as shown in Figure IV-1.

The inventory of end items or components has several costs associated with this covering action.

- The cost of the money used to buy the inventory can be considered to be at an arbitrarily determined discount rate, (10%) used by DOD for economic tradeoffs.

- There are maintenance, spoilage, double handling, and other costs associated with the storage of components and end items.

- Obsolescence of products due to changes in design or field requirements as a result of scenario changes could create the loss of much inventory value.

- There is a probability that mobilization will not occur prior to the end item obsolescence or deterioration. The cost of all components not consumed for reasons given in the last two items above must be added to the cost of inventory.

2. Analysis of Storage In-Place Costs Vs Central Storage Cost of IPE

The relationship between the cost of storage of IPE as an in-place line and the cost of central storage with the attendant component and/or end item inventory required when IPE is in central storage can best be shown with typical examples as shown in Table IV-1. The examples are based on actual data for low, medium, and high cost end items - the 20mm shell body, the 155mm M107 body, and the 155mm M483 body and cargo.

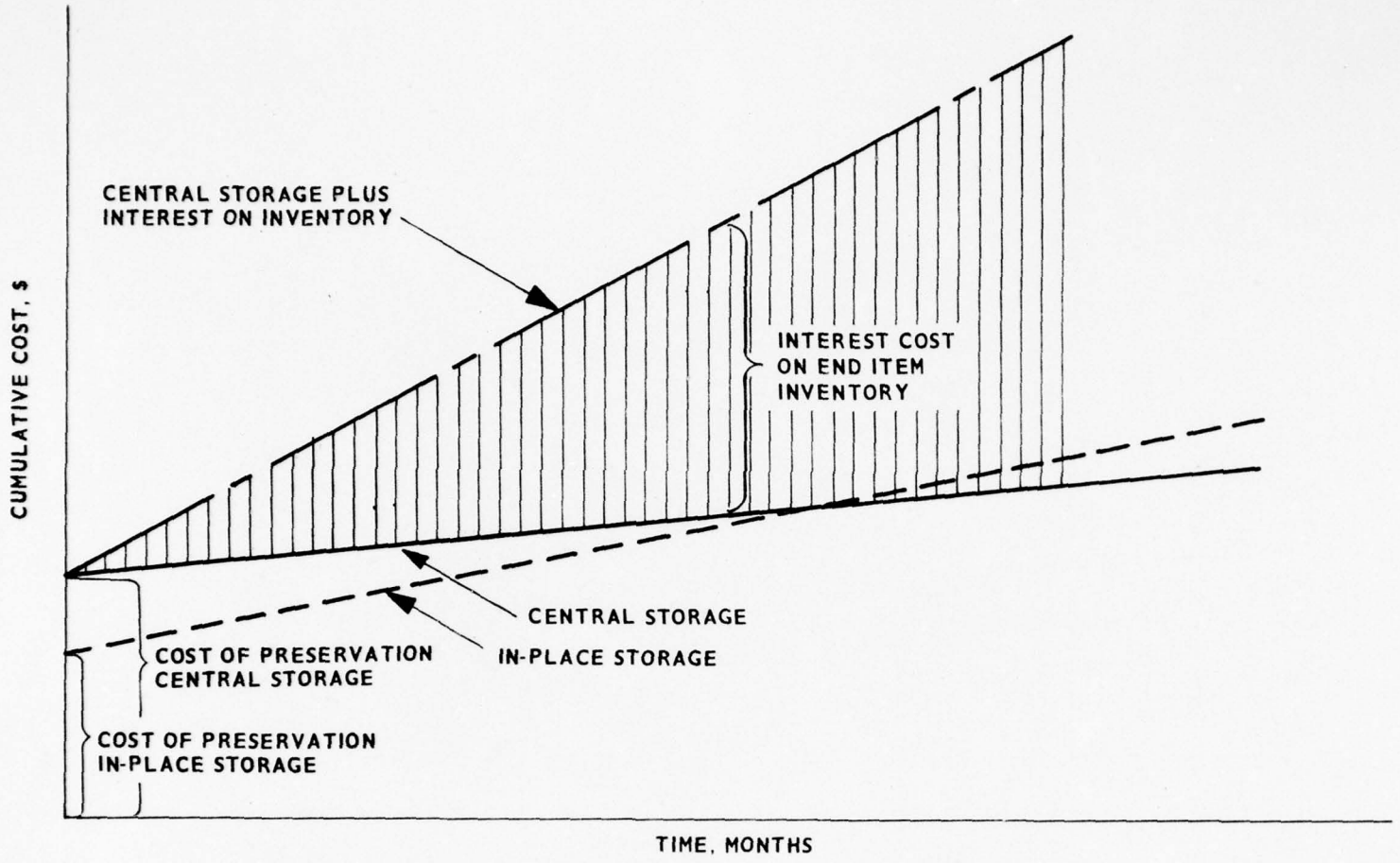


FIGURE IV - 1

COST COMPARISON OF IN-PLACE STORAGE OF IPE
VS CENTRAL STORAGE OF IPE AND END ITEM INVENTORY

TABLE IV-1
ANALYSIS OF COST DIFFERENCE
IN-PLACE VS CENTRAL STORAGE OF IPE

Item	20mm Body	155mm M107 Body	155mm M483 Body & Cargo
1. End item cost, each	$0.33	$35	$190
2. Planned end item production per month at mobilization	4,000,000	150,000	120,000
3. IPE cost (acquisition plus rehabilitation costs)	$4 million	$17.5 million	$33 million
4. Difference in startup time: 9 months (central storage) 4 months (in-place storage)	5 months	5 months	5 months
5. Annual cost of storage in-place: 5% IPE cost	$200,000	$880,000	$1,650,000
6. Annual cost of central storage: 1% IPE cost	$40,000	$180,000	$330,000
7. Discount rate	10%	10%	10%
8. End item inventory discount cost per year (line 1 x 2 x 4 x 7)	$660,000	$2,600,000	$11,400,000
9. Cost difference: central storage minus in-place storage (line 6 + 8 - 5)	$500,000	$1,900,000	$10,080,000
10. Ratio: IPE cost ÷ cost of one-month's production (line 3 ÷ (1 x 2))	3.0	3.3	1.4

The 20mm example was taken from a modernized line study for Silent Industries.* The 155mm M107 example is based on data from the modernized line for Chamberlain, New Bedford, Mass.** The 155mm M483 data were obtained from a study by KE of the 155mm ICM Complex, Mississippi Army Ammunition Plant.

For simplicity, only the annual costs for storage are considered for both in-place and central storage. This higher cost of preparation for central storage, reactivation, and shipping costs and cost of end item obsolescence have not been included. The cost of central storage (1% of IPE cost) was obtained from Page Airways, operator of the storage facilities in Atchison, Kansas. Typical maintenance contracts for in-place storage observed during field visits, range between 3% and 4%. The cost of in-place storage is limited by regulations to 5% of IPE value. The differential end item inventory cost due to an assumed minimum 5-month delay in startup is the basis for end item inventory discount computations.

At a 10% discount rate, the cost of central storage of IPE with attendant differential inventory exceeds in-place layaway costs per year by the amount shown on line 9 of Table VI-1. The choice is independent of time as shown in Figure IV-1, where the cost of in-place storage is always less than central storage plus interest on end item inventory costs. The difference shown in the first month represents the higher costs of preservation associated with central storage when compared with in-place storage.

Other costs for central storage, i.e., transportation, end item storage, and end item obsolescence, were omitted for ease of presentation. Their inclusion would merely increase the cost difference between the two methods of layaway in favor of in-place storage of IPE under power.

It can be generalized over a wide range of conditions that in-place storage under power is less expensive than central storage of IPE plus interest on end item inventory. The cost

*PEP Modernization Program, Volume 5-1, issued under this contract.

**PEP Modernization Program, Volume 5-10, issued under this contract.

relationship between inventory and IPE from the prior examples is that the breakeven point between cost of IPE in-place and central storage is reached when inventory interest costs (interest rate x differential inventory cost) equal net storage costs (net IPE storage cost rate (5% in-place minus 1% central) x IPE value).

An important relationship exists between IPE cost and the cost of one month's end item production and was calculated as shown on line 10 of Table IV-1. This relationship is shown over a wide range of ratios of IPE cost/one-month end item production cost in Figure IV-2 in conjunction with the difference in startup time due to the difference in the state of readiness. The area lying above the 10% discount rate line identifies those conditions whereby in-place storage is favored; conversely, conditions when central storage is favored lie below the line. Referring to the prior examples where the difference in startup time between central storage and in-place storage was assumed to be 5 months, Figure IV-2 shows that any ratio less than 12.5 will favor in-place storage over central storage. The real ratio is somewhat higher than this because the analysis has ignored such items as transportation of IPE to and from central storage and end item obsolescence, both associated with central storage of IPE. The three ratios calculated on line 10 of Table IV-1 for three specific end items are plotted on Figure IV-2 showing that they fall well within "Favors In-Place Storage."

Table IV-2 shows, for the 20mm body, several combinations of allowable changes in IPE cost, end item cost, and production per month while holding a required 5-month end item inventory differential - all of which would still maintain a ratio of IPE cost/cost of one month's end item production at no more than 12.5.

The original values in Table IV-2 are those used in the example for the 20mm body in Table IV-1.

- Under Option 1, the end item unit cost and production/month are fixed. Therefore, the allowed cost of IPE would be $16,500,000 ($1,320,000 x 12.5).

- Under Option 2, the IPE cost and end item unit cost are fixed. Therefore, the allowed end item production per month is 320,000 (4,000,000 ÷ (12.5 x .33)).

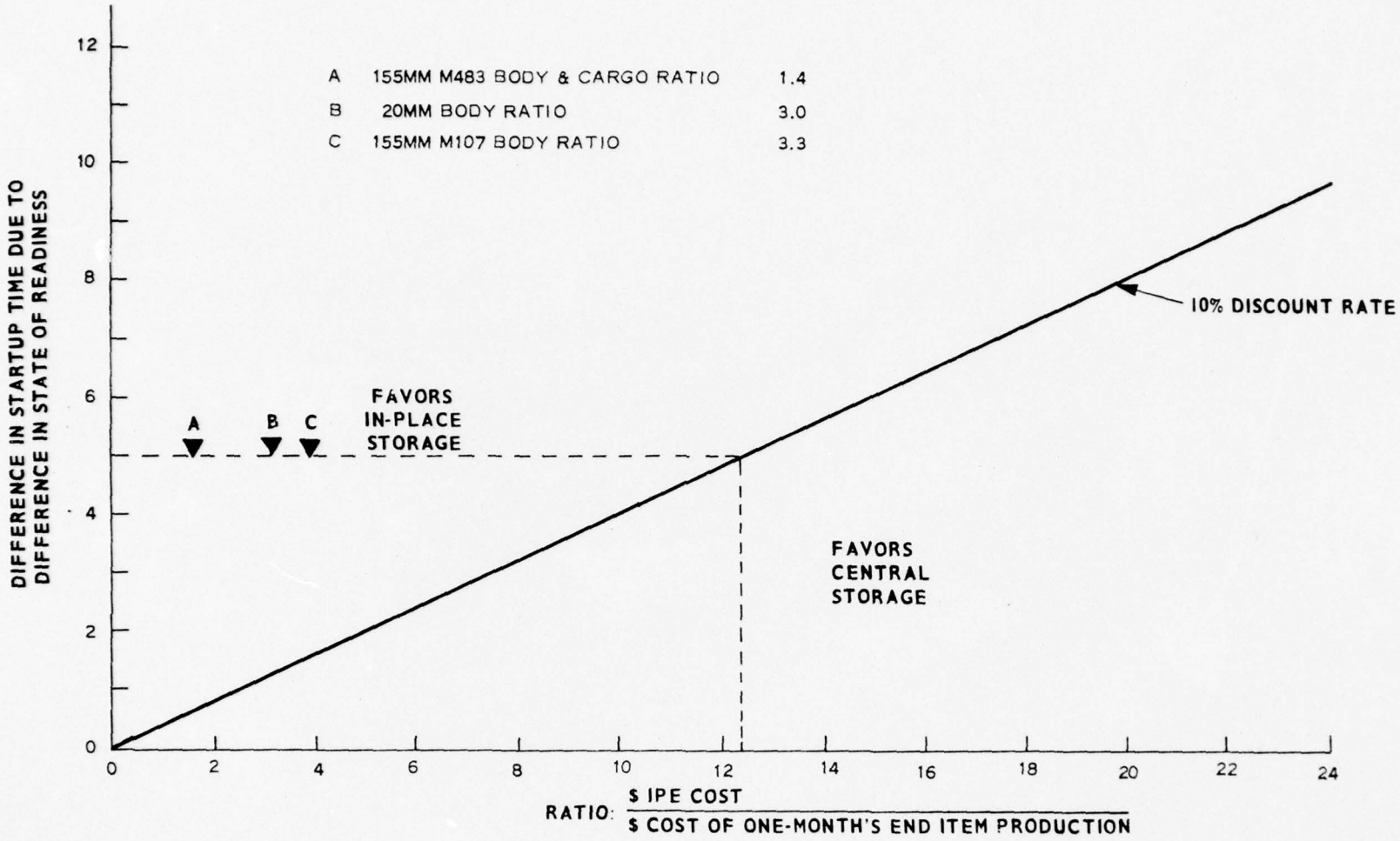


FIGURE IV - 2

RATIO OF IPE COST TO COST OF ONE-MONTH'S END ITEM PRODUCTION
VS DIFFERENCE IN STARTUP TIME

- Under Option 3, the IPE cost and end item production per month are fixed. This condition would limit end item unit cost to no less than $0.08 (4,000,000 ÷ (4,000,000 x 12.5)).

Similar tradeoffs can be made with the 155mm shell examples.

TABLE IV-2
IPE AND END ITEM LIMITS

	IPE Cost	End Item Unit Cost	End Item Production/Mo	One-Month Inventory Cost
Original value	$ 4,000,000	$0.33	4,000,000	$1,320,000
Option 1	16,500,000	0.33	4,000,000	1,320,000
Option 2	4,000,000	0.33	970,000	320,000
Option 3	4,000,000	0.08	4,000,000	320,000

The equation for the line in Figure IV-2 is $y = 0.4x$ for 10% discount rate. The slope is determined by the net storage cost divided by the discount rate for inventory (4% ÷ 10%). Changes in storage costs and other discount rates for inventory can be replotted to establish a new relationship between the ratio and the months of delay in startup.

Storage location and its effect on startup times is critically important to PEP readiness. Only PEP's retained in-place can be considered as being in a high state of readiness. Storage of PEP's at other locations must be considered to be in a low state of readiness.

Retention of mobilization base IPE that at one time was assigned to a producer, but is no longer assigned, does not provide the state of readiness stated in the PBA. Such equipment is normally referred to as an X-facility. In most cases, X-facilities are stored unassigned in Government central storage and are not complete production lines. They

may include a few pieces of equipment or large quantities of IPE, but the X-facility always requires private producer's complementary equipment or the filling of all voids with GFE to complete a productive process. When the original, assigned producer is no longer available, it is difficult to find an alternative producer with similar equipment that could utilize the IPE from the X-facility. The retained IPE should not be considered to be a production unit in industrial preparedness planning. Rather, it should be considered as another reserve of IPE with no end item production capability of its own unless definitive action is taken to fill all voids.

The above evaluations consider the completed product and the parts finished by the PEP. It does not consider stockpiling piece parts from each operation of the PEP so that upon reactivation all operations could start at the same time with immediate material float in the line. Stockpiling piece parts for each operation would not require large quantities if such stock were retained only to establish tool setup and to prove production capability. This type of stockpiling would be most effective if original tooling were retained with the IPE.

Piece parts from each operation on a production line may be useful for reactivation, but parts could prove cumbersome to store in large quantities. The finished item from each production line is more easily stored, and components of the finished item that have a long lead time may be considered for storage along with production end items. Piece parts, purchased parts, and end items can be stored to provide quicker response to mobilization. The best balance of these variables should be developed for the least cost and most effective storage arrangements to be responsive to M-day requirements.

J. EQUIPMENT INCLUDED IN LAYAWAY

In addition to the conventional IPE retained in PEP's, consideration should be given to any aids that will assist reactivation of a PEP line during mobilization. Policy in AR 700-90 states that special tools and special test equipment may be included during layaway. Such test equipment should include all

mandatory and end item inspection gages, Government or producer owned and Government approved. The gages should be identified with the product by part number and last change number along with the original contract number. Drawings of each gage should be retained in tool engineering files for future gage checking. A complete gage list identifying each gage with the respective production operation should be included in the gage files.

In addition to inspection gages, the last inspected piece part off each IPE should be retained along with the IPE and its tooling.

Any templates used for manufacturing should also be retained. These items will assist new personnel during reactivation so that processes can be started quickly. Any visual aids or standards developed to expedite manufacturing can be helpful in training equipment operators during mobilization.

The latest policy states that other essential equipment such as special tools will be placed in PEP layaway "only when the lack of this equipment will impair the lead time for reactivation." Industrial plant equipment alone cannot produce munitions metal parts. Tooling is an essential item and in some cases can require up to 8 months or longer to develop.

To reduce the requirement for storing large quantities of metal tooling and still compress reactivation response times for production to a minimum, consideration should be given to storing tool designs and reproductive capabilities on numerical control tapes for all munitions tooling.

A central Government tool center facility under DARCOM control could provide services to produce, transpose, and upgrade programs and format as applicable, and store N/C tapes to reproduce all Government munitions tooling for both Government and private producers. The tool center could retain files on original tool designs, develop new improved designs, and provide assistance to producers. Tooling standards could be established for specific machine classifications to assure interchangeability if machinery replacement becomes necessary or producers are changed.

Private tool producers could still be used to manufacture needed tooling using the Government N/C tapes whenever new tooling may be required or if heavy maintenance on existing tooling is required.

Availability of tool design on N/C tapes could significantly reduce tool lead time, allowing for faster reactivation of productive capacity. N/C tapes would also assure more consistent tool reproduction without restricting improvements on a controlled basis.

Government control of all tooling for the manufacture of munitions using N/C tapes should be beneficial in providing controlled production and manufacturing methods. Consistency of end product can be more achieveable by using similar tooling when using multiple supply sources.

With tool reproductive capabilities available to generate tooling quickly after M or D-day, the need to store large quantities of tooling for long periods of time is diminished. Only very large tooling requiring specialized long lead time operations to reproduce will have to be laid away. This could reduce layaway and retention costs.

K. LAYAWAY RESPONSIBILITY

Despite the fact that materials, methods, and levels of protection are established to perform preservation of IPE for shipping and storage, there appears to be no designation of who performs the task. Such action for PEP's is the responsibility of the MSC owning the PEP, but the actual work is usually contracted to the lowest bidder. Preservation of equipment in Government central storage in many cases is performed by the DIPEC rebuild centers. In either case, full knowledge of Government requirements is essential for proper performance. Trained and experienced workers are necessary so that complete preparation and preservation of IPE are accomplished. Without workers experienced in the correct methods, IPE may be laid away improperly, causing unwarranted deterioration of expensive assets.

L. REACTIVATION RESPONSE

Reactivation of startup of a PEP could be considered as being directly opposite to layaway. In spite of this, layaway is only performed with the ultimate intention of reactivation, and this is to be accomplished as easily as possible within the shortest time.

Very little documentation was found that covered policy or procedures for reactivation of IPE associated with PEP's. The policy

included in Subsection H, Section III comprises the basic information available.

Reactivation must be considered from more than one aspect. Individual IPE may be reactivated when required or a complete PEP may be reactivated at one time. These two extremes plus any variation, including total mobilization of all idle PEP's, could be involved.

IPE from PEP's stored in Government warehouse facilities and IPE from PEP's stored in-place connected to power also create different reactivation consideration.

When individual IPE from a PEP is reactivated from a Government storage facility, DD Form 770-1, Intradepartmental Request for Release of Equipment (Package Plant and Standby Line Equipment), is the document that is used to initiate, obtain approval, and activate the process. A copy of DD Form 770-1 is included in Appendix H for reference. DD Form 770-1 is initiated by the contractor or using agency. It must then be:

- Reviewed and approved by DCAS.
- Reviewed and approved by the cognizant areas in ARMCOM.
- Reviewed, recorded, and coordinated by PEQUA.
- Approved by DARCOM.
- Acted upon by DIPEC to assure shipment of the IPE to the contractor and to notify the owning agency of the action.

The various reviews and approvals seem adequate to control the reactivation process during nonemergency situations if it is done with knowledge and in a conscientious manner. The DD Form 770-1 appears adequate if properly completed. The same process apparently is used for more than one IPE with individual DD Forms 770-1 used for each IPE, or as mentioned in Section III.G. For loaned equipment, a single DD Form 770-1 may be used for more than one item by attaching a supplemental list, provided all items are from the same plant equipment package, stored at the same site and planned for use at the same location.

Under mobilization, it is assumed that individual forms for each IPE reactivated would become an impossible task to initiate and

approve. Information in the documents reviewed does not address such a situation. It was assumed that under mobilization conditions, stored IPE from assigned PEP's would be reactivated by special orders from the procurement agency for the end item according to priority requirements. Using such special orders, complete PEP's would be reactivated, bypassing normal, nonemergency routine and formalities. As mentioned above, such special action apparently is not documented.

The above assumptions were confirmed by consulting ARMCOM's Industrial Management Division, the Industrial Preparedness Planning Branch, and the Procurement and Production Directorate. All action expected to develop at M-day to reactivate planned producers and idle PEP's apparently is based on a common sense approach passed on by experienced personnel for what is required with no written guidance for inexperienced or new workers. Under such arrangements, continuity of operations and realistic reactivation response may become questionable after long periods with no emergencies.

In addition to the absence of documented reactivation directives or guidance under emergency conditions, there appears to be another area that could create problems if the emergency situation continues for a long time. During reactivation of PEP equipment by verbal orders, records of which IPE is or is not reactivated may be nonexistent. This may reduce the effectiveness of the Industrial Management Division to control and allocate equipment to the highest priority areas later.

Industrial production planning will not develop rapid responsiveness if it does not consider what actions are required for quick reactivation of equipment that has been preserved and stored for emergencies and how to document the reactivation procedure.

After IPE from PEP's is reactivated and received by the producer, the IPE requires deprocessing, checkout, and startup. No written directives or guidance directly covering these subjects were located. Various sources were consulted about past and current methods applied to these activities. Mr. Claude G. Wright, Vice President of Page Airways, Inc., stated that when their operations were originally involved with layaway and reactivation of IPE, they followed the policy of cleaning and operationally testing IPE

coming out of storage before shipping it to the producers. In this way, only IPE confirmed usable was furnished from long term storage. Currently, this is not done for PEP equipment. PEP equipment is shipped to the user as it comes out of storage unless specific orders and funding direct special handling. This current policy was confirmed at Ravenna AAP, Ohio and Tracy Defense Depot, California.

Basically, deprocessing for reactivation is the reverse of layaway preparation and can be accomplished by the following steps:

- Blocking, bracing, shipping shrouds, and skidding must be removed.

- All equipment metal parts must be inspected (to assure that all parts are included), cleaned, and dried. Methods for cleaning and drying IPE parts are listed in paragraphs 3.2 and 3.3 of MIL-P-116E.

- All parts of the IPE must be installed and assembled according to the original manufacturer's directions.

- All hydraulic lines, valves, and actuators must be inspected and confirmed for use before reserve tanks are checked for fluid or filled to the proper levels with approved fluids.

- Electrical systems should be inspected to assure proper connections, clean contacts, and complete circuits. If switches, connections, and circuits have been protected with materials referenced in Appendix B, startup can be achieved with little or no cleaning of contacts.

- Rubber items such as hoses and drive belts must be inspected to assure usability. If equipment has been stored for over 4 years, the rubber items should be replaced.

- When applicable, cutting or cooling fluid tanks should be filled with new, approved fluids to proper levels.

- The equipment should be operationally tested only after the above steps have been completed.

In general, standard startup procedures for new equipment prescribed by the equipment manufacturer should be used during reactivation.

The IPE stored at the producer's plant may or may not require the same attention required by the IPE from Government central storage, depending on the method used in layaway.

- IPE retained in-place, connected to power, and regularly cycled should be ready to operate upon reactivation orders with little or no cleaning.

- IPE retained in-place without power, but protected by hutments in controlled humidity may require light cleaning, inspection, power hookup, and hutment removal before startup.

- IPE stored away from the production line or adjacent to the producer's facilities would require the same attention as IPE from Government central storage, but long distance shipping precautions and time would not be involved.

The various kinds of protection and locations involved with layaway of IPE from PEP's produce varied PEP responsiveness. It is obvious that IPE retained in-place under power at the planned producer's facility should be more capable of responding to immediate requirements than IPE laid away in a remote storage facility.

V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

1. Current PEP Policies and Procedures

The policies and procedures relating to PEP industrial plant equipment are included with those for other IPE in the industrial preparedness program. References to PEP's are found in numerous military publications and are difficult to locate for quick reference. Since the industrial preparedness planning policies cover IPE's in general, it is often difficult to establish whether or not a particular section applies to PEP. The basic policies as currently established are adequate; however, integration of the policies and publication of them in one source document would be highly beneficial in assuring proper understanding and use.

2. Management of PEP's

The reason for having PEP's is to retain Government industrial productive capability for use during mobilization. Equipment stored for this purpose should be in such a condition that full confidence exists in its capability to perform the production operation for which it is retained.

Full confidence in the capability of each PEP to meet planned requirements is not a reality. Based on observations to date, IPE retained in PEP storage in most cases is well preserved but the equipment's operating capability is questionable. Since the established policies and procedures are adequate, the improper implementation of those policies and procedures creates a lack of confidence in the PEP's responsiveness to mobilization.

Improper implementation of the policies and procedures can develop from a number of reasons, including lack of funds, lack of understanding, lack of knowledge on the part of those responsible for PEP's, and poor supervision of implementation of policies and procedures.

Under Task B-9 of this contract, an investigation of methods to improve the control of Government-owned equipment is

planned so that confidence in the responsiveness of IPE's in layaway will be enhanced.

3. PEP Retention/Storage

The established policy of storing PEP's in-place or on-site/adjacent to site with the original producer as a first choice for storage should continue to be emphasized. In this way, the producer's equipment that is used along with the Government-owned equipment is available during mobilization. The material handling equipment and facilities are retained. The private producer's skills may be retained so that reliable reactivation is achieved.

Government central storage for PEP's is a less favorable choice. In spite of the fact that Government storage facilities and layaway methods at central storage depots are good, usually only the Government equipment can be retained. Loss of the private producer's equipment, facilities, and skills create a situation leading to slower and less reliable reactivation response and sometimes a permanent loss of productive capability.

The conclusion can be drawn that the in-place storage with its inherent economic benefit and the obvious improvement in flexibility to response is the preferred method for storing IPE. Other considerations based on the producer's need for production space, and similar requirements, will dictate the need for central storage of IPE.

When PEP equipment is laid away in-place or on-site/adjacent to site, it should be kept in limited access areas or, preferably, in bonded storage to reduce cannibalization of individual IPE.

If central storage is necessary, a special PEP central storage method should be considered so that the Government-owned portion of each PEP production line stored can be retained in one location along with OPE, tooling, parts, etc. for simplified control.

Equipment retained as a PEP should only be stored if there is an assigned, willing producer or if the production line is complete in itself and is owned by the Government. Partial production lines with no assigned producer should be

evaluated and completed/modernized before retention. An incomplete, unassigned line cannot produce a final product and thus has no value as a PEP. Partial lines not completed/modernized and unassigned should be discontinued and the standard equipment reassigned or excessed. Other provisions should be made to cover the PBP requirements. Continued reliance on X-facilities provides a false mobilization base.

Individual IPE should be reviewed for future usability by a screening process before layaway, based on criteria established in the revised reutilization value percentage method (RVPM) outlined in Appendix G. The scope of this task did not permit development of complete, revised RVPM for PEP equipment. It is recommended that this be done and that the use of the revised method be instituted so that selectivity of IPE's for retention more closely reflects current requirements.

If specialized or unique equipment is included with IPE that is not assigned or is not part of a complete line, provisions should be established in Government central storage to retain such equipment until reassignment as long as the product that it manufactures is required. This is essential so that good, usable, special purpose IPE is not lost by excessing merely because a private producer no longer is a planned producer. Under such circumstances, extra effort should be exerted to reassign the special IPE immediately to prevent the need for surplusing.

Full consideration of controlled storage should be given for all PEP equipment and storage locations. Use of temperature and/or humidity control should be a prime criterion where natural weather conditions do not provide low humidity conditions. Use of sealed buildings or hutments with humidity control has provided good results in assisting in the preservation of equipment over long periods of time. Recent improvements in barrier materials and closure devices have broadened the applications of flexible containers for similar use. Reusability and versatility of both storage and shipping are advantages worthy of consideration for flexible containers. Their relative costs compared with hutments and sealed buildings are not available because each container is designed and manufactured for a specific purpose. Standardized containers for IPE are possible, and costs would

have to be developed for comparison with hutments or sealed buildings. Customized containers may have a long lead time, but for special applications, such containers may be useful where suitable storage facilities are not available.

4. Inactivation

Current procedures relating to the actions during inactivation for both regular IPE and IPE assigned to PEP's are similar. If the procedures are followed using the current materials and methods prescribed and the operations are performed by knowledgeable workers in a conscientious manner, the metal parts of equipment so cleaned and preserved can be retained indefinitely in a humidity controlled atmosphere. Periodic and regular preservation maintenance assists in assuring the stored condition.

Rubber products installed on or in IPE's do not maintain their usable characteristics after long periods of storage or use. Items such as rubber hoses, seals, drive belts, and electrical insulation deteriorate with age whether or not the items are being used. Current storage methods retain all rubber products in the installed condition with no special preservation except drive belts. Drive belts are normally removed or the tension is completely relieved. Upon reactivation of IPE, the rubber products that no longer are usable are replaced but only after examination and trial. There appears to be no problem encountered with these procedures. Because of the relative low cost of such items, replacement appears to be the simplest method rather than devising an expensive preservation method that may not work all of the time.

Electrical items such as machine control circuits and control enclosures are normally left unprotected when stored. Specifications and required actions only provide for cleaning before layaway. Once cleaned, the equipment is stored as is or covered with a loose tarpaulin to protect against dust. Even though such equipment may be stored in a humidity-controlled atmosphere, the exposed electrical connections, switches, and other metallic parts are exposed to moisture with the resultant potential for oxidation and corrosion after long periods of storage. It is true that some corrosion is possible during normal operation, but when the IPE is dormant, the normal heat of operation is not present

to drive off the moisture-laden air. Contact points are cleaned through movement and use. Greater corrosion to connections and contact points is possible when the equipment is inactive. This possibility is compounded if the atmosphere is not humidity controlled.

Electrical control circuits on industrial plant equipment require some preservation to assure its usability upon reactivation after long periods of storage. To eliminate the need for cleaning and sometimes replacing components when reactivation is required, a suitable method of isolating the components of electrical controls from the atmosphere is the best approach. Such a method may be achieved for certain kinds of electrical equipment by sealing the complete unit in a plastic container or bag after evacuation of the air from the bag. Larger electrical panels could have their components and connections coated with materials currently used to protect printed circuit boards and other miniature electrical devices. Epoxy and urethane coatings can be applied by spraying or brushing and can be used for equipment just being inactivated or those already stored.

In addition to preserving electrical controls for IPE, planning should be started regarding future equipment specifications so that preservation would not be such a problem. Epoxy-covered electrical control boxes using solid state modules and T/TFE wire along with corrosion-resistant, plated contacts could reduce corrosion to a point that electrical parts of IPE laid away in a humidity-controlled, dust-free atmosphere could last as long as the metal parts of the IPE.

Special OPE should also be considered in a similar fashion when new equipment is required. Nonmetallic, noncorrosive conveyor belting, chains, and related items manufactured by Intralox, Inc., New Orleans, Louisiana and KVP Company, Inc., Sacramento, California would reduce preservation of such items to cleaning only. Purchasing of new equipment for PEP's should be given full consideration as to preservation as well as the equipment productive capability.

Any new equipment, whether IPE or OPE, should be purchased with consideration for laying away and eventual reactivation. Purchasing specifications should require the equipment manufacturer to identify shutdown and storage requirements

for any new equipment so that preservation for layaway can be done with confidence that reactivation can be achieved quickly. Contracts for equipment being rebuilt/upgraded before layaway should also include similar specifications.

During storage, hydraulic and air cylinders or actuators should be retained in the fully retracted position to obtain the best distribution of piston weight on the seals and bearings. Whenever possible, actuators should be stored in a vertical attitude to remove the load from seals. The hydraulic system is best stored with its fluid intact as long as the fluid is proven to be void of contamination and the IPE is stored in-place in warm status. If the hydraulic fluid is contaminated, it should be replaced with acceptable fluid after the system is cleaned. Fluid sampling on a regular basis is necessary and should be part of storage maintenance.

When IPE is stored in cold status in Government central storage or any off-site location, the hydraulic system should be cleaned, drained, and preserved per MIL-STD-107E for layaway.

5. IPE Storage Condition

IPE retained in PEP layaway is desired to be in good operating condition at reactivation so that fast mobilization is achievable. To achieve this goal, the IPE must be in satisfactory operational condition before storage takes place. When IPE is assessed to be in less than required condition, it should be rebuilt/upgraded before storage. If time or funds do not permit such actions before storage, definite plans should be established to rebuild/upgrade or remanufacture as soon as possible, and the IPE should be retained in temporary storage. Temporary storage of IPE for a PEP should not be for longer than 6 months.

A plan for inspecting the operational characteristics of IPE in stored PEP's on a statistical basis should be instituted as a permanent policy. This would be in addition to, or along with, the regular inspection currently performed on the preservation applied to the IPE for PEP storage. A percentage of IPE from each PEP should be attached to power and operated while being inspected per DIPEC test pattern for the respective equipment. This testing should be performed

on a sample or rotating basis each year so that over a long period of storage all IPE would be exposed to such inspection.

If and when IPE requires repair, rebuilding/upgrading, or remanufacturing and funds or time prevent immediate action, plans established to accomplish the work should be made by PEP line in accordance with the priority established for the metal parts or items produced by the PEP.

6. Unassigned PEP's

In some cases, a PEP originally assigned to a producer is no longer assigned to that producer and is retained, unassigned, in Government central storage. Since the PEP was established to work with or complement the original producer's equipment, the IPE owned by the Government is not able to produce a completed item. Storing such equipment in the hope of finding another producer that would require the same equipment can prove futile. Reliance on the unassigned PEP for mobilization is fallacious.

PEP's unassigned and stored as X-facilities should not be retained on a permanent basis. A time limit of 6 months should be considered as temporary storage for needed IPE while plans are established either to complete the PEP as a full production line for a designated producer or find a new producer for the product and establish a new PEP. The old PEP should then be eliminated.

7. Reactivation Response

Reactivation response can be considered greater than M+6 months for any PEP that is laid away in states other than in-place connected to power. Even with PEP's retained in-place, prompt reactivation may not be possible if the persons responsible for the reactivation in the procuring activity have no clear directives upon which to base their actions.

8. Equipment Included in Layaway

Policy states that STE may be included in layaway. Some test equipment are complex tools that take months to design, manufacture, and to obtain Government approval. Quantity manufacturing of parts without production and inspection

gages cannot be achieved. Complex gages can be the pacing item during reactivation of a PEP line if they are not available. Because of this, all necessary production and inspection gages for PEP end items should be candidates for layaway after they are properly identified and preserved.

During mobilization when PEP lines are reactivated, training aids of any kind can help reduce the time required to indoctrinate new equipment operators and other personnel. Such items as last inspected piece off each operation, templates, and visual aids or standards developed to expedite manufacturing can be helpful and should be considered candidates for layaway.

It would be unnecessary to retain normal munitions tooling in storage if tooling reproduction could be achieved rapidly after M-day. Such action would be possible if all munitions tool designs were available in a form for use on N/C machinery and kept current to the latest product design in a Government tool center. Standardized tooling designs under Government control could assist in keeping required tooling from being the pacing item without storing large quantities of hard tooling. Special, large, long lead time tooling would still require storage. Competitive private producers should continue to be the munitions tool source for all hard tooling.

In addition to ST/STE, training aids, and tool designs, all Government-furnished IPE, except self-destruct equipment, should be laid away in PEP's considered necessary in industrial production planning. Self-destruct equipment includes plating and chemical processing tanks, small furnaces and ovens in use more than 5 years, and other similar equipment. Such equipment should be excessed at time of layaway and replaced when reactivation of the PEP is required. When the PEP is retained in a hot or warm layaway status, replacement is recommended immediately if the original equipment is not retained. Large equipment that cannot be moved or is built into a facility should be laid away in-place.

9. Layaway Responsibility

Competitive bidding for the preparation of IPE for storage in PEP could prove to be unacceptable if the bidder's

capabilities are not verified. Improperly prepared IPE deteriorates, causing retention or holding costs to be more expensive than estimated. If equipment and tooling are not properly skidded, crated, and documented, the retained equipment can become separated in storage, causing a slower reactivation response because of lost tooling or IPE parts.

Definite criteria covering the ability, skills, and responsibilities of the preparing agent should be established for PEP's if private operators are used. Preparation of such criteria is beyond the scope of this task. Performance of a follow-on task to explore and develop the criteria adequately is recommended.

Using an outside contractor commissioned by the producer to prepare and preserve PEP equipment may prove to be the best method for layaway. This independent third party doing work verified by a producer and in turn audited by the Government can produce satisfactory results.

B. RECOMMENDATIONS

1. PEP Information Source

Information relative to PEP layaway policies and procedures is difficult to locate and identify from the many current military industrial preparedness program manuals. It is recommended that one manual covering all areas of PEP policy, procedures, and management be published for quick and complete reference.

2. Management of PEP's

A revision is recommended to the methods used to control Government-owned production equipment so that they can be identified with each end item in the PBP rather than with the producer. More complete coverage of this subject will be undertaken in Task B-9 of this contract.

3. Policy Enforcement

Lack of forceful implementation of current PEP policy appears to be one of the prime problem areas creating lack of confidence with current PEP's. It is recommended that:

- o A central control for all Army munitions PEP's be established with authority to enforce policy.

- o Special attention to contractual obligations relative to maintenance, repair, rebuilding, and replacing IPE in PEP's should be stressed.

- o Accurate inventories of IPE should be maintained to assure that only required IPE be retained in PEP's and that voids are eliminated.

- o Identification of specific IPE used to manufacture each end item should be established so that product lines can be continuously reviewed for responsiveness and possible modernization.

- o Operational condition of all IPE retained for PEP's in layaway should be assured, verified, and maintained.

4. Storage of PEP's

PEP's classified for high or medium states of readiness are recommended to be stored in-place, so that the assigned producer can be held responsible for equipment, facilities, and skills necessary for quick response. High and medium readiness PEP's can not be stored in Government central storage and still be responsive to assigned mobilization rates. PEP equipment laid away in-place, should be held in bonded storage to limit access to the IPE's for the purpose of reducing cannibalization.

The cost of retaining PEP IPE in-place as compared to other modes of layaway is analyzed in Section IV of this report and indicates in-place storage to be the best economic choice.

Central storage should only be considered for PEP's assigned a low readiness state. This storage type should be restricted to retaining all the IPE's from the entire PEP at one location. The assigned producer should be kept informed of any changes to the PEP's and of any maintenance or inspection that is performed.

All PEP storage is recommended to be humidity controlled in sealed buildings or fabricated hutments. Extra-large

equipment that cannot be retained in this fashion must be given special attention on an individual basis.

Evaluation of flexible environmental containers is recommended to determine the cost-effectiveness of individual containers as compared with controlled storage in hutments or sealed buildings.

IPE in X-facilities that are not complete production lines has no end item productive ability and thus should not be retained under its former PEP number. It should not be included in the PBP unless the production line is completed and then assigned to the producer under a new PEP number, or a new producer for the product is assigned and the IPE from the X-facility is sufficient to satisfy the new producer's needs for machinery and equipment.

It is recommended that an unassigned PEP (X-facility) should be retained in temporary storage a maximum of 6 months to permit the above action to be accomplished. If a new producer is not found, the IPE from the X-facility should be excessed.

It is recommended that all IPE be screened for usability before layaway using the revised reutilization value percentage method as indicated in Appendix G.

5. Items to be Considered for Retention

Retention of a PEP is determined after a full evaluation of the end item requirements. The specific equipment or items stored as the PEP should not be restricted to production IPE, but should include anything that is necessary to assure reliable reactivation of the production capability. It is recommended that the following items be retained along with the IPE:

- Process sheets for each operation performed on retained IPE along with any tapes or programs from numerical controlled equipment.
- A production line layout indicating equipment, operations, production rates, and other vital data.

- o Special tooling and special test equipment along with their engineering drawings.
- o Producer owned IPE of a special nature.
- o A certified piece part for each completed operation retained with respective equipment and tooling for guidance during reactivation.
- o A plant facility list along with large equipment foundation drawings.
- o Special toolroom facilities or equipment required to maintain operations.
- o A quantity of approved piece parts from each completed operation to be used in set-up operations and proving the new set-up during reactivation when original tooling and equipment are retained.

It is recommended that specifications be developed for use when new production equipment is purchased and the rehabilitation of used equipment is contracted with full consideration for eventual long term storage. It is further recommended that the equipment manufacturer or rebuilder be required to develop shutdown and storage requirements.

6. PEP Certification

PEP's must be certified each year for continued retention based on their need. It is recommended that evaluation during the annual review of PEP's include confirmation of IPE's ability to perform the operations for which it is retained. Proof of operations ability can be verified through statistical test results for each PEP.

To obtain operation verification for IPE, a continuing statistical inspection program is recommended to supplement the preservation inspection that is current policy. Operational inspection should include:

- o A specific number of IPE tested from each PEP according to military standards sampling procedures and individual PEP test results.

- o Checking for operational ability to perform the specific task for which the IPE is retained in the PEP.

- o Confirming the condition code of the IPE that was assigned before layaway.

7. Preservation Materials

New materials that may be useable for preserving IPE are being developed on a continuing basis. It is recommended that such material be screened and those with greatest potential be tested in a continuing program established for that purpose. In addition to new materials, new uses for currently used materials may also be discovered. Some materials for consideration are listed in Appendix B. Some of these proposed materials could possibly be recommended for preservation of electrical parts, panels, connections, and contact points.

It is recommended that a program to evaluate preservation materials be established under the direction of the single service manager for the munitions production base. The results of such a study should be made available to all military departments. Specific areas of concern should be established for reserach, study, and testing.

8. Economic Analysis

It is recommended to consider in-place, hooked-to-power storage for munition production lines for all PEP equipment requiring fast reactivation response based on the generalized economic analysis outlined in Section IV.

Forms from the PEQUA draft paper "Evaluation of Layaway Analysis" can be used to collect and compare layaway costs, holding costs, and reactivation costs for input to economic analysis as well as to provide information for the P-17 exhibit to assist in choosing the most economical layaway type for the fastest possible response. Samples of forms are included in the Appendix.

9. Tool Availability for PEP's

It is recommended that a Government tool center be formed under control of DARCOM to provide services for producing,

transposing programs and format, and storing numerical control tapes to reproduce all Government munitions tooling. The Government tool center should be responsible for establishing tooling standards for specific machine classifications to assure tooling interchangeability between machines. The tool center should provide liaison service to munitions producers when required to develop or improve tooling on a controlled basis. Storage of tooling should not be attempted at the tool center. Hard tooling should continue to be retained with the respective IPE.

10. Layaway Responsibility

It is recommended that provisions be established in each PEP producer's contract to have a qualified, independent contractor perform any layaway required for PEP equipment. Specific criteria covering IPE operational condition, preservation materials, and work time table are recommended to be established between the producer and the independent layaway contractor following prescribed policy and procedures with a close audit and inspection by the Government.

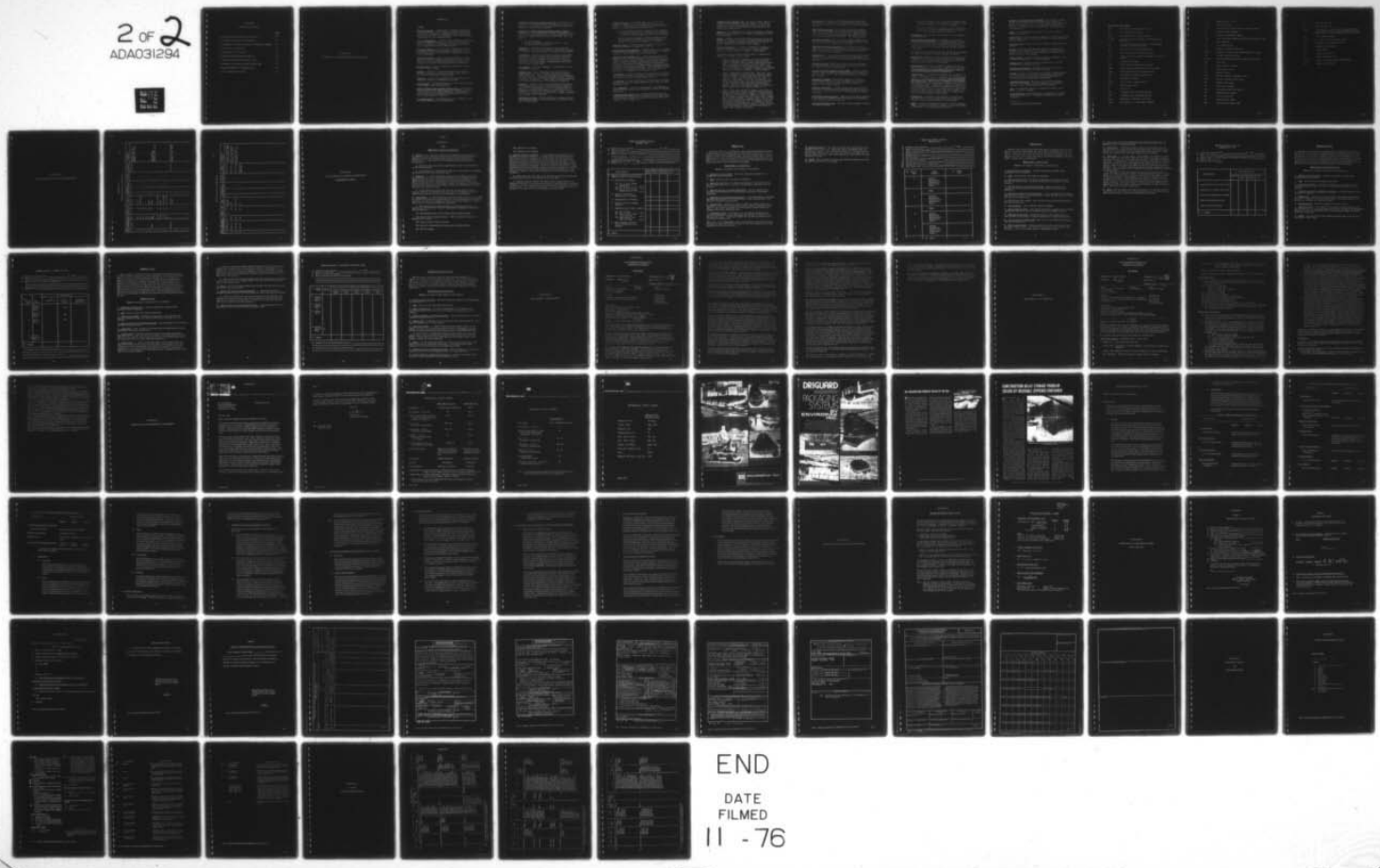
11. Reactivation Response

It is recommended that written directives be established as part of industrial preparedness planning to take advantage of the experiences developed in previous emergency situations, or to correct deficiencies encountered during previous emergency situations, so that IPE from idle PEP's can be reactivated promptly and in planned order while bypassing peacetime formal requirements. A plan to identify and record IPE reactivated under emergency situations should be established so that management of the production base is retained.

APPENDIX

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APPENDIX A

GLOSSARY AND ABBREVIATIONS AND ACRONYMS

APPENDIX A

GLOSSARY

active base package - Government-owned industrial equipment not currently in productive use, located in an active facility when such equipment is specifically retained to provide acceleration capability in the event of an emergency, or to be used following a change-over to a new or modified item.

active plant equipment - An item of plant equipment is considered active for purposes of retention as long as it is required to support the production or maintenance or research, development and test assignment for which it was provided.

analytical inspection - The analysis by examination and testing to determine the operation and tolerance characteristics of a metal-working machine tool as measured or compared to a specific level of performance.

assigned IPE reserve - IPE held by DOD components in ASD (I&L) approved mobilization packages or package plants (ASOD, standby lines, PEP, reserve and active base production packages) in accordance with approved mobilization production requirements.

cannibalization - The act of dismantling a machine for parts to be used for other machines.

cleaning - Cleaning is a process accomplished by a variety of methods and techniques to remove all sludge, chips, abrasives, dirt, rust and other harmful foreign matter.

components - Those articles, materials, and supplies which are directly or indirectly incorporated in end items.

condition code - A designation assigned to IPE to define its operational characteristics and use ability.

Defense Industrial Plant Equipment Center (DIPEC) - A major field activity of the Defense Supply Agency (DSA) responsible for providing services to the military departments in performance of the functions set forth in regulation AR 700-90 and in DSA Manual 4215.1 (DIPEC Operations) (AR700-43).

DOD General Reserve - Idle unassigned IPE held in reserve to support current and projected DOD requirements.

Departmental Industrial Plant Reserve (DIPR) - That portion of the national industrial plant reserve (IPR) assigned to a DOD component such as the Department of the Army and further assigned to subordinate commanders for management.

Department of Defense Industrial Equipment Reserve (DODIER) - those items of IPE retained under the control and account of the DOD and its component elements for use during emergencies to establish or augment portions of the production base. It is composed of:

- o DOD General Reserve
- o Military Departmental Mobilization Reserve. (PEP's are included in this grouping.)

disassembly - Disassembly is the removal of major parts and assemblies and other operations further dividing plant equipment to facilitate inspection, cleaning, preservation and/or shipment.

documentation - Documentation consists of packing lists, inspection and test reports, operating and installation instruction, historical records and diagrams of electrical and hydraulic systems and utility connections. When specified, the documentation shall include photographs, manufacturing procedures and other required technical data.

DOD component - A Military Department or Defense Agency and its subordinate activities.

elephant tools - Items of industrial plant equipment with an acquisition cost of $100,000 or more, exclusive of numerical control attachments. They are long procurement and installation lead time tools (e.g., 18 months), requiring building alterations to install, are difficult to remove, usually requiring dismantling and building rehabilitation. (See nonseverable equipment.)

excess IPE - Items of IPE which are not required by the owning DOD component and which are not required by DIPEC to support current and future requirements of the DOD in accordance with the policies and procedures contained in DOD Instruction 4218.18, Management of Defense Owned Industrial Plant Equipment (I&L) and DSAM 4215.1/AR 700-43/NAVSUP Pub 5009/AFM 78-9, Defense Industrial Plant Equipment Center Operations.

exercising or cycling - Periodic operation of a machine under no-load conditions through all feeds and speeds to distribute lubricants or preservatives.

Government property - All property owned by or leased to the Government or acquired by the Government under the terms of a contract. Government property includes both Government-furnished property and contractor-acquired as defined below:

- o Government-furnished property - property in the possession of, or acquired directly by, the Government and subsequently delivered or otherwise made available to the contractor;

- o contractor-acquired property - property procured or otherwise provided by the contractor for the performance of a contract, title to which is vested in the Government.

historical record - A record or group of records on each item of IPE which accompanies the equipment on transfer.

idle industrial plant equipment - Government-owned IPE in contractor or military facilities which is no longer required for the purpose for which it was originally authorized and provided.

industrial plant equipment (IPE) - Plant equipment with an acquisition cost of $1,000 or more used for the purpose of cutting, abrading, grinding, shaping, forming, joining, testing, measuring, heating, treating or otherwise altering the physical, electrical or chemical properties of materials, components or end items entailed in manufacturing, maintenance, supply processing, assembly or research and development operations. IPE is identified by noun name in Joint DOD Handbooks as listed in ASPR 13-312 and in DSA 4215 series IPE handbooks, AR 700-43 and AR 700-90.

IPE accessory - A device identified to the basic unit of IPE which facilitates or enhances the operation but which is not essential for its operation, such as remote control devices.

IPE auxiliary - A device identified to the basic unit of IPE without which the basic unit cannot operate, such as motors for pumps and machine tools.

IPE - Classified - IPE which is classified by a DOD component to protect a defense program, military operation, system or equipment application.

industrial plant reserve (IPR) - Selected industrial facilities whose production capacity has been designated for retention to rpo provide production capability required for expansion during mobilization. (Ref. NIPR and DIPR)

industrial production base, Army - The total privately owned and Government-owned industrial production capacity of the United States, its territories and possessions which is or may be made available to the Army for manufacture of items required by the United States Armed Forces.

inspection - The examination and testing of equipment to determine whether or not it conforms to the technical requirements set forth for the equipment.

layaway - Retention of industrial facilities, special tooling and special test equipment not required to support current production but which are required to support approved forces in times of national emergency or limited war. (Ref. storage)

levels of protection - The degree of protection to be applied to industrial plant equipment for storage or shipment depending upon the conditions that can be foreseen or anticipated.

The various levels of protection apply equally to preservation-packaging and packing, except as noted:

- Level A - This level is designed to provide the degree of protection required against the most severe conditions known or anticipated during shipment, handling and storage. Level A protection is provided to selected items of IPE that are designated Military Support Items (MSI). Normally, level A protection is provided industrial plant equipment destined for uncontrolled storage or overseas shipment.

- Level B - (applicable to packing only). This level is designed to provide the degree of packing protection against conditions known to be less severe than those requiring level A, but more severe than those for which level C is adequate. Items packed to this level are intended to be shipped and handled under cover, and stored in warehouses or other structures having equivalent protection from weather. This level of packing is adequate for standby-in-place, standby-on-site and central storage of IPE.

- Level C - This level provides the degree of protection required against known favorable conditions during shipment, handling and limited tenure of storage. It should be used on items of IPE to be placed in controlled humidity storage and for domestic shipment from user to user, user to Department of Defense Industrial Equipment Reserve (DODIER), user to Property Disposal Office (PDO) for disposal or manufacturer to user for immediate use. It involves provision of the minimum protective measures required to insure delivery to the first receiving activity without deterioration or damage during shipment and handling.

machine tools - A category of metal-working machines which meet the definition of IPE and found in Federal Supply Classes 3405, 3408, 3410 through 3419 and 3441 through 3449. (Ref. metal-working machinery)

metal-working machinery - That category of production equipment (IPE) consisting of power-driven, nonportable machines which remove, cut, shape, mill or otherwise form metal. These machines are described under production equipment codes (PEC) 3405, 3408, 3410 through 3419 and 3441 through 3449. (Ref. machine tools)

minor plant equipment - An item of plant equipment having an acquisition cost of less than $200 and other plant equipment regardless of cost when so designated by the Government.

mobilization production requirement - The quantity of an item expressed as a rate of production which is required in the military supply system on M-day to support increased military operations during a specified post M-day period.

modernization - A broad term denoting the improvement of industrial facilities through replacement, modification, rearrangement, or addition of capability to achieve economic, quality, time or safety advantages.

modernization costs - Expenditures which result from increasing the original capacities and capabilities or an increase in the efficiency or operating economy of IPE.

National Industrial Equipment Reserve (NIER) - A national reserve of IPE to supply the production capability required in support of approved armed forces in time of national emergency or in anticipation thereof.

nonseverable equipment - Nonseverable equipment is a type of plant equipment which, due to size or design, cannot be economically removed from its installed position for storage or shipment. (Ref. elephant tools)

numerical control (NC) - A control system which accept and interprets part, or all, pre-recorded alpha-numeric coded instructions and, in turn, directs some, or all, of the operations of a machine or process.

operational/functional testing - Complete power and manual operation of all systems to determine correct functioning of all mechanical and/or electrical controls and devices.

other plant equipment (OPE) - That part of plant equipment excluding IPE categorized below.

- o Minor plant equipment - an item of plant equipment having an acquisition cost of less than $1,000.00 and other plant equipment regardless of cost when so designated.

- o Any plant equipment with an acquisition cost of $1,000.00 or more that is used to operate and maintain a facility, e.g., office cafeteria and medical equipment.

owning agency - The Government activity which has accountability for plant equipment.

plant equipment package (PEP) - A complement of active and/or idle plant equipment which has been formally approved for retention by the Assistant Secretary of Defense (Installation and Logistics) in accordance with criteria and procedures set forth in DOD instruction 4215.1 and which has been assigned a number by ASD (I&L).

Other names previously used include ASOD, Package Plant Equipment, DOD Component Mobilization Reserve, Assigned IPE Reserve.

preservation - Application or use of adequate protective measures to prevent deterioration resulting from exposure to atmospheric conditions, fungus, excessive drying, high humidity, fumes and gases when being handled, stored or shipped.

rebuild/upgrade - To restore an item to a standard as near as possible to original or new condition in appearance, performance and life expectancy and include upgrading to assure compliance with safety and pollution abatement regulations.*

rehabilitation - The restoration of a facility or equipment to a standard as near as possible to iriginal or new condition in appearance, performance, and life expectancy, and the inclusion of upgrading to assure compliance with safety and pollution abatement regulations.* Rehabilitation of equipment involves removal from the production line, disassembly, inspection of all parts and components, repair or replacement of defective elements using original manufacturer's tolerances or specifications, and subsequent reassembly and return to the production line. Maintenance of large installed presses, furnaces, and other equipment of similar nature which are not normally removed for rehabilitation will be considered repair for this purpose.

remanufacture - A program of rehabilitation, as revised, plus the introduction of design change that increases capacity, capability, and productivity equivalent to new equipment.

repair - The specified maintenance required to correct material damage or failure as necessary, to restore the end item, assembly or subassembly to the normal operating condition.

replacement of industrial plant equipment - This refers to replacement of one or more existing items of industrial equipment by another item or items in order to achieve economic and/or industrial preparedness advantage to the DOD through increased efficiency. Items can be replaced either by new procurement or equipment from idle inventories.

reserve - Government propoerty withheld from use and stored for future or special use.

retro-fitting - The act of applying, adapting or building new controls, parts or accessories to an older style machine with the intention of adding a capability.

serviceable item - Item in new or used condition suitable for issue and use.

storage - Government-owned facilities placed in a layaway status when they are no longer required for current production, but are required to provide a mobilization capability not attainable from private industry. (Ref. layaway)

storage adjacent - adjacent storage is storage of equipment in the vicinity of the premises of the contractor/user.

storage on site - Equipment stored on the premises of the user, but removed from operating position.

storage standby-in-place - Equipment stored in its original, or last operational position and connected to power.

testing - An element of inspection which denotes the determination, by technical means of the properties or elements of plant equipment, or components thereof, and involves the application of established scientific principles and procedures.

unassigned IPE reserve - IPE held either in the DOD general reserve or in the national industrial equipment reserve (NIER) to support current or planned DOD production requirements.

user - The Government activity or contractor operating, or proposing to operate, equipment.

visual inspection - Visual inspection is accomplished by visually observing the operation of the equipment performing its normal operations.

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* Underlined words are task additions.

ABBREVIATIONS AND ACRONYMS

AIPP	Army Industrial Preparedness Program
AMC	U. S. Army Materiel Command
APBSP	Army Production Base Support Program
ASD(I&L)	Assistant Secretary of Defense (Installations and Logistics)
ASOD	An acronym derived from the title of the Assistant Secretary of Defense (Ref. PEP)
ASPR	Armed Services Procurement Regulations
COCO	Contractor-owned and contractor-operated
D-Day	The day on which an operation commences or is due to commence.
DA	Department of the Army
DCAS	*Defense Contract Administration Service*
DCASR	Defense Contract Administration Services Region
DIPEC	Defense Industrial Plant Equipment Center
DIPR	Departmental Industrial Plant Reserve
DOD	Department of Defense
DODIER	DOD Industrial Equipment Reserve
DSA	Defense Supply Agency
FY	Fiscal Year
GOCO	Government-owned, contractor-operated
GOGO	Government-owned, Government-operated
HQDA	Headquarters, Department of the Army
HQAMC	Headquarters, U.S. Army Materiel Command

ICP	Inventory Control Points
IFB	Invitation for Bids
IMPPP	Industrial Mobilization Production Planning Program
IPE	Industrial Plant Equipment
IPP	Industrial Preparedness Planning
JCAP	Joint Conventional Ammunition Production Coordinating Group
KE	Kaiser Engineers
LAP	Load, Assembly, Pack
LIF	Layaway of Industrial Facilities
M-Day	Designates the day on which mobilization is to begin.
MCA	Military Construction, Army
MILSTRIP	Military Standard Requisitioning and Issue Procedures
MPTS	Metal Parts
MSC	Major Subordinate Command
MUL	Master Urgency Listing
N/C	Numerical Control
NIER	National Industrial Equipment Reserve
NIPR	National Industrial Plant Reserve
NSN	National Stock Number
OPE	Other Plant Equipment
OSHA	Occupational Safety and Health Act
PBA	Production Base Analysis
PBP	Production Base Plan
PBS	Production Base Support
PBSP	Production Base Support Plan

PBU	Production Base Unit
PEC	Plant Equipment Code
P-Day	That point in time at which the rate of production of an item available for military consumption equals the rate at which the item is required by the Armed Forces.
PEP	Plant Equipment Package
PEQUA	U.S. Army Production Equipment Agency
PIF	Provision of Industrial Facilities
R&D	Research and Development
REH	Rehabilitation
RFQ	Request for Quotation
SAI	Stetter Associates, Inc.
ST/STE	Special Tooling and Special Test Equipment
TDP	Technical Data Package

APPENDIX B

PROTECTIVE COATINGS FOR CONSIDERATION

APPENDIX B

PROTECTIVE COATINGS FOR CONSIDERATION

Item No.	Description		Approx. Cost	Main	Applied by			Systems	Present	Manufacturer
	Trade Name	Type	Per Sq. Ft.	Property	Dip	Brush	Spray	Components	Application	Address
1	Humiseal	1B15	$ .088	Acrylic	X	X	X	1	Electronics	Humiseal Division Columbia Tech. Corp Woodside, N.Y. 11377
2	"	1B31	.092	Acrylic	X	X	X	1	"	"
3	"	1A20	.111	Polyurethane	X	X	X	1	"	"
4	"	1A27	.086	"	X	X	X	1	"	"
5	"	1A33	.136	"	X	X	X	1	"	"
6	"	2A53	.213	Epoxy	X	X	X	2	"	"
7	Hysol	PC12-007M	.199	Epoxy	X	X	X	2	"	Hysol Division The Dexter Corp Industry, Calif. 91744
8	"	PC29-M	.170	Polyurethane	X	X	X	2	"	"
9	"	PC16-M	.154	Epoxy	X	X	X	2	"	"
10	"	PC18-M	.124	Polyurethane	X	X	X	2	"	"
11	"	PC28-Std.	.065	Polyurethane	X	X	X	1	"	"
12	Westcoat	100	. 02	Hot Melt Plastic	X	X		1	Metal Parts	Western Coating Company Alhambra, Calif. 91803
13	"	50	. 02	"	X	X		1	"	"
14	"	70	. 02	"	X	X		1	"	"
15	"	80	. 02	"	X	X		1	"	"
16	"	404	. 02	"	X	X		1	"	"
17	"	202	. 02	"	X	X		1	"	"

PROTECTIVE COATINGS FOR CONSIDERATION

Item No.	Description		Approx. Cost Per Sq. Ft.	Main Property	Applied by			Systems Components	Present Application	Manufacturer Address
	Trade Name	Type			Dip	Brush	Spray			
18	Paraflex	10	$. 02	Hot-Melt Plastic	X	X		1	Metal Parts	Western Coating Company Alhambra, Calif. 91803
19	Protecto	5610	.001	Rosin	X		X	1	Electronics	Kester Solder Division Chicago, Ill. 60639
20	Soft Seal	3013	.012	Petroleum	X	X	X	1	Machine Tools	CRC Chemicals USA Warminster, Pa. 18974
21	CRC 3.36	3006	.002	Oil	X	X	X	1	Machine Tools Electrical	"

APPENDIX C

EVALUATION OF LAYAWAY ALTERNATIVES

PROPOSED BY PEQUA

APPENDIX C

P-17

EVALUATION OF LAYAWAY ALTERNATIVES

1. PURPOSE. This evaluation method has been developed to aid major subordinate commands in reviewing, selecting, justifying, and documenting potential alternatives available after the anticipated shutdown of a production line. All or part of the production capability may need to be retained to:

a. Satisfy future mobilization requirements for one or more end items or critical components.

b. Be available for reactivation at some time in the future to replenish the Authorized Acquisition Objective (AAO).

2. PROCEDURE. a. Major subordinate commands are to inclose Evaluations of Alternatives with P-17 project requests submitted for Budget hearings. PEQUA-approved Evaluations of Alternatives will be required prior to the AMC Apportionment review. Evaluations of Alternatives will consider each of the alternatives listed in paragraph 3 below. Evaluations of Alternatives for late start layaway projects (funded from omnibus projects) will also be submitted for PEQUA validation.

b. If the evaluation results in more than one alternative, then an economic analysis, in accordance with AR 37-13 and the inclosure, will be performed and submitted as part of the Evaluation of Alternatives.

3. ALTERNATIVES. a. The alternatives below are listed in order of preference to conform to Department of Defense policy in limiting Government ownership of production facilities and reducing the cost of facilities owned to a minimum, consistent with meeting mobilization requirements.

b. The following alternatives should be considered in performing the Evaluation of Alternatives. Provide a feasibility statement in response to each alternative.

(1) Excessing/Disposal of IPE through existing DIPEC channels.

(2) Sale of IPE to planned producer. (This is subject to passage of negotiated sale bill.)

(3) Lease of IPE to planned producer.

(4) Rent-free use/maintenance exchange with planned producer.

(5) On-site layaway.

(6) Adjacent site layaway.

(7) Central storage layaway.

4. ECONOMIC ANALYSIS PROCEDURES. a. The following steps may be used in performing an economic analysis. If there is more than one alternative, Cost Backup Sheets are assembled in the first step for each cost factor to be included in each alternative. In the second step, the information for each alternative is gathered together on a Summary Cost Sheet. In the third step, discounted total costs for each alternative are transferred to an Alternatives Comparison Sheet. Item 8 in this Sheet has space for entering qualifying remarks pertinent to any of the costs included in or excluded from the economic analysis. The Alternatives Comparison Sheet will then display the essential information for selecting the most desirable course of action.

b. Forms suggested to be used in the economic analysis and instructions for filling out the forms are provided in the inclosure.

c. Length of Layaway Period: The total number of years will be the longest time period during which an end item to be produced could be expected to remain in the Army supply system as a preferred item with type classification Standard A. For sensitivity analysis, the economic analysis should be reevaluated for 50% and 150% of the projected layaway period.

BACKUP FOR ECONOMIC ANALYSIS
LAYAWAY COSTS

1. Submitting Army Component _____ 2. Date _____
3. Items to be Produced _____
(incl. critical components) _____
4. Name and Location of Current Producer(s) _____
_____
_____
_____
5. Location of Facilities to be Laid Away (if known) _____
6. Project Year ____ of ____ (Use separate backup sheets for each year.)

Cost Elements	7. Annual Alternative Costs			
	On Site	Adjacent Site	Central Storage	Excess GFE
8. Layaway, Relayaway, Redistribution and/or disposal (estimated costs)				
a. Processing for Storage				
(1) No. of items (DIPEC reportable) ____				
(2) No. of items of OPE ____				
(3) No. of items of non-production equipment ____				
b. Removal from Plant & Preparation for Shipment				
c. Transportation to Storage				
d. Receive & Store at Layaway Location				
e. Rehabilitation of Equip (total)				
(1) No. of items ____				
(2) Repl Value of items to be rehabbed ____				
(3) Repl value of all IPE in package ____				
f. Other expenses (Restoration of facilities, etc.; specify)				
9. TOTALS				

LAYAWAY COSTS

This cost factor is for physically laying away the production equipment to be retained. This includes the cost of processing for storage, plant removal, transportation, rehabilitation, and other relevant costs. Layaway costs, of course, are entered only under those alternatives that include a layaway action. Layaway actions are usually completed within one year, but, for certain types of processing plants, the costs may carry over into additional years and should be entered as applicable.

Backup Sheet - Layaway Costs

(Numbers are keyed to item numbers of the Format.)

1. SUBMITTING ARMY COMPONENT: The major subordinate command of AMC responsible for the analysis.

2. DATE: Enter the date this sheet was prepared.

3. ITEMS TO BE PRODUCED: The FSN and nomenclature of all end items and critical components thereof for which the production capability is to be retained.

4. NAME AND LOCATION OF CURRENT PRODUCER(S): Name and address of all currently active producers of Item 3, either contractor or Government controlled.

5. LOCATION OF FACILITIES TO BE LAID AWAY: If the information is available, indicate which producer's facilities are to be laid away and will be the basis for estimating layaway costs.

6. PROJECT YEAR: Identifies the year in which the layaway costs will be incurred. If carried over more than one year, prepare a separate backup sheet for each year and indicate the total number of years to make the layaway and the year summarized here.

7. ALTERNATIVE COSTS: Under each of the alternatives being analyzed, enter the annual cost for each applicable cost element 8a through 8f on the analysis format. These cost elements are the same as those required in Item 14 of Exhibit P-17.

8d(1), (2), & (3), ITEM COUNT: These items contain no cost information but are solely a count of the various types of items that comprise the layaway package and help define its size.

8e, REPLACEMENT VALUES: (1) Enter the total number of items that will require rehabilitation. (2) Enter the current replacement value for all items in a above. PEQUA replacement factors for IPE should be used to determine these values. (3) Enter the current replacement value for all the DIPEC reportable items in the package 8(1) again using the PEQUA replacement factors.

9. TOTALS: Sum the annual costs for each layaway alternative and enter the sum at the bottom of each column.

BACKUP FOR ECONOMIC ANALYSIS
HOLDING COSTS

1. Submitting Army Component _____ 2. Date _____
3. Items to be Produced _____
(incl. critical components) _____
4. Item(s) to be Stored - End Item(s) and/or Components _____ IPE _____
5. Storage Location _____
6. Mobilization Requirements _____
7. D-P Day Period _____
8. D-P Day Stock Required = Item 6 x Item 7 _____
9. Unit Cost of End Items _____
10. D-P Day Stock Acq. Cost = Item 8 x Item 9 _____
11. Holding Cost Percent (if applicable) _____
12. Total Square Feet of IPE & Other Equipment to be Stored _____

13. Project Year	Cost Elements	14. Annual Cost
1	Storage Maintenance Deterioration Obsolescence Losses	
	TOTAL	
2	Storage Maintenance Deterioration Obsolescence Losses	
	TOTAL	
3	Storage Maintenance Deterioration Obsolescence Losses	
N	Storage Maintenance Deterioration Obsolescence Losses	
	15. TOTAL	

4

HOLDING COSTS

Holding costs include storage and maintenance expenditures and allowances for deterioration, obsolsscence, and losses due to accidental damage or pilferage. These costs will apply and must be computed separately for end items that are stored as part of D to P stock and IPE stored as a layaway package. Holding costs will apply during each year of the economic analysis time period until a layaway line is reactivated.

Backup Sheet - Holding Costs

(Numbers are keyed to item numbers of the Format.)

1. SUBMITTING ARMY COMPONENT: The major subordinate command of AMC responsible for the analysis.

2. DATE: Enter the date this sheet was prepared.

3. ITEMS TO BE PRODUCED: The FSN and nomenclature of all end items and critical components thereof for which the production capability is to be retained.

4. NAME AND LOCATION OF CURRENT PRODUCER(S): Name and address of all currently active producers of Item 3, either contractor or Government controlled.

5. LOCATION OF FACILITIES TO BE LAID AWAY: If the information is available, indicate which producer's facilities are to be laid away and will be the basis for estimating layaway costs.

6. MOBILIZATION REQUIREMENTS: Enter the rate (items per month) assigned to this planned producer.

7. D-P DAY PERIOD: Enter applicable number of months.

8. D-P DAY STOCK REQUIRED: This figure provides an estimate of the D-P Stock requirement consistent with the capabilities of this planned producer.

9. UNIT COST OF END ITEMS: Record unit costs of those items listed in Item 3 above. Costs should be based on mobilization production quantities.

10. D-P DAY STOCK ACQUISITION COST: This could be the basis for determining end item holding costs.

11. HOLDING COST PERCENT: Indicate percentage of unit cost to be used for estimating holding costs of end items, if this method is to be used. (See FM 38-22.) If not to be used, state not applicable and why.

12. TOTAL SQUARE FOOTAGE OF FLOOR SPACE TO BE OCCUPIED BY IPE, OPE, AND NONPRODUCTION EQUIPMENT TO BE STORED.

13. PROJECT YEAR: Identifies the year in which a cost will be incurred. The total number of years (N) will be the longest time period during which an end item to be produced could be expected to remain in the Army supply system as a preferred item with type classification Standard A.

14. ANNUAL COST: a. For end items: If the holding cost percent (Item 11) is used, enter for each project year only the total annual cost obtained as the product of unit cost times holding cost percent times number of items to be stored. If holding cost percent is not used, separate estimates for each cost element will have to be made based on the judgment of the submitting command. O&MA Budget Codes 72111.XXXX (formerly 2220.XXXX) may be used as reference here. If holding costs do not apply to certain ammunition items, so state. Interest costs on funds invested in end items are considered part of the holding costs.

b. For IPE: Storage and maintenance cost elements may be based on square foot factors supplied by PEQUA. Deterioration and losses, if applicable, may be estimated as a percentage of acquisition cost based on DIPEC or command experience. Obsolescence will not apply if design of the end item(s) to be produced is not expected to be changed over the time period of the analysis. If design changes are expected to affect production capability of package, some allowance will have to be made for obsolescence. O&MA Budget Codes 728011.20000 through 728011.22000 may be used as reference here. Enter costs for each project year.

15. TOTAL: Sum the annual costs over all project years and enter the sum at the bottom of the column. The totals of holding costs for end items and IPE should be added for transfer to the Summary Cost Sheet.

BACKUP FOR ECONOMIC ANALYSIS
REACTIVATION COSTS

1. Submitting Army Component _____ 2. Date _____
3. Items to be Produced _____
(incl. critical components) _____
4. Producer Facilities and Location of Layaway (if known) _____
5. Project Year _____
6. Discount Factor _____

Cost Elements	7. Alternative Costs			
	On-Site	Adjacent Site	Central Storage	Excess GFE
Transportation from Storage to Use				
Materials for Cleanup, Test, Etc.				
Utilities Installation or Hookup				
Rehab Previously Unexpected				
Other Services (specify)				
8. TOTALS				

REACTIVATION COSTS

The cost of reactivation of a layaway line is assumed to occur only at the end of the last year of the analysis period. Reactivation costs should be included in the economic analysis because a layaway line would have to be reactivated to provide the benefit for which it was retained. Inclusion of this cost at the end of the time period reduces its effect on the analysis to a minimum; however, if it is desired to base the analysis strictly on peacetime costs, including no wartime emergency costs, reactivation cost may be omitted for this reason at the discretion of the using command.

Backup Sheet - Reactivation Costs

(Numbers are keyed to item numbers of the Format.)

1. SUBMITTING ARMY COMPONENT: The major subordinate command of AMC responsible for the analysis.

2. DATE: Enter the date this sheet was prepared.

3. ITEMS TO BE PRODUCED: The FSN and nomenclature of all end items and critical components thereof for which the production capability is to be retained.

4. PRODUCER FACILITIES AND LOCATION OF LAYAWAY: Indicate intended storage locations (if known).

5. PROJECT YEAR: Identifies the year in which reactivation costs will be incurred. It will be the end of the last year of the time period for the analysis as estimated for other cost factors.

6. DISCOUNT FACTOR: Record the appropriate discount factor.

7. ALTERNATIVE COSTS: Under each of the alternatives being analyzed enter the estimated cost for each applicable cost element. If one of the alternatives is excessing GFE, the replacement cost of this equipment should be included under this alternative.

8. TOTALS: Sum the costs for each layaway alternative and enter the sum at the bottom of each column.

ECONOMIC ANALYSIS - SUMMARY OF COSTS

1. Submitting Army Component _____ 2. Date _____
3. Items to be Produced _____
(incl. critical components) _____
4. Name and Location of Current Producer(s)

_____

_____

_____

5. Alternative _____

6. Project Year	Cost Factors	7. Annual Costs a. Annual Cost	b. Discount Factor	c. Discounted Annual Cost
1	Layaway Holding Other		.954	
2	Layaway Holding Other		.867	
3	Holding Other		.788	
.				
.				
.				
N	Holding Reactivation Other			
8. TOTALS				

9. Remarks and Non-$ Quantifiable Benefits: _____

_____

10. Name and Title of Principal Action Officer: _____

_____

SUMMARY OF COSTS

Space has been provided in Item 6 of the Alternatives Comparison Sheet for other possible cost factors. Among these may be the cost for Government leasing of contractor-owned production equipment, which is a remote but possible alternative, or the opposite - a dollar return to the Government from sale or lease to a producer. There may also be costs incurred for modifying the production equipment to convert its capability for producing one end item to producing a similar end item that will be a replacement. This situation will occur when the remaining time for an item as a preferred item is very short, and it is desired to retain and convert the production capability for use in producing a new item. This cost should be entered for the year in which it is expected to occur, and the preferred time period for the new item should be added to the time over which the economic analysis is made.

Summary of Costs

(Numbers are keyed to item number of the Format.)

1. SUBMITTING ARMY COMPONENT: The major subordinate command of AMC responsible for the analysis.

2. DATE: Enter the date this sheet was prepared.

3. ITEMS TO BE PRODUCED: The FSN and nomenclature of all end items and critical components thereof for which the production capability is to be retained.

4. NAME AND LOCATION OF CURRENT PRODUCER(S): Name and address of all producers currently producing Item 3.

5. ALTERNATIVE: Enter the name of the alternative for which costs are being summarized; for example, On-Site Lwy.

6. PROJECT YEARS: Identifies the year in which a cost will be incurred. The total number of years (n) will be the longest time period during which an end item to be produced could be expected to remain in the Army supply system as a preferred item, i.e., type classified Standard A.

7. ANNUAL COSTS: a. Enter in the first column, headed "Annual Cost," the annual cost figure obtained from the Backup Sheet for each cost factor that is applicable to the alternative being analyzed, for each year of the total time period. Cost factors other than those listed should be included if applicable in the judgment of the submitting command. Likewise, nonapplicable cost factors may be omitted.

b. Enter in the second column, headed "Discount Factor," the appropriate project year discount factor, if not already provided. Holding costs are assumed to be mid-year costs as an average of annual expenditures. Layaway costs may be mid-year or year-end, depending on the expected time to complete the layaway action. Reactivation is a year-end cost at the end of the last year of the time period.

c. Enter in the third column, headed "Discounted Annual Cost," the product of the Annual Cost and the Discount Factor (from the first two columns) for each of the project years.

8. TOTALS: Sum the discounted annual costs computed for each cost factor and enter the total at the bottom.

9. REMARKS AND NON-$ QUANTIFIABLE BENEFITS: a. Record any qualifying remarks pertinent to any of the cost factors and enter the total at the bottom.

b. Record any differences that might be expected in the benefits to be derived from this alternative versus other alternatives; that is, outcomes that have not already been quantified in dollar terms, e.g., variations in lead time or maximum production capability.

10. NAME AND TITLE OF PRINCIPAL ACTION OFFICER: Identify the name(s) of the principal parties responsible for the Summary of Costs.

ECONOMIC ANALYSIS - ALTERNATIVES COMPARISON SHEET

1. Submitting Army Component _____ 2. Date _____
3. Items to be Produced _____
(incl. critical components)
4. Name and Location of Current Producer(s)

_____

_____

_____

5. Project Year	Cost Factors	6. Alternative Costs				
		1 Discounted Annual Cost	2 Discounted Annual Cost	3 Discounted Annual Cost	4 Discounted Annual Cost	5 Discounted Annual Cost
1 Layaway Holding Other						
2 Layaway Holding Other						
3 Holding Other						
•						
•						
•						
N Holding Reactivation Other						
7. TOTALS						

8. Remarks and Non-$ Quantifiable Benefits: _____

_____

9. Name and Title of Principal Action Officer: _____

_____

ALTERNATIVE COMPARISON SHEET

The most highly aggregated form used in the economic analysis has a layout that is similar to the Format A of AR 37-13. Item 6 of the Alternative Comparison Sheet displays the major cost factors recommended for inclusion in the economic analysis, with space for additional factors as deemed necessary in the judgment of the submitting command. For each alternative examined, there is a separate column for recording the discounted annual cost for each cost factor.

Alternatives Comparison Sheet

(Numbers are keyed to item numbers of the Format.)

1. SUBMITTING ARMY COMPONENT: The major subordinate command of AMC responsible for the analysis.

2. DATE: Enter the date this sheet was prepared.

3. ITEMS TO BE PRODUCED: The FSN and nomenclature of all end items and critical components thereof for which the production capability is to be retained.

4. NAME AND LOCATION OF CURRENT PRODUCER(S): Name and address of all producers currently producing Item 3.

5. PROJECT YEAR: Identifies the years in which a cost will be incurred. Enter year from Summary of Cost Sheet, Item 6.

6. ALTERNATIVE COSTS: a. Enter at the top of each column in place of the numbers the name of the alternatives being analyzed. For example, in place of "No. 1," write "On-Site Lwy;" in place of "No. 2," - "Adjacent Site Lwy."

b. Under each of the alternatives being analyzed, enter the discounted annual cost for each applicable cost factor for each year of the total time period. These figures are to be taken from the last column of Item 7 on the Summary of Costs for each alternative.

7. TOTALS: Sum the discounted annual costs listed for each alternative and enter the sum at the bottom of each column. Each columnar total should correspond to the total in Item 8 of a Summary Cost Sheet.

8. REMARKS AND NON-$ QUANTIFIABLE BENEFITS: Briefly summarize the information recorded under Item 9 on the Summary of Costs for each alternative.

9. NAME AND TITLE OF PRINCIPAL ACTION OFFICER: Identify the name(s) of the principal parties responsible for the economic analysis.

APPENDIX D

TRIP REPORT - GATEWAY AAP

APPENDIX D

PLANT EQUIPMENT PACKAGE (PEP) MODERNIZATION PROGRAM

TRIP REPORT

CONTRACT NO. DAAA21-75-C-0303

KE JOB NO. 75086-002-30
-002-40

PREPARED BY: H.E. Wick
E.G. Schmitz

DATE: 10/8/75

APPROVED BY:

PLACE:
Gateway A.A.P. (PEP #793)
6703 Southwest Avenue
St. Louis, Missouri

CONTACT:
A.D. Bain

DATE:
9/29/75, 0845-1700

PURPOSE:

To inspect preservation and layaway of IPE performed on a long-term basis

DISTRIBUTION:

H.W. Flippen
Jack Ritchie
Lloyd Hurwitz
All SAI Personnel

PARTICIPANTS:
Joyce Kufel, PEP Division Engineer - PMO
Gene Schmitz, Kaiser/Stetter
Harold Wick, Kaiser/Stetter
Al D. Bain, Commanders Representative/COR - Gateway
Charlie Sackmann, Plant Manager - Voss Machinery Company
Ed Mudyewt, Plant Operations Director - ARMCOM
Bill Hansen, Plant Operations Director - ARMCOM

REPORT

Product - 175 mm HE M437 SHELL (Metal Parts)

Miss Joyce Kufel, Gene Schmitz and the writer arrived at Gateway Army Ammunition Plant approximately 08:45 Monday, 29 September 1975, and were immediately admitted to Mr. A.D. Bain's office. Mr. Bain is the Commander's Representative managing the Government's interest at the facility.

Mr. Bain distributed copies of a printed booklet, Information And Sequence Of Manufacture for 175 mm Metal Parts. This booklet was apparently printed while the plant was in operation. An additional letter, dated 1 July 1975, was also made available updating the booklet and covering the data for Layaway/Maintenance and Surveillance Activities. Copies of both publications have been placed in the project files. These publications give an accurate description of the facility and operations during the last activation period.

Mr. Bain was very cooperative and answered questions from the group before the group inspected the laid away equipment. The maintenance contractor, Voss Machinery Company, has a five year fixed price contract, renewable yearly. The fifth yearly renewal started 1 October 1975, two days after our visit. Total maintenance employees were 13 (under contract strength by three). They included one plant manager, one secretary, two maintenance people and nine plant protection people. Mr. Bain is the only government representative.

Current cost for maintenance, year ending 30 September 1975 was $263,948. The average electric power bill is $3000 per month. Total cost for preservation and layaway starting April, 1971, was $977,524 with additional administrative and report costs amounting to $2,525. Layaway took six months ending September, 1971. Yearly maintenance costs increase about 10% each year.

The last production was completed at the facility by the GOCO contractor, Chrysler Corporation, on 1 September 1970. Chrysler performed interim maintenance from that time through 30 April 1971. After a decision in November, 1970 to put the plant in inactive status, Voss Machinery Company was awarded the contract for Layaway, First Year Maintenance and Surveillance beginning April 1971, and the facility has been in inactive status ever since.

At the present time there is no planned producer for the facility in case of mobilization. The Government is actively seeking a producer. With no planned producer, there are no definite reactivation plans established.

The automated production facility was established to produce 50,000 shells per month on a 2-8-5 shift basis with approximately 700 employees. The third shift was kept for maintenance. Unfortunately the facility never reached desired production capacity. The maximum rate achieved was 28,000 shells per month.

Our inspection of the IPE laid away at the facility began about 10:30 when we were joined by Messers Ed Mudyett and Bill Hansen, Plant Operations Directors from ARMCOM on their regular IMR inspection of the facility. Mr. Bain apologized for the inconvenience, but he had no one else to accompany us and could not let unescorted parties in the facility. The Plant Manager for Voss Machinery Company, Mr. Charles Sackmann, was already occupied, but planned to join us later.

Our party looked at equipment in the order of production operations starting with billet cutting by Artco Flame Cutters through the External Painting operation. All equipment was in-place with the large equipment preserved with P-3, MIL-C-16173 compound while the small IPE were placed in hutments built inside the plant extending over long portions of the production line and preserved with P-2, MIL-C-16173 compound. All hutments were humidity controlled with recorders placed at critical locations recording humidity and temperature. The large IPE were not humidity controlled. Inspection of IPE is done on a statistical sample basis. Originally 30 pieces every 90 days were inspected. Starting March, 1974 only four pieces are checked every six months.

All unpainted surfaces were treated with protective preservatives and appeared in excellent condition. Painted surfaces in the humidity controlled hutments were in good condition. Painted surfaces outside the hutments on conveyors, furnaces and large presses revealed some signs of rust, but constant maintenance prevented deterioration. Gateway has 133 pieces of IPE plus OPE for a total of 194 pieces. This includes three pieces at another location. Our records show 199 pieces total with none at another location.

Shot blast equipment had been painted on the inside with read lead paint and the doors were left open so moisture would not be trapped. Phosphate equipment had no preservatives applied and except for the stainless steel hooks on the conveyor, is planned for replacement.

All air lines were drained and valves left open. In spite of this, rust had accumulated to the point that replacement would be necessary.

Electrical control panels had been deenergized from the central power and in some cases main fuses were removed, but retained in the box. No other preservation was attempted. Control boxes in the humidity controlled hutments were in fair condition with only small amounts of corrosion on connections. Contact points were not visible. Control boxes in the uncontrolled section of the plant revealed much greater corrosion on connections. These exposed electrical controls may not be usable without extensive repair before reactivation. An attempt to protect a few electrical control boxes on a test basis was made by installing Calrod heat units in the boxes. The Plant Manager, Mr. Charles Sackmann, felt that such installations created more moisture in the control box with the increase in temperature. The more than usual corrosion on the electrical connections of these boxes confirmed his statement. Transformers remain in place with fluid tested on an annual basis.

Hydraulic fluids in all systems were not drained. They are intact and sampled for deterioration on a yearly basis. Hydraulic fluid at the hot pierce and draw operation is not the fire retardent type.

All drive belts had been removed and hung on their respective machines. Tooling had been removed, preserved, wrapped separately and stored next to the machines where possible. Large dies for the hot pierce and draw presses were located in humidity controlled hutments along with support tool room equipment. All other OPE such as lift trucks, and other back-up equipment used for production had been removed from the premises during the lay away procedures.

Mr. Charles Sackmann, Plant Manager for the maintenance contractor, Voss Machinery Company, joined our party at 13:30 and highlighted the problem areas involved. These were the electrical controls, hydraulic systems, the air and steam lines and valves. All of these areas were questionable as to their state of readiness. The basic IPE appeared in excellent physical condition. After the conclusion of the plant inspection at 16:00 hours, Mr. Bain left, but Mr. Sackmann showed color slides of the various operations in making 175 mm shells photographed while the plant was still operating. The visit was concluded at 16:45 hours.

It is apparent from the examples at Gateway Army Ammunition Plant that when IPE are preserved per military specifications, laid away in a controlled humidity environment and then maintained properly per current specifications, the IPE metal parts will last indefinitely. Since the equipment has never been exercised at Gateway it is not possible to evaluate the hydraulic systems stored with its fluid intact. Unpreserved air and steam lines have deteriorated to the point that replacement would be necessary. Existing lines would only be useful to extablish location. Deterioration of electrical controls through corrosion appeared less in humidity controlled hutments than what might have occurred in normal uncontrolled humidity use. Contact points would have to be checked on an individual basis upon reactivation.

Product engineering files (Tech. Data) remain at the facility as they were when the facility was shut down. These files include manufacturing procedures. They have never been updated.

The climate of the St. Louis area is designated as "humid continental". Summers are generally warm, but sustained periods of extremely hot weather are rare.

Spring and Autumn are moderate. The average annual temperature is 54.1. Maximum temperatures of 90 degrees F. or above occur on approximately 35 to 40 days during the year, while minimum temperatures of zero or below occur on only about two days annually.

In general, the production equipment at Gateway is in clean, ready condition, but because of the lack of a reactivation plan and the deterioration of air and steam lines, the facility is not in a state of readiness. Since the facility was inactivated and laid away before the concept of OSHA, all operations would require evaluation for compliance to OSHA regulations upon reactivation.

APPENDIX E

TRIP REPORT - ST. LOUIS AAP

APPENDIX E

PLANT EQUIPMENT PACKAGE (PEP) MODERNIZATION PROGRAM

TRIP REPORT

CONTRACT NO. DAAA21-75-C-0303

KE JOB NO. 75086-002-30
-002-40

PREPARED BY: H.E. Wick
E.G. Schmitz

DATE: 10/8/75

APPROVED BY:

PLACE:
St. Louis A.A.P. (PEP #164)
4300 Goodfellow
St. Louis, Missouri

CONTACT:
H.J. Hartmann

DATE:
9/30/75, 0900-1700

PURPOSE:

Evaluate layaway methods and techniques to determine how effective the current procedures are accomplishing the program goals

DISTRIBUTION:

H.W. Flippen
Jack Ritchie
Lloyd Hurwitz
All SAI Personnel

PARTICIPANTS:

Joyce Kufel, PEP Division Engineer, PMO
Gene Schmitz, Kaiser/Stetter
Harold Wick, Kaiser/Stetter.
Herman J. Hartmann, Commanders Representative/COR - St. Louis
Lee Crouch, Plant Manager, Plant Facilities & Engineering Company

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REPORT

Product - 105 mm HE, M1 SHELL (Metal Parts)

Miss Joyce Kufel, Harold Wick and I arrived at St. Louis A.A.P. at 0900, Tuesday, 30 September, 1975. Mr. Herman J. Hartmann, the Commander's Representative welcomed us and expressed strong interest in our task. He introduced Mr. Lee Crouch, the plant manager who is associated with Plant Facilities and Engineering Company (a sub-contractor to Donovan Corporation who is the mobilization contractor.)

Mr. Hartmann began the briefing by providing the following data:

Data On Last Layaway: (Performed January - June, 1970)

Contract No.: DAAA 09-67-C-0025, Mod #18

Layaway Cost: $1,824,171, not fully expended - now being used to layaway new equipment

Current Staff: Manager (Crouch), 1 clerk, 3 mechanics, 10 security personnel

Last Contractor: (GOCO) GM, Chevrolet Division (Also did layaway)

GOCO Plt Supt.: William Cummings (has been on all three activations of the plant - first as Forge Foreman, second as Master Mechanic, third as Plant Superintendent

Tooling: Abandoned in plant by GM at shutdown

Current Maintenance Contract: $269,600 (1 October 1975 - 30 September 1976)

Brief Plant History:

(1) Plant started in 1941 with 30 and 50 caliber ammunition. Switched to 105 mm HE M1 shells in 1944. Reactivated in 1950 and 1966. Most equipment is 31 years old.
(2) Actual years in production:
WWII - 2 + 1 year
Korean - 4 years
Vietnam - 3 years
} 10 years
(3) Layaway time - 24 years
(4) Peak manpower - 2500 people
(5) Limited automation in all active operations
(6) Has produced approximately 50 million+ projectiles
(7) Produces peak of 800,000/month on 2-8-5
(8) Layaways occurred 1947, 1954, 1969
(9) Last production period - 27 August 1966 to 12 December 1969
(10) Last mobilization goal was 120 days, in production in 90 days. This may be attributed largely to the fact that the same contractor and many of the old employees were available.

Plant Status & Condition:.

(1) Three production buildings appear well-maintained with only ten years actual use in 34 year existence. Floor damage from dropped projectiles seems to be the most severe problem. Power is available, but main circuits are cut off.
(2) Approximately 1½ years ago, new equipment started arriving at the plant. One hundred and five pieces of this equipment was assigned as replacement for existing equipment "on line" and in place. Over 60 pieces of the equipment was added to enhance plant capability in both 105 mm and 155 mm MPTS. Some of the equipment placed in this PEP may tentatively be planned for the "Lonestar" operation in Texas. Examples of the new equipment are:
5 - Bliss presses, 2000 ton rating
42 - J & L lathes for finish turning
32 - J & L lathes for face to base and turning boat tail
2 - Schmidt marking machines
9 - Arcade band groove & turn
9 - C.A. Laughten band presses
9 - Pipe Machinery Company turning machine for nose bore & form
This equipment received functional test at the vendor's plant and is stored at St. Louis on skids. No hook-up or exercise of the equipment has occurred since arrival.
(3) Building #1 houses the nick and break operation. Eight Bliss mechanical presses, Model 309A, 345 ton capacity are used for the breaking operation. The upper dies are in the press, but lower dies are removed. Five AIRCO Travograph flame cutting machines perform the nicking operations for the

presses. This building is fairly open and the equipment is exposed to the full range of temperature and humidity. General condition of the equipment can only be considered fair. Numerous reapplication of the preservative is evident. Although gear boxes were drained and preservative added, the internal condition of these items should be considered suspect due to humidity/temperature ranges. External bare metal was preserved with P2 and P10. Internal surfaces were preserved with P10 and P11.

(4) Building #2 houses the nine rotary hearth type furnaces for billet preheat, (seven are oil fired, two are converted to oil/gas) and the presses (Baldwin-Lima) for cabbage and pierce and draw. This building is also fairly open with resultant exposure of the equipment to temperature and humidity extremes. The ovens are in need of paint (some rusting has occurred). No fire brick was replaced at layaway so it is highly probable that the interiors would require substantial rehabilitation if mobilization would occur. The presses are 30 year old water hydraulic units which appear quite worn. Cabbage/pierce was performed on vertical presses, while the draw was done on horizontal presses. It must be noted that the PEP listing does not show any of the horizontal draw presses. (New replacement presses for this operation are stored in building #2 with electrical panels, controls and tooling stored in building #3.)

(5) Building #3 houses all other operations, including a tool/maintenance room. This building is closed and heated to 45 degrees F. during the winter months, so the metal surfaces of the equipment appears to be in an excellent state of preservation. GM, Chevrolet Division, who ran the plant during the last activation, also performed the preservation and layaway. The layaway was done to MIL-STD-107B, MIL-P-116E and old APSA regulations at a cost of approximately 1.3 million. Application of the preservatives (P2, P10 & P11) to exposed metal surfaces appears to have been done in a very workmanlike manner. The most questionable areas of preservation are the electrical boxes, electric motors and hydraulic lines (flex). Electrical cabinets had no preservatives of any sort applied. A cursory examination of several cabinets showed evidence of some corrosion build-up on the contacts. Internal condition of relays and switches could not be ascertained. The external rubber surfaces of the flexible hydraulic lines showed some evidence of ozone cracking, but it did not appear severe. Rubber drive belts also appeared to be somewhat dried out.

According to Lee Crouch, almost all the new equipment received from the various manufacturers was received without adequate preservatives applied. Prior to final placement in storage, all pieces were inspected thoroughly and proper preservatives applied as required.

Conclusions:

In general, the equipment housed in heated and fully enclosed plant buildings appears to be in a fairly good state of preservation insofar as exposed metal surfaces are concerned.

From historical data related to the last activation and personal observation, several problem areas exist:

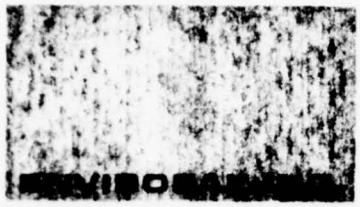
- Electrical contacts/relays,etc. have not been preserved. Substantial numbers of these items required replacement at last activation.

- Electric motors would require bake-out before operation under any mobilization in the future. Current preservation techniques for motors is not adequate. Bake-out was required at last mobilization.
- Hydraulic systems are now being laid away with the used fluid in place on current layaway operations. According to DIPEC specialists, this method appears to be better than the old system of draining and adding Solution A, (particularly on large closed systems). Several machines reactivated and transferred to another plan operated effectively. The fluid is chemically analyzed on a yearly basis to check for degradation.
- Much of the equipment in the plant is 30+ years old and designed for single operations. The plant is basically a manpower dependent operation with manual conveyors and almost total "hand operation" oriented manufacturing methods. Some effort has been made to start modernization (ie. bore, face and champher - nine new machines (eight plus one spare), Pipe Machinery Company, replace 30 lathes with four men performing operations previously done by 30.) If this plant should be required in a future mobilization, much greater modernization is essential.
- If a substantial portion of the old equipment is used in a future mobilization, a large percentage would require modification to comply with OSHA regulations. Most belts and drives require guards and a fair number of the controls do not meet current safety requirements. Both Mr. Crouch and Mr. Hartmann stated that any mobilization would have to start using the existing installed equipment, until the new equipment could be installed and phased into the operation.
- There is no tech data package on the product (105 mm, HE M1 Shell) on hand. Only general type methods sheets are on hand. The tech data package for equipment is complete. Tool drawing package is not complete.

APPENDIX F

EXAMPLES OF ENVIRONMENTAL CONTAINERS

APPENDIX F



110 MARYLAND STREET / EL SEGUNDO, CALIFORNIA 90245 / (213) 322-8017

Mr. Harold Wich
STETTER ASSOCIATES
3000 Sand Hill Road
Menlo Park, CA 94025

December 16, 1975

Dear Mr. Wich:

It was a pleasure talking with you about DRIGUARD containers.

Corrosion and contamination damage to your precision equipment in shipment and storage can be very costly. DRIGUARD Environmental Containers are designed to protect all kinds of sensitive equipment from environmental damage. General Electric is using DRIGUARD containers to protect its huge high-speed turbine generator fields, shipped and stored on open railroad flat cars.

Enviropak began manufacturing flexible vinyl containers to protect Air Force gas turbine engines fifteen years ago. Today, usage has expanded into diesel engines, electronic equipment, gear drives, space vehicles and electrical generating and transmission equipment. DRIGUARD containers are completely weatherproof, field repairable and reusable many times. They are economical and reliable and cut shipping costs because they are lightweight. They fold into a small package when not in use to free up valuable warehouse space. Most importantly, DRIGUARD containers will maintain your equipment in perfect operating condition, ready at a moment's notice when needed.

DRIGUARD containers are flexible fabric-supported plastic bags that are custom-made to fit your requirements. They have a vapor-sealed zipper feature that allows them to be desiccated and protect your equipment for extended periods. DRIGUARD containers include a humidity indicator which allows monitoring of the humidity. More desiccant can be easily added through the zipper, should the period of storage be longer than anticipated.

Our standard containers meet Mil-C-9959, Types I, II and III. They give 18-months, 9-months and 100-days protection, respectively, at a mean temperature

dg-ltr-05aa

of 70 deg. F. and relative humidity of 70% without redesiccation. Enviropak also makes tarps, shrouds and covers for a wide variety of precision equipment.

Enclosed is a product sheet illustrating various DRIGUARD containers, and a material sample. Please contact us if you wish more information. If you will submit a drawing or dimensions of your equipment we will be pleased to quote.

Sincerely,

John H. Nunn
National Sales Manager

dm

Enc: DG product sheet
Material sample

ENVIROPAK INC. 110 MARYLAND STREET / EL SEGUNDO, CALIFORNIA 90245 / (213) 322-8017

TECHNICAL DATA SHEET

	DRIGUARD 727 or 1127*	DRIGUARD 1227**
Base Fabric - oz.	3.05 Nylon Scrim, 840 Denier	Same
Total Weight - oz./sq. yd.	28	Same
WVTR - grams/100 sq. in.-24 hr. (FTMS 101B, Method 3030, Procedure A at 73 deg. F.)	L0.10	L0.05
Tear - lb. (FTMS 191, Method 5134)	145 x 145	Same
Grab Tensile - lb./in. (FTMS 191, Method 5100)	290 x 270	Same
Adhesion - lb./in. (FTMS 191, Method 5950 at 2"/minute)	20	Same
Low Temperature - deg. F. (FTMS 101B, Method 2049)	-40 deg. F.	Same
Chemical Resistance	Superior to most PVC by virtue of low % of plasticizers and heavy plies of film.	***One side coated for oil, grease, hydraulic fluid and resistance.
Construction	Calendar laminated	Calendar laminated
Ply Ratio	60/40 approx.	60/40 approx.
Color (Standard)	Light blue or dark blue	Dark blue

*DRIGUARD 1127 complies with Table I, "Physical Properties of Barrier Material," Grade C of Mil-C-9959A-1 except it is not resistant to fluid Mil-L-7808.

**DRIGUARD 1227 complies with Table I, "Physical Properties of Barrier Material," Grade B of Mil-C-9959A-1 without exception.

***This material is the same as DRIGUARD 1127 with the exception of the fluid resistant film on the matte side.

March 1974

ENVIROPAK INC. 110 MARYLAND STREET / EL SEGUNDO, CALIFORNIA 90245 / (213) 322-8017

TECHNICAL DATA SHEET

	DRIGUARD 1510
Basic Fabric	10 x 10 1,000 Denier, Dacron
Total Weight - oz/sq. yd.	30
WVTR - grams/100 sq. in.-24 hr. (FTMS 101B, Method 3030, Procedure A at 73 deg. F.)	.02
Tear - lb. (FTMS 191, Method 5134)	45 x 45
Grab Tensile - lb./in. (FTMS 191, Method 5100)	280 x 260
Adhesion - lb./in. (FTMS 191, Method 5970)	20 - 40
Low Temperature (ASTM D-746), deg. F.	-60
Hydrostatic Resistance - lb./sq. in. (FTMS 191, Method 5512)	300

Note: The technical data above represents Quality Control Statistics and Lab Results and are to be used as a guide only.

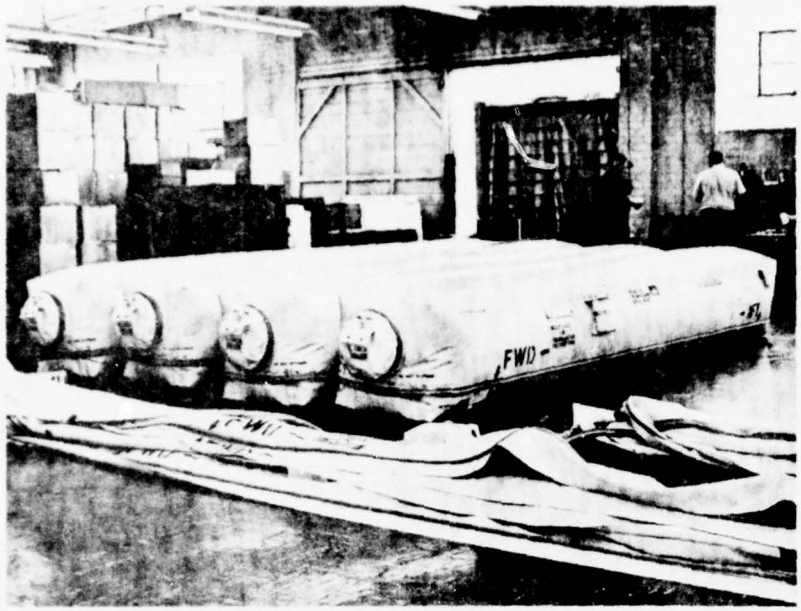
March 1974

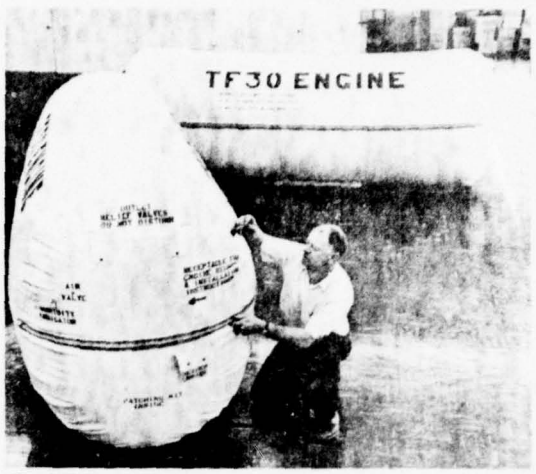
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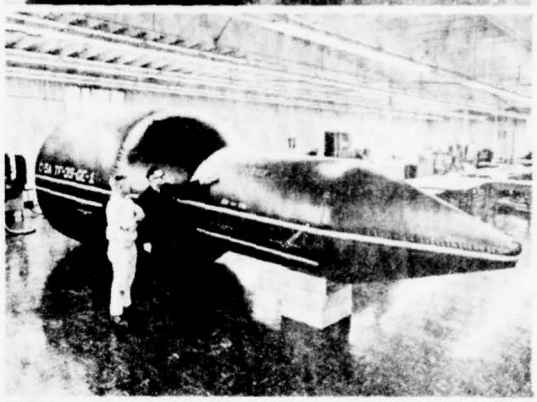
TECHNICAL DATA SHEET

	DRIGUARD 1600 Polyurethane Film
Durometer (± 5)	87 Shore A
Tensile (PSI)	5000 - 6000
Elongation (%)	400
Elongation Set (%)	20
Tear - Die B (#/in.)	300 - 350
Tear - Die C (#/in.)	400 - 450
Modulus (# @ 300%)	2500 - 3000
Comp. Set - Method A (%)	35
Base	Ether
Weight @ .010" thick (#/sq. yd.)	.529

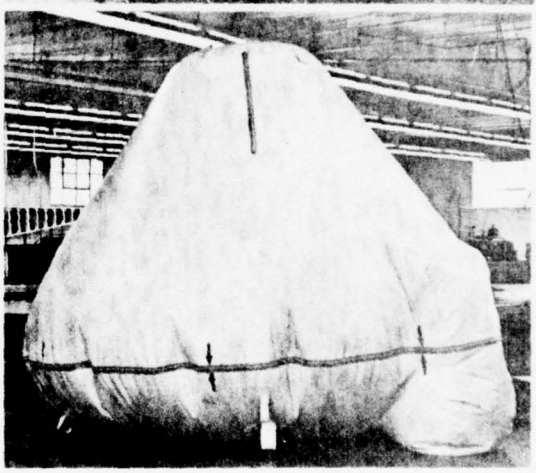
March 1975











ENVIRONMENTAL COVERS

Water vapor tight, flexible, zippered containers for practically any size apparatus or equipment. Use with bagged desiccant or air dryers for long term storage against corrosion, dust and other airborne contaminants.

OTHER PRODUCTS

– Mil Spec flexible engine containers – tank liners – ditch and pond liners – missile and satellite covers – pool covers – boat slip liners.

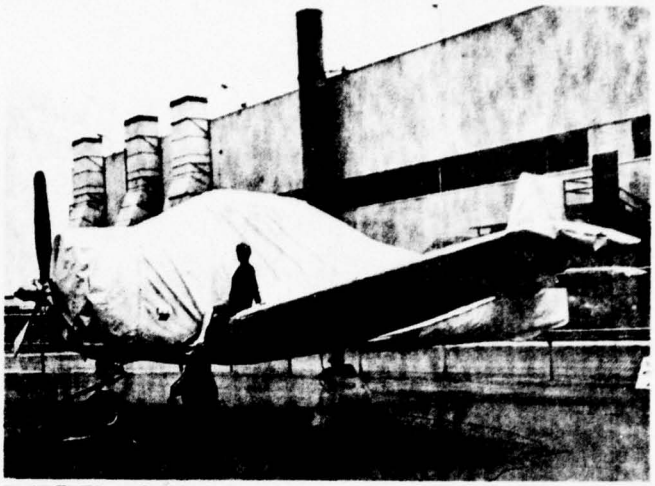
Your inquiries are invited and will be given prompt attention.

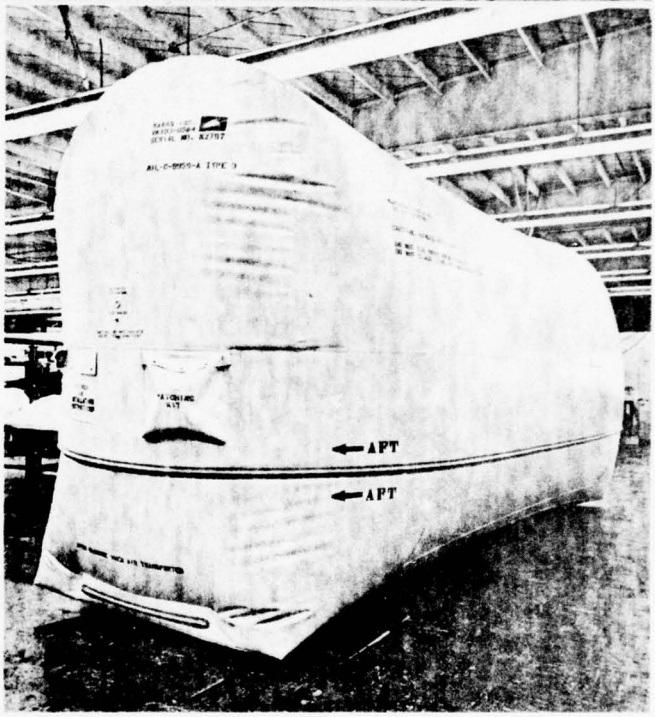
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Fabricators of Coated Fabrics, Thermoplastic Laminates and Films

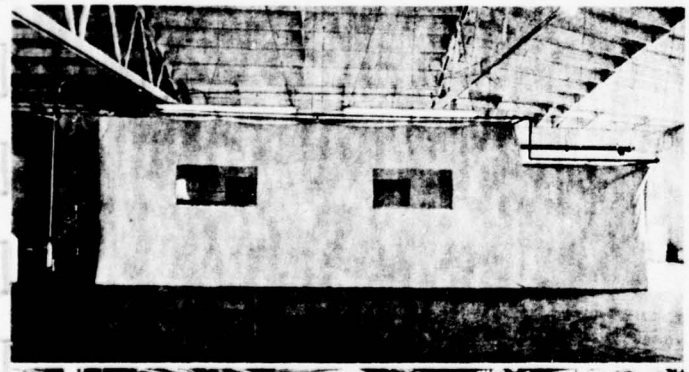
DRIGUARD
superior
PACKAGING SYSTEMS
BY ENVIROPAK INC.

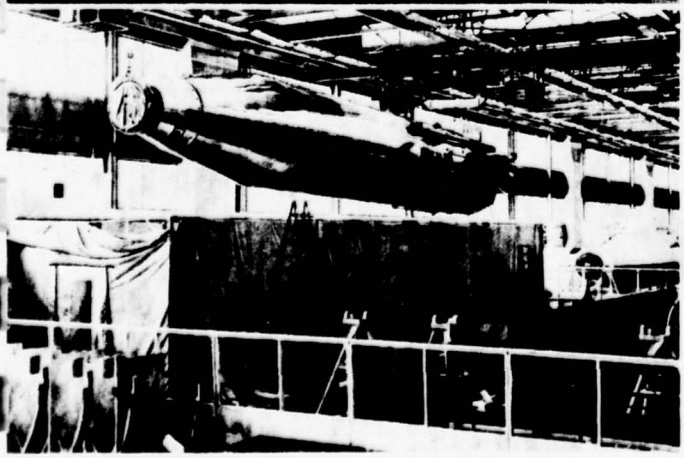
SPECIALISTS IN ENGINEERING AND MANUFACTURING PRODUCTS FROM VINYL, *HYPALON*, NEOPRENE, POLYURETHANE AND OTHER FLEXIBLE SHEETING MATERIALS – PLAIN AND FABRIC SUPPORTED. SELECTED FOR DURABILITY AND TOUGHNESS TO MEET YOUR SPECIAL NEEDS.





EQUIPMENT COVERS
— Plain or zippered, ruggedly built for many reuses.





TARPAULINS AND SHELTERS
— All welded for full material strength and waterproof seams.



PACKS AND POUCHES
— Zipper or snap closing, with padding if required, for smaller parts, assemblies, tools, etc.

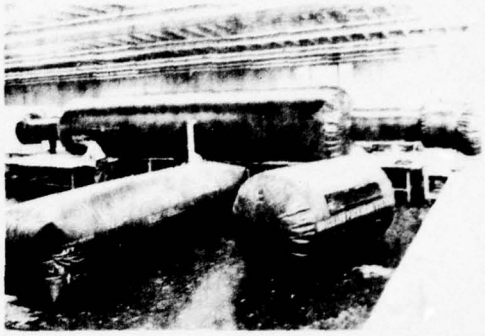
BIG PRESERVATION PROBLEM SOLVED BY BIG BAG

PROVIDING for the shipping and storage of a multi-million dollar precision electric generator rotor 48 feet long and 75 inches in diameter is a difficult job. But the problem was solved by a leading electrical equipment company through the use of a Driguard reusable zippered environmental container.

This packaging system was originally developed for the Air Force to package gas turbine engines as an alternative to metal cans. The bags proved so successful that their usage continues to expand into new applications. Currently the containers are being used to protect diesel engines, gear drives, electronic equipment, space vehicles and other precision equipment.

Driguard containers, manufactured by Enviropak, Inc., of El Segundo, Calif., offer advantages over alternative methods of environmental protection. Zippered and flexible, the containers are less than one-third the cost of a vapor-sealed metal container. Driguard containers are only a fraction of the weight of metal containers, and they save many cubic feet by being close form-fitting. When not in use, the bags fold up and can be placed in a small box for additional economy in shipping and storage. And added feature is their reusability. In these times of extreme material shortages, large savings of packaging materials are achieved with multiple reuses of the bags. The rotor cover will be used 10 to 15 times.

After final inspection, the giant generator rotor is placed in a custom made Driguard environmental container. The container is desiccated with silica gel and zipped along the top with a vapor-tight zipper. The rotor, complete with Driguard vapor barrier containers, is then lifted by crane with a sling around the mid section onto a specially constructed flat car. The rotor is secured in cradle blocks on the flat car. The barrier bag fits inside the shipping supports. Because the rotor is shipped on an open flat car, the resistance of the bag to wind, rain, mildew and sunlight makes it an optimum shipping container. ■



Reprinted from the February, 1974, issue of Western Material Handling/Packaging/Shipping magazine

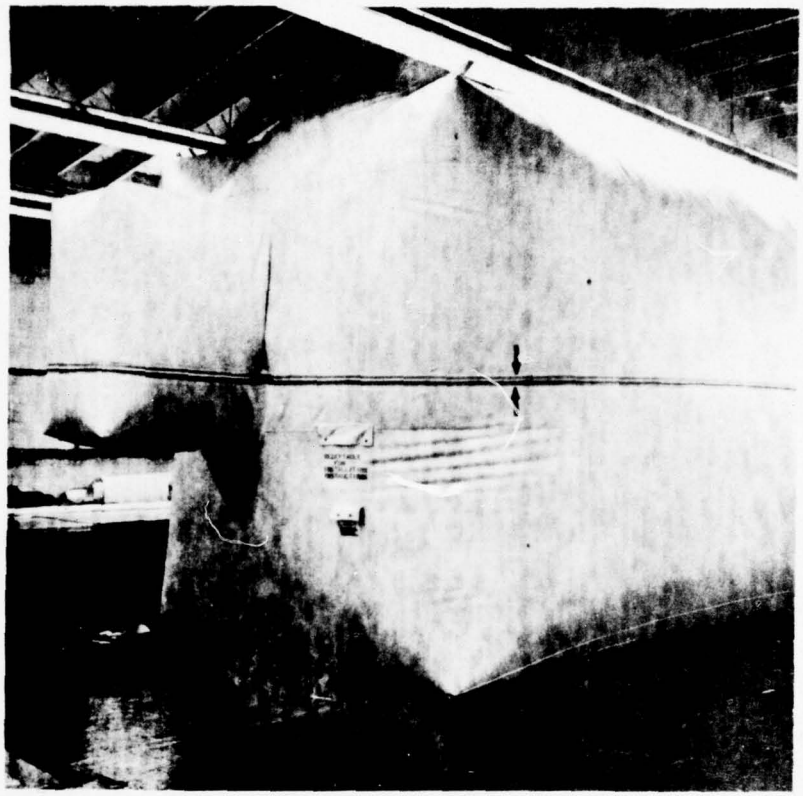
CONSTRUCTION DELAY STORAGE PROBLEM SOLVED BY REUSABLE ZIPPERED CONTAINER

CONSTRUCTION delays can pose a serious problem when valuable equipment arrives at the jobsite with nowhere to go. Equipment can be severely damaged or completely ruined if it is exposed to the elements with only a tarp or shipping crate for protection. Blowing dust and moisture condensation can play havoc with delicate equipment that is stored outside without adequate protection.

Recently a California power company was delayed in its construction of a new combined cycle power plant by the Environmental Protection Agency. By the time approvals for construction were finally granted, valuable and delicate gas turbines and generator units had arrived at the jobsite. This equipment required a closely controlled environment for storage and the manufacturer insisted that the equipment be stored in a dry nitrogen environment in order to keep the product warranties in effect.

Power plant engineers estimated that the equipment could not be installed in the new building for one year, and they began looking for methods of environmental controlled outdoor storage. The environmental protection was provided through reusable zippered Driguard containers. This packaging system was originally developed for the Air Force to package gas turbine engines as an alternative to metal cans.

In the case of this power plant equipment, which measures 27 feet long, 11 feet wide and 14 feet high, there were no alternatives to the flexible, zippered, vapor-sealed containers for protection against corrosion and contamination. A vapor-sealed metal container to do the same job would be more than five times the cost and many times the weight. Driguard containers for equipment of this size can be folded and placed in a cardboard carton four by three by three feet and weigh only 200 pounds.



CONTAINER for power plant generator unit is inflated for pressure testing in Enviropak's El Segundo plant.

The containers are designed in two halves. The bottom half is placed on wooden skids; a crane is then used to lift the equipment onto the skids and the bottom half of the container. The crane then lifts the top half of the container by means of special lifting loops and lets it down over the equipment. The extruded plastic vapor- and pressure-sealed zipper is then zipped up around the equipment.

Container air valves are used to purge the container and pressurize it with dry nitrogen. In this case dry nitrogen was specified by the manufacturer. There are some other equally effective methods of preserving equipment in the Driguard containers. Bagged silica gel desiccant and forced-air dehumidifiers have been used effectively in preventing corrosion and contamination damage. Periodic inspection of the equipment is easy since the zipper can be opened and reclosed as many times as necessary.

According to Enviropak, Inc., of El Segundo, Calif., manufacturer of the Driguard containers, this system affords superior protection for outdoor and indoor storage of precision equipment. Enviropak's nylon-reinforced material will stand up extremely well under severe wind whipping and sunlight exposure. This is important in the bright California sun. ■

Reprinted from the October, 1974, issue of Western Material Handling/Packaging/Shipping Magazine

A NEW LOOK AT FLEXIBLE CONTAINERS

(Presented by John H. Nunn, Enviropak Inc.)

I. INTRODUCTION:

With recent advances in barrier materials, closure devices and design capabilities, flexible outdoor vapor varrier containers deserve a new look. Today, many new applications are technically feasible and economical because of improved container capabilities and higher costs of alternative packaging and preservation methods.

A. History:

For many years corrosion and contamination damage of precision equipment in shipping and outdoor storage has been a concern of packaging engineers. The armed services have extensively employed pressure sealed metal cans to get the levels of protection they need. Metal cans provide good protection for a wide variety of equipment components and munitions, but there are several drawbacks. Cans are expensive, with the cost getting proportionately greater the larger the equipment. Cans are heavy and take up extra space both when in use and empty. This results in high shipping and storage costs.

In the early 1960's the Air Force started working on a new specification for flexible barrier bags that could take the place of metal cans for their gas turbine engines. They wanted a container that would be water vapor and dust sealed. The container had to resist long-term exposure to weathering and ultraviolet light. Also, the container had to withstand wind whipping like that experienced on a flat bed truck.

The Air Force was interested in flexible barrier bags to save money and still maintain adequate levels of preservation. The specification developed to meet this requirement is Mil-C-9959. The flexible Mil-C-9959 container, plus engine handler, is up to 70 percent lighter than the metal can which they replaced. The number of cubic feet of space required with the container in use was cut by 20 percent. When

empty, the bag is simply folded up, saving more than 80 percent of shipping and storage space.

B. Specification:

The Mil-C-9959 specification established by the Air Force sets up Types I, II and III containers using A, B and C grades of barrier materials respectively. At a mean 80 deg. F. and 80% relative humidity, Types I, II and III containers maintain contents below 40% relative humidity for 12, 6 and 2 months, respectively, without redesiccating. The specification was designed so that Mil-C-9959 containers could be kept dry statically with silica gel desiccant.

Following are some of the major barrier material and closure requirements:

Table I: Physical Properties of Barrier Material

Properties	Requirements		
	Grade A	Grade B	Grade C
Flame Resistance			
FTMS 406 Method 2022	The barrier material shall show a time of flame of not more than 5 seconds		
Abrasion Resistance			
CCC-T-191 Method 5302	No penetration greater than 50% of the thickness of the material in 300 cycles on abrasion wheel machine		
Resistance to Aging			
CCC-T-191 Method 5882	No delamination, seam separation or cracking in accelerated aging test		
Resistance to Light			
STD-810 Method 505, Procedure I	No embrittlement, no cracking or delamination after exposure to sunlight		

Table I: Physical Properties of Barrier Material (Cont.)

Properties	Requirements		
	Grade A	Grade B	Grade C
Corrosiveness			
MIL-C-9959 (4.5.3.5)	No corrosion when maintained at 160 deg. for 48 hours		
Water Vapor Transmission Rate(WVTR)			
FTMS 101 Method 286, Procedure A After room temperature flexing Before exposure (Gms/100 sq. in./ 24 hours)	0.02 (Max)	0.05 (Max)	0.10 (Max)
Resistance to Blocking			
FTMS 101 Method 223, Procedure D	No blocking, delamination or rupture		
Fluid Resistance			
FTMS 101 Method 260	No leakage, excessive swelling, delamination, embrittlement or sponginess when tested with fluids meeting the requirements in MIL-J-5624, MIL-O-6081, MIL-C-6529 or MIL-L-7808		
Impact Puncture Resistance			
FTMS 101 Method 313, Procedure A	No puncture entirely through the material		
Breaking Strength			
CCC-T-191 Method 5100	300 (Min)	200 (Min)	200 (Min)
Tear Strength			
CCC-T-191 Method 5134	45 (Min)	45 (Min)	45 (Min)

Table I: Physical Properties of Barrier Material (Cont.)

Properties	Requirements		
	Grade A	Grade B	Grade C
Low Temperature Vibration Resistance			
FTMS 101 Method 158	No delamination, cracks or holes		
Weight per Square Yard	3.1 pounds maximum		
Wind Resistance	Withstand 50 - 60 MPH on an open flat-bed trailer		
Closure Operating Temperature Range	-20 deg. to +140 deg.	0 deg. to +140 deg.	+21 deg. to +140 deg.

A broad range of applications have developed in the years since Mil-C-9959 was adopted.

C. Applications:

(1) Air Force:

DRIGUARD flexible containers were first used by the Air Force on the C-141 program and savings of $288,000 were realized in the first eighteen months of use. The Air Force standardized on the method of engine packaging and Mil-C-9959 containers were made for F-111, C-5A, A-7, C-130 and F-15 engines.

(2) Navy:

The outstanding success achieved by the Air Force encouraged the Navy to adopt the specification with some modifications for their shipping and storage requirements. The Navy stores reconditioned diesel engines for extended periods in remote areas with high humidity and extreme temperatures. They wanted to maintain these engines in top condition so that the engines would be ready for installation at a moment's notice.

Diesel engines used in mine sweepers are all aluminum and look like giant versions of Indianapolis race car engines. It costs the Navy about $80,000 to completely overhaul an engine, so they can't afford to let an engine deteriorate in in storage. Flexible barrier containers have successfully protected not only engines but gear drives, superchargers, missiles and bomb racks.

(3) NASA:

NASA adopted Mil-C-9959 for use on the Mariner, J-2 Rocket Engine, Saturn F-1 Rocket Engine, Atlas Missile Components, C-4 Solid Rockets, Apollo Service and Command Modules and, most recently, the Space Shuttle. Their sensitive instruments and components require precise control of humidity and contamination. DRIGUARD environmental containers provided the required protection very economically. NASA imposed additional requirements such as additional flame and contamination resistance. All of their requirements were met by flexible barrier containers.

(4) Coast Guard:

Mil-C-9959 shelters were recently used for the Coast Guard ADAPTS Pumping Subsystem. This equipment is oil spill clean up equipment that they store outside at several air bases. When there is an oil spill the equipment is immediately air lifted to the scene. The container keeps the equipment in good operating condition.

(5) Industry:

Commercial applications include shipping and storage protection for all kinds of equipment and components, including Nuclear Pump Motors, Generator Fields, Electronic Cabinets, Industrial Gas Turbines and Instruments. Flexible barrier containers are being more and more widely used by all kinds of precision equipment manufacturers and users.

II. BARRIER MATERIALS:

There are now a whole range of barrier materials available for equipment preservation and storage. Some were developed to comply with Mil-C-9959

and others were developed independently to serve a specific purpose. Increasing interest in recent years by the Army, Navy and precision equipment manufacturers have stimulated development of new flexible barriers and new style shipping and storage containers.

A. Flexible Barrier Materials for Outdoor Exposure:

Barrier materials are now available to meet all grades of Mil-C-9959.

(1) DRIGUARD 1127 material meets the requirements of a Grade C barrier. The 1127 material is a specially compounded PVC laminated with a nylon scrim. This material contains a minimal amount of plasticizer so that aging and weathering characteristics exceed specification requirements. This material is adequate for most domestic shipping and storage requirements, giving more than 100-days protection at a mean 70 degrees and 70% relative humidity using silica gel. Of course, the period of storage can be indefinitely extended by periodically replacing the desiccant. DRIGUARD 1127 is the most economical of the Mil-C-9959 barrier materials currently available.

(2) DRIGUARD 1227 material complies with all of the requirements of a Grade B barrier. It is a laminate of PVC, Saran and a nylon scrim. DRIGUARD 1227 is especially useful where pooling of synthetic oils and greases are anticipated. The containers of the F-15 aircraft utilize 1227 for this reason. The addition of the Saran laminate improves the barrier properties as well as the oil resistance. Containers manufactured from 1227 material using static dehumidification protect equipment in excess of 9 months at a mean 70 degree temperature and 70% relative humidity.

(3) DRIGUARD 1510 material is a Grade A barrier material. DRIGUARD 1510 is a lamination of chlorinated polyethylene with a dacron scrim. This material is the best currently available for long-term outdoor storage. 1510 contains no plasticizer and as a consequence has excellent aging properties with no cracking or crazing. This material retained 90% of its tensile properties after weathering in the Arizona sun for 7-1/2 years. DRIGUARD 1510 has been cold impacted successfully to -72 deg. F. This material is currently under consideration by the Army for static storage of locomotives. A DRIGUARD

container made of 1510 material will stand up to the effects of weathering well in excess of 10 years.

(4) 15-mil polyurethane film is currently being used by the Aviation Systems Command for helicopter preservation containers. Polyurethane film does not meet the puncture, tear or WVTR requirements of Mil-C-9959, but AVSCOM likes it because it is lightweight with high tensile, high elasticity, excellent abrasion resistance and good weatherability. They don't worry so much about WVTR because they are using dynamic dehumidifiers that can take out many times as much moisture as static silica gel desiccant. DRIGUARD polyurethane is available in thicknesses from 10- to 50-mil. Polyurethane is good with synthetic oils and greases and gasoline vapors. Developments are underway for its use in conjunction with barrier materials to take advantage of its abrasion, elasticity and tensile properties.

B. Flexible Barrier Materials for Use Inside of Another Container:

(1) Mil-B-131:

While Mil-B-131 foil and scrim materials have been available for years they are not designed for reusability because of the inconvenience of sealing. Also, if the bag is subject to flexure, pinholing will result. If the term of storage is indefinite or if repeated opening and closing of the bag is required then standard Mil-C-131 is not adequate.

(2) Navy-developed Material:

The Navy has been developing a barrier material that is designed to fit inside an unsealed metal can. The material is a lamination of polyethylene and aluminum foil and has a Grade A level water vapor transmission rate. It is not suitable for outdoor exposure because like Mil-B-131 repeated flexing causes pinholing of the foil and rapid deterioration of barrier properties. The Navy wants to eliminate the sealed metal can and combine this barrier bag with a cheaper unsealed metal can. In this way, they hope to maintain a high level of environmental protection, retain their stacking capabilities and cut costs.

III. CLOSURE DEVICES:

There are basically two kinds of pressure-sealing zippers. The extruded plastic type and the metal tooth/rubber seal type. The extruded plastic type zippers are considerably cheaper and offer more container design flexibility. The metal tooth/rubber seal zippers are more convenient to open and close and will handle loads up to 250 lb./in of side pull.

A. The DRIGUARD extruded vinyl zipper is the easiest zipper to operate and is designed specifically to meet the Type III requirements of Mil-C-9959. A separate slider with aluminum wheels closes this zipper completely and easily. It can be used to make containers with detachable panels, containers in separate halves and containers in one piece, opening like a clam shell. The zipper is the lowest cost, heavy-duty, vapor-sealed zipper available.

B. The DRIGUARD extruded CPE zipper is fully operable from -50 deg. F. to +140 deg. F. It meets the requirements for a Type I closure. A separate slider will close this zipper except for the last few inches which must be manually closed by pressing against a hard surface inside the container. The CPE zipper is slightly more expensive than the DRIGUARD vinyl zipper.

C. The stand-up extruded vinyl zipper is easy to open and close manually without a closure device. It meets all the requirements of a Type III closure, operating in a temperature range of +21 deg. to 140 deg. It is comparable in price.

D. The extruded polyurethane zipper is operable from -40 deg. to +140 deg. and has the additional advantage of resistance to synthetic oil and grease. It also must be manually closed for the last few inches by pressing against a hard surface inside the container. The polyurethane zipper is the most expensive of the extruded plastic zippers.

E. The Talon metal tooth/rubber seal zipper will handle 90 lb./in. side pull. It is operable from -60 deg. to +160 deg. and is frequently used where sustained wind whipping is anticipated. This type of zipper has a beginning and a termination point so it cannot be used to join a container with separate sections. This zipper is more than 25 times as expensive as the average extruded plastic zipper.

F. B. F. Goodrich metal tooth/rubber seal zipper is very similar to the Talon except it takes a load of 250 lb./in. side pull. Operating temperatures, design flexibility and cost are all comparable to the Talon zipper.

IV. EXAMPLES OF THE VERSATILITY OF FLEXIBLE BARRIER CONTAINERS:

A. Nuclear Generator Field Containers:

Providing for the shipping and storage of multi-million dollar precision electric generator fields up to 48 feet long and 75 inches in diameter is a difficult job. But custom-tailored flexible environmental containers got the job done. Use of traditional pressure-sealed metal containers for this huge equipment was ruled out because of expense, weight and size. Flexible barrier containers are less than one-fifth the cost of pressure sealed metal containers of this size. DRIGUARD containers are only a fraction of the weight of metal containers and they save many cubic feet by being close form-fitting. This also serves to minimize wind whipping.

When not in use they fold up for additional economy in shipping and storage. Even the huge generator rotor cover can be folded and placed in a cardboard carton 4 ft. x 3 ft. x 3 ft., and weighing only 200 lbs. Another attractive feature of the DRIGUARD container is its reusability. In these times of extreme material shortages large savings of packaging materials are achieved with multiple reuses of DRIGUARD bags. The rotor cover will be reused as many as ten times.

After final inspection the giant generator rotor is placed in a custom-made DRIGUARD environmental container. 1127 material is used because it provides good protection at the most economical cost. The container is desiccated with silica gel and zipped along the top with a metal tooth rubber seal zipper. This type of zipper offers the best physical strength to resist wind whipping. The rotor, complete with DRIGUARD vapor barrier container, is then lifted by crane with a sling around the midsection onto a specially constructed flat car. The rotor is secured in cradle blocks on the flat car. The DRIGUARD barrier bag fits inside the shipping supports. 50-mil polyurethane sheeting is welded on the container at the shipping support points. This take advantage of the unexcelled abrasion resistance of polyurethane to maintain the integrity of the container in use after use.

B. Diesel Locomotive Containers:

The Army was looking for a method of preserving locomotives and other valuable equipment outdoors for long periods of time. They decided that flexible barrier containers gave the best protection at the most economical cost. A container made of polyurethane film had the necessary strength and aging properties and could be kept dry with a dynamic dehumidifier. The best feature of the material is that its high tensile and elasticity properties allow the locomotive wheels to run right over it without damaging the material.

By using a combination of materials, DRIGUARD 1510 and polyurethane water vapor barrier properties of the complete container can be improved as much as ten times. Using strips of polyurethane to take the weight of the locomotive the rest of the container is made from DRIGUARD 1510. This allows use of static silica gel desiccation for more than three years without interruption. The container will last in excess of ten years exposed to the elements. This is an important advantage in remote locations where electric power is not readily available. Also, static desiccation cuts down on maintenance by eliminating the dehumidifier.

C. Large Industrial Gas Turbine Containers:

Recently construction delays held up plant construction so that when delicate industrial gas turbines arrived at the jobsite they had to be left outdoors. This equipment required a closely-controlled environment for storage and the manufacturer insisted that the equipment be stored in a dry nitrogen environment in order to keep the product warranties in effect.

Plant engineers estimated that the equipment could not be installed in the new building for one year and they decided on flexible barrier containers. In the case of this equipment which measures 27 ft. long x 11 ft. wide x 14 ft. high, flexible barrier containers are less than five times the cost and ten times the weight of a pressure-sealed metal container.

The containers were made in two halves from DRIGUARD 727 material. The bottom half is placed on wooden skids; a crane is then used to lift the equipment onto the skids and the bottom half of the container. The crane then lifts the top half of the container by means of special lifting loops and lets it down over the equipment. The extruded plastic

pressure-sealed zipper is then zipped up around the equipment. Periodic inspection of the equipment is very easy as the zipper can be opened and reclosed as many times as desired. Container air valves are used to purge the container and pressurize it with dry nitrogen. A constant pressure of dry nitrogen can be maintained with bottled nitrogen and a low-ressure regulator. Pressure is maintained at about one inch of water pressure. Pressurized dry nitrogen is just one method of desiccation. Bagged silica gel desiccant and forced-air dehumidifiers have been used effectively for years with flexible barriers in preventing corrosion and contamination damage.

V. CONCLUSION:

Recent improvements in barrier materials, closure devices and preservation techniques have greatly broadened the potential applications for flexible barrier containers. At a time when costs of humidity-controlled buldings, metal containers and other preservation materials are skyrocketing, flexible barrier containers are becoming relatively more and more economical. With the combination of various barriers, closures and drying methods, flexible containers have become an extremely versatile means of shipping and storage. Reusability has become much more important with the advent of ecology and material shortages. Flexible barrier containers can be repeatedly reused, cutting packaging material costs.

In summary, even though flexible outdoor storage containers have been around for many years, packaging engineers should give them a new look.

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APPENDIX G

PROPOSED MODIFIED RVP METHOD FOR PEP

APPENDIX G

PROPOSED MODIFIED RVP METHOD FOR PEP

The modified Reutilization Value Percentage (RVP) method is the most useful available process for determining what PEP equipment should be considered for storage. Using this method, the equipment is considered only for its usefulness to perform its necessary functions.

Currently, there are three elements considered necessary to develop the first step in the evaluation system:

- o Chronology - date of acquisition.
- o Design technology versus current technology.
- o Availability of parts and technical data.

Two additional elements are required in this first step of RVP to provide a more complete value for reutilization. The values used for each of the first three elements must be redistributed to provide proper weighting with the fourth and fifth elements:

- o Ability to comply with operator safety regulations (OSHA) and/or pollution control regulations.

- o Modification of remaining useful life to consider fraction of total life in storage and time since the last major rehabilitation.

The addition of criteria relative to OSHA Safety Standards and Pollution Abatement Standards should be considered from two points of view. First, does the IPE under consideration currently comply with the required standards? Secondly, if it does not now comply, is the IPE adaptable for retrofitting?

Failing the first question would not eliminate the IPE but it would reduce its current value. Failing the second question would automatically make the IPE a candidate for excessing. Failing the first question and passing the second would make mandatory the immediate rebuilding of the IPE to comply with the required standards, if the IPE is retained.

NOTE: This is contrary to policy stated in 4-31(e), Section VI, Chapter 4, AR 700-90, which states, "Modification of Government-owned plant equipment in storage to meet safety standards will only be made as the property is placed into active use." An exception to this policy is required for PEP equipment to assure speedy mobilization response.

D R A F T
H. E. WICK/dsl
75086-002
1-12-76

PEP MODIFIED RVP METHOD - EXAMPLE

1. TECHNICAL VALUE PERCENTAGE (TVP)

		Minimum	Maximum
Determined by:	Age - Chronological	0	10 %
	- Useful Life	0	10 %
	Design Criteria	0	50 %
	Parts Availability	0	15 %
	Safety & Pollution	0	15 %
TVP TOTAL		0	100 %

Note:
Score of 0 in Safety & Pollution - Replace IPE
Score of 0 in Parts Availability - Replace IPE
Score of 30% or less (% to Suit Need) - Replace IPE
(% Developed from DIPEC charts & Processes)

2. CURRENT TECHNICAL VALUE (CTV)

CTV = Replacement Cost x TVP

3. BASIC VALUE (BV)

BV = CTV - Cost to Transport & Store

4. REUTILIZATION VALUE (RV)

RV = BV - Maintenance/Rebuild Cost

5. REUTILIZATION VALUE PERCENTAGE

$$RVP = \frac{RV}{\text{Replacement Cost}}$$

6. PEP RETENTION RVP

RVP Greater than 30% - Retain IPE
RVP 20% to 30% - Retain for Active Mobilization
(RVP Retention Values can be modified to suit policy.)

APPENDIX H

EXAMPLES OF GOVERNMENT FORMS

USED FOR PEP

APPENDIX H

FORMAT A

PLANT EQUIPMENT PACKAGE FACT SHEET

1. Sponsoring DoD Component _____
2. Bureau, Command, Corps _____
3. Planned Producer and Plant Location _____
4. Item to be procured _____
5. End Item (if 4 above is component) _____
6. Capacity versus Mobilization Requirement
   a. Mobilization Requirement per month _____
   b. Capacity
      (1) Current planned capacity _____
      (2) Capacity of this PEP _____
      (3) Total capacity if this PEP is approved (b(1) and b(2)) _____
7. Number and value of Government-owned IPE
   a. Currently furnished (Incl 1) _____(NR)_____ _____(VALUE)_____
   b. Additionally required (Incl 2) _____(NR)_____ _____(VALUE)_____
8. Has contractor agreed to retain privately-owned equipment which is required to augment (if needed) Government-owned and retained capabilities identified above? YES_____ NO_____ (Explain)
9. Value of Government-furnished OPE, ST&TE _____
10. REMARKS:

I certify that the plant equipment package described above meets all criteria contained in Enclosure 1 to Department of Defense Instruction 4215.1.

Date _____

ASSISTANT SECRETARY
(ARMY), (NAVY), (AIR FORCE);
AGENCY DIRECTOR;

or designee

Note: Sample obtained from AR 700-90.

FORMAT A

SUPPLEMENTAL DATA SHEET

1. Item(s): Item(s)/Component(s) must be identified in the Industrial Preparedness Planning List (IPPL) or state that nomination action is in process.

2. Requirements for Base Retention: (Indicate date of computation and base retention schedule number).

USER	MONTHLY REQUIREMENT

TOTAL_____

3. Production Allocation:

PRODUCERS	*CURRENT	*PLANNED	MAX CAP	MO. TO MAX	*SOURCE PRIVATE	*SOURCE GOV'T

* Indicate with "X"

4. Comparative Analysis of Costs and Reactivation Leadtime:

NOTE: Include brief statement of layaway plan and rationale.

5. Other Plant Equipment (OPE), Special Tooling and Special Test Equipment (ST/STE): Inclose a list of OPE, ST/STE by nomenclature, identification number, location, status (active or inactive), and acquisition cost.

Note: Sample obtained from AR 700-90.

PEP CHANGE NOTICE

Date: 1 Jul 75

SUBJECT: Change Notice # 1 to Format A 201.

Facility: Acme Armor Casting Co.

1. Sponsoring DOD Component: Army

2. Bureau, Command, Corps: US Army Materiel Command

3. Major Subordinate Command: US Army Tank Automotive

4. Military Item(s) to be Produced:

   a. Tank, M60A1

   b.

   c.

5. Change in Status:

   a. This PEP has been completely activated. Production is scheduled through 30 Jun 76 and/or

   b. Planned producer has been changed from Zenith Forging Co. to Acme Armor Casting Co. and/or

   c. Following military item(s) to be produced has(have) been added or deleted:

   Hull, Turret, M60A1

6. Remarks:

Note: Sample obtained from AR 700-90.

FORMAT B CERTIFICATION

I certify that the Plant Equipment Package(s) listed below has been reviewed and meets all criteria for retention contained in Enclosure 1 of DoD Instruction 4215.1.

Assistant Secretary (I&L)
(Army), (Navy), (Air Force),
or Director, Defense Supply
Agency

or
designee

Note: Sample obtained from AR 700-90.

FORMAT C

REPORT OF DISCONTINUANCE OF PLANT EQUIPMENT PACKAGE

Plant Equipment Package Number _____ was reviewed as of _____ and it was determined that it no longer meets the criteria for retention. Action has been initiated to declare the industrial plant equipment in this package to the Defense Industrial Plant Equipment Center.

Assistant Secretary (I&L) -
(Army), (Navy), (Air Force),
or Director, Defense Supply
Agency

or
designee

Note: Sample obtained from AR 700-90.

MANAGEMENT OF DEFENSE-OWNED INDUSTRIAL PLANT EQUIPMENT PACKAGE (PEP) STATUS REPORT

REPORTS CONTROL SYMBOL
DD (I&L) (AR) - 642

COMMAND	TYPE	DATE OF REPORT
	☐ ANNUAL ☐ CHANGE	AS OF DATE

1	2	3	4					5		6
PEP NO.	PLANNED PRODUCER	PLANNED END ITEMS	IPE DATA					DEFICIT		REMARKS
			QUANTITY REQUIRED	INACTIVE ON SITE/OFF SITE	ACTIVE	SHORTAGE		COST ($000)	TIME (DAYS)	
						VOID	LOAN			
			a	b	c	d	e	a	b	

9-H

DA FORM 1 JUL 75 3353-R

PREVIOUS EDITION IS OBSOLETE

INTER-DEPARTMENTAL REQUEST FOR RELEASE OF EQUIPMENT
(Package Plant and Stand-by Line Equipment)

PERS AUTHORITY NO.

DATE OF FINAL ACTION

SECTION I - TO BE COMPLETED BY THE MILITARY DEPARTMENT REQUESTING RELEASE OF ITEM

1. NAME OF DEPARTMENT
Navy - Naval Ordnance Systems Command

2. ITEM DESCRIPTION (Commercial description of item, name of manufacture, and any information pertaining to special characteristics if applicable)
Lathe, Shell, 105 MM, Right Hand (Headstock left of operator) horizontal, consisting of base machine with chip removal system and Cadillac impact marker; to rough turn the outside diameter, face the base and cut to length the 105 MM projectile. Lathe complete with all accessories is required except the templates and arbor assembly for the 105 MM projectile. Serial # 26485-7183
Assigned to PEP 000

a. STANDARD COMMODITY CLASSIFICATION CODE (17 digits)	b. DEPARTMENTAL IDENTIFICATION NO.	c. CONDITION CODE	d. ACQUISITION COST
3690-2408-1236	3690-02604	N-1	102,366

3. PROPOSED USER	4. LOCATION WHERE ITEM WILL BE USED
Ajax Manufacturing Company	Ft. Worth, Texas

5. EQUIPMENT REQUIRED FOR	a. PROGRAM	b. PRODUCT
	5"/54 Program	5"/54-Mk 64 Projectiles

6. PROPOSED TRANSFER CONDITIONS	7. RETURN DATE	8. REPLACEMENT DATE
☐ LOAN ☒ REPLACEMENT XX		1 March 1973

9. STATEMENT OF URGENCY (List reasons for requesting release. Paragraph 7c of SR 715-5-20, 29 Apr 54, will be used as a reference)
No suitable substitute is available in the unassigned reserves or from commercial sources in time to meet Naval Ordnance Systems Command production schedules. UMMIPS Priority 02 is assigned this request.

Requisition No. 90784-2139-8104 applies. MUCOM CONTROL 02317D

10. REQUEST APPROVED BY

DATE	TYPED NAME AND TITLE OF AUTHORIZED PERSON	SIGNATURE
25 May 1972	G. LAMPMAN, JR. Dir NOIESD, NAD, Crane, Ind	

SECTION II - TO BE COMPLETED BY THE MILITARY DEPARTMENT HAVING CUSTODY OF ITEM

11. NAME OF DEPARTMENT
U.S. Army

12. EQUIPMENT CURRENTLY ASSIGNED TO	a. PROGRAM	b. PRODUCT
	Layaway PEP 000	Shell, HE, M1,105MM MPTS

13. PRESENT LOCATION	14. DEPARTMENTAL IDENTIFICATION NO.
St Louis AAP, St Louis, Mo	999444

15. TRANSFER CONDITIONS	16. RETURN DATE	17. REPLACEMENT DATE	18. TRANSFER
☐ LOAN ☒ REPLACEMENT		1 March 1973	☐ APPROVED ☐ DENIED

DATE	TYPED NAME AND TITLE OF AUTHORIZED PERSON	SIGNATURE
29 June 72	John Doe, Assistant Director of Production	

SECTION III - ACCEPTANCE OF TRANSFER TERMS BY THE REQUESTING MILITARY DEPARTMENT *(This need NOT be filled out if transfer terms in Sections I and II are the same and are properly authorized and approved.)*

DATE	TYPED NAME AND TITLE OF AUTHORIZED PERSON	SIGNATURE

DD FORM 1 APR 84 770

Note: Sample obtained from DSAM 4215.1/AR 700-43.

INTRA-DEPARTMENTAL REQUEST FOR RELEASE OF EQUIPMENT
(Package Plant and Stand-by Line Equipment)

PERO AUTHORITY NUMBER

DATE OF FINAL ACTION

SECTION I - TO BE COMPLETED BY THE AGENCY REQUESTING RELEASE OF ITEM

1. NAME OF AGENCY (Technical Service, Bureau, or command and Department)
KANSAS ARMY AMMUNITION PLANT

2. ITEM DESCRIPTION (Commercial description of item, name of manufacture, and any information pertaining to special characteristics if applicable)
X-Ray unit complete, vertical panel type with water cooling system for tube. GE model RES-3-Ser No. 219975 - complete. For 105MM Shell Tag # A55864-76144

PEP 000 KANSAS ARMY AMMUNITION PLANT 06 PRIORITY

a. STANDARD COMMODITY CLASSIFICATION CODE (13 digits)	b. DEPARTMENTAL IDENTIFICATION NO.	c. CONDITION CODE	d. ACQUISITION COST
6635-7530-1000	6814-00123	02	36683

3. PROPOSED USER	4. LOCATION WHERE ITEM WILL BE USED
KANSAS ARMY AMMUNITION PLANT	PARSONS, KANSAS

5. EQUIPMENT REQUIRED FOR	a. PROGRAM	b. PRODUCT
	Ammunition	CTG, 105MM, HE, M1

6. PROPOSED TRANSFER CONDITIONS	7. RETURN DATE	8. REPLACEMENT DATE
[X] LOAN [ ] REPLACEMENT	July 1975	

9. STATEMENT OF URGENCY (List reasons for requesting release. Paragraph VI B of Department of Defense Directive 4215.9, 18 August 1953, will be used as a reference.)
Provisions of par. 5-12, AR 700-90 apply as follows:
Criteria: Item to be produced is listed on Format A.
Contract No. DAAA09-70-C0245
PCH&T costs not required. All costs for reactivation, maintenance, rehabilitation, & reprocessing will be accomplished IAW the terms of the contract. Item needed to meet increased inspection.

10. REQUEST APPROVED BY

DATE	TYPED NAME AND TITLE OF AUTHORIZED PERSON	SIGNATURE
1 Jun 1973	HORATIO S. BUCK JR. LTC ORD CORPS COMMANDING	

SECTION II - TO BE COMPLETED BY THE AGENCY HAVING CUSTODY OF ITEM

11. NAME OF AGENCY (Technical Service, Bureau or Command and Department)
US Army Munitions Cmd, Joliet Ill 60436 MUCOM Control No 02388

12. EQUIPMENT CURRENTLY ASSIGNED TO	a. PROGRAM	b. PRODUCT
	Ammunition	CTG, 205MM, HE, M1

13. PRESENT LOCATION	14. DEPARTMENTAL IDENTIFICATION NO.
Kansas Army Ammunition Plant Parson Kansas 67357	6814-00123

15. TRANSFER CONDITIONS	16. RETURN DATE	17. REPLACEMENT DATE
[X] LOAN [ ] REPLACEMENT	July 1975	

DATE	TYPED NAME AND TITLE OF AUTHORIZED PERSON	SIGNATURE
21 Jun 73	P.J. HAMMOND, Assistant Director of Production	

SECTION III - TO BE COMPLETED BY AGENCY HAVING FINAL DEPARTMENTAL AUTHORITY TO AUTHORIZE OR DENY TRANSFER

18. [X] AUTHORIZED [ ] DENIED [ ] ON REQUESTOR'S TERMS [ ] ON CUSTODIAN'S TERMS

DATE	TYPED NAME AND TITLE OF AUTHORIZED PERSON	SIGNATURE
1 Jul 1973	JOHN W. CAMPBELL, Col, GS, Dep Dir of Reqmts & Procurement	

DD FORM 1 APR 64 770-1

Note: Sample obtained from DSAM 4215.1/AR 700-43.

DOD PROPERTY RECORD

1. ☐ ACTIVE ☐ INITIAL ☒ IDLE ☒ CHANGE | 2. JULIAN DATE: 3088 | 3. I.D./GOVERNMENT TAG NO.: TA-20205 | Form Approved Budget Bureau No. 22-R0209

SECTION I - INVENTORY RECORD

4. COMMODITY CODE	5. STOCK NUMBER	6. ACQUISITION COST	7. TYPE CODE	8. YR OF MFR	9. POWER CODE	10. STATUS CODE	11. SVC CODE	12. COMMAND CODE	13. ADM OFFICE CODE
3418-6512-0000	3419	11250	1	42	44	3D	0	A5618N	W34HZ0

14. NAME OF MANUFACTURER	15. MFR'S CODE	16. MANUFACTURER'S MODEL NO.	17. MANUFACTURER'S SERIAL NO.
ROCKFORD MCH TL CO.	51292	SO	56- 11

18. LENGTH	19. WIDTH	20. HEIGHT	21. WEIGHT	22. CERTIFICATE OF NON-AVAILABILITY NUMBER	23. ABOD NO.	24. ARD	25. CONTRACT NUMBER
11	8	9	12800		438		2-1784

26. DESCRIPTION AND CAPACITY

SHAPER, VERTICAL, HYDRAULIC, SWIVEL RAM, STR 12", LONGTD TT 26", CROSS TT 26".

CONTINUED ON REVERSE SIDE ☐ YES ☒ NO

27. ELECTRICAL CHARACTERISTICS

QUANTITY	HORSEPOWER	VOLTS	PHASE	CYCLE	AC	DC	SPEED	TYPE AND FRAME NUMBER
1	7-1/2	220/440	3	60	X		1160	JX 324
1	1-1/2	220/440	3	60	X		1100	CS 204
1	1/4	220/440	3	50/60	X		1425/1725	N/A

28. PRESENT LOCATION
Lima Army Mod Ctr
No street address
Lima, Ohio 45804

28a. DIREC CONTROL NO.: 3419-04969

29. POSSESSOR CODE: 36 4220 999308

SECTION II - INSPECTION RECORD

	YES	NO		YES	NO
30. CAN ITEM BE STORED AND MAINTAINED ON SITE FOR AT LEAST 12 MONTHS?	X		42. MUST ITEM BE REPAIRED/REBUILT/OVERHAULED TO PERFORM ALL FUNCTIONS? $		X
31. HAS ITEM BEEN REBUILT/OVERHAULED? DATE IF SO, WHEN?	X		43. DO QC RECORDS INDICATE SATISFACTORY PERFORMANCE? IF NO, EXPLAIN UNDER REMARKS BELOW	X	
32. HAS ITEM BEEN MODIFIED FROM ORIGINAL CONFIGURATION? IF SO, EXPLAIN UNDER REMARKS BELOW.		X	44. ARE MANUALLY OPERATED MECHANISMS IN WORKING ORDER? IF NO, DESCRIBE UNDER REMARKS BELOW	X	
33. WAS ITEM INSPECTED UNDER POWER? IF NOT EXPLAIN UNDER REMARKS BELOW. IN STORAGE		X	45. ARE SCALES, DIALS, AND GUAGES WORKING AND READABLE? IF NO, DESCRIBE UNDER REMARKS BELOW.	X	
34. ARE MAINTENANCE COSTS NORMAL? IF NOT, EXPLAIN UNDER REMARKS BELOW.	X		46. ARE HYDRAULIC PUMPS, VALVES, AND FITTINGS OPERATING PROPERLY? IF NO, DESCRIBE UNDER REMARKS BELOW.	X	
35. ARE SAFETY DEVICES ADEQUATE AND SATISFACTORY? IF NOT, EXPLAIN UNDER REMARKS BELOW.	X		47. ARE ELECTRONIC SYSTEMS AND CONTROLS OPERATING PROPERLY? IF NO, DESCRIBE UNDER REMARKS BELOW	X	
36. ARE INSTALLATION INSTRUCTIONS AVAILABLE FOR TRANSFER?		X	48. HOW MANY HOURS WAS ITEM USED BY CURRENT POSSESSOR? N/AV		
37. ARE OPERATING INSTRUCTIONS AVAILABLE FOR TRANSFER?		X	49. EXPLAIN UNUSUAL LABOR OR EQUIPMENT REQUIREMENTS NOTED IN ITEM 24. CHICLE, MED-TR SERIES		
38. WAS ITEM LAST USED ON A FINISHING OPERATION?	X		50. ESTIMATED COST FOR PACKING, CRATING, HANDLING $ NONE		
39. WILL ADJUSTMENTS OR CALIBRATION CORRECT DEFICIENCIES?	N/AV		51. INDICATE DATE ITEM WILL BE AVAILABLE FOR REDISTRIBUTION. 30 APRIL 197		
40. IS ITEM SEVERABLE WITHOUT DAMAGE TO COMPONENTS? IF NOT, GIVE THEIR REPLACEMENT COST. $	X		52. CONDITION CODE 0-2		
41. IS ITEM IN OPERABLE CONDITION?	X		53. OPERATING TEST CODE N/A		

SECTION III - REMARKS

54. REMARKS: ATTACHMENTS AND/OR ACCESSORIES:
Coolant Tank & Motor.
1 -Light W/Adjustable Arm.
1 - Gull Dog On, Off Safety Switch.
1 -Pendant Control W/3 Push Button & 2 Turn Button.

REMARKS CONTINUED ON REVERSE SIDE ☐ YES ☒ NO

SECTION IV - DISPOSITION RECORD

55. CONSIGNEE (NAME AND ADDRESS, INCLUDING ZIP CODE)	56. TYPE OF DISPOSITION	56a. DATE OF DISPOSITION AND PROCEEDS IF SOLD
	☐ DONATION ☐ DESTRUCTION ☐ SALE ☐ ABANDONMENT	

SECTION V - VALIDATION RECORD

57. VALIDATION (TYPED NAME(S) AND SIGNATURE(S))
R. J. BURGER
Accountable Property Officer

DD FORM 1 FEB 68 1342 — PREVIOUS EDITIONS OF DD FORM 1342 ARE OBSOLETE. REPLACES DD FORMS 1342M, 1342S, AND 1342SM WHICH ARE OBSOLETE.

Note: Sample obtained from DSAM 4215.1/AR 700-43.

DOD INDUSTRIAL PLANT EQUIPMENT REQUISITION | REQUISITION NUMBER: N91252-8183-0020 | FORM APPROVED BUDGET BUREAU NO. 22-R0233

SECTION I - ITEM DESCRIPTION

1. COMMODITY CODE	2. MANUFACTURER	2a. MODEL NUMBER
3405 1234 5678	Peerless Machine Company	2600

3. STOCK NUMBER	4. POWER CODE	5. ESTIMATED COST	6. PHYSICAL INSPECTION REQUIRED	7. PROCUREMENT SPECIFICATION ATTACHED
	37	3,250	☐ YES ☒ NO	XX YES ☐ NO

8. DESCRIPTION

CUT OFF MACHINE, BAND, VERTICAL, TILTING WORKTABLE, MANUAL FEED, MULTIPLE SPEED, 60-270 FPM, 26 INCH WORK WIDTH, 15 INCH WORK THICKNESS, ONE INCH BLADE WIDTH, WITH BUTT WELDER.

CONTINUED UNDER REMARKS SECTION ☐ YES ☒ NO

SECTION II - REQUIRING AGENCY/FACILITY/CONTRACTOR

9. NAME AND ADDRESS (Include ZIP Code)	10. CONTRACT NUMBER	10a. DATE	11. COMMAND CODE
LOCKHEED-CALIFORNIA COMPANY BURBANK, CALIFORNIA 91503	N006386C0000 64-23D-90	1 MAY 73 1 JUN 73	N00638
	12. PROGRAM: ☐ MILITARY ☒ CONTRACTOR		

13. INTENDED USE	14. DATE ITEM REQUIRED AT DESTINATION	15. DATE CERT. N/A REQUIRED	16. PRIORITY
CUTTING MILD STEEL STOCK	31 DEC 73	30 SEP 73	08

17. BASIS FOR AUTHORIZATION ("X" applicable box)	18. PROCUREMENT PLANNED	19. REBUILD/OVERHAUL CANDIDATE
☒ PRODUCTION ☐ MOBILIZATION ☐ REPLACEMENT	☒ YES ☐ NO If "YES", cite Appropriation: 2X 4450-68	N/A ☐ YES

20. TYPED NAME AND TITLE OF REQUESTING OFFICIAL	21. SIGNATURE OF REQUESTING OFFICIAL	22. DATE
R. B. JONES CHIEF, STOCK MANAGEMENT BRANCH	R. B. JONES	1 JUL 73

23. CERTIFICATION OF NEED BY ADMINISTERING ACTIVITY: e. ADMINISTERING OFFICE CODE 6

b. NAME AND ADDRESS (Include ZIP Code)	c. TYPED NAME AND SIGNATURE OF PRODUCTION REPRESENTATIVE	d. DATE
DCASD VAN NUYS 8155 VAN NUYS BLVD. VAN NUYS, CALIFORNIA 91402	H. T. SANDERS	1 JUL 73
	e. SIGNATURE OF ADMIN. CONTRACTING OFFICER: J. R. CODY	f. DATE: 1 JUL 73

SECTION III - APPROVAL AUTHORITY

24. NAME AND ADDRESS (Include ZIP Code)	25. TITLE, SYMBOL AND TELEPHONE NO. OF APPROVING OFFICIAL	
	26. TYPED NAME & SIGNATURE OF APPROVING OFFICIAL	27. DATE

SECTION IV - ALLOCATION AND AUTHORITY TO INSPECT *(TO BE COMPLETED BY DIPEC)*

28. COMMODITY CODE	29. I.D./GOVERNMENT TAG NUMBER	30. DESCRIPTION (See attached copy of DD Form 1342, dated: 20 JUNE 73
3405 2345 5432	438585	

31. PRESENT LOCATION (Name, address and ZIP Code)	32. SHIPPED TO
DSA STORAGE FACILITY DCSC COLUMBUS, OHIO 43215	

33. ESTIMATED TIME REQUIRED FOR SHIPMENT FROM DATE OF ACCEPTANCE *(Enter number of days)*

a. AS IS CONDITION	b. TEST REQUIRED	c. REPAIR REQUIRED	d. REPAIR/OVERHAUL REQUIRED	e. STANDARD ATTACHMENTS REQUIRED
15		75		

34. TYPED NAME AND SIGNATURE OF ALLOCATING OFFICIAL	35. DATE	36. DATE OFFER EXPIRES
JOHN DOE, EQUIPMENT SPECIALIST	1 SEPTEMBER 73	1 OCTOBER 73

SECTION V - NON-AVAILABILITY CERTIFICATE *(TO BE COMPLETED BY DIPEC)*

NA The item described in Section I of this form has been screened by DIPEC against the idle inventory of the Department of Defense and it is hereby certified as not available or cannot be delivered on or before the date specified in Section II (item 14). Procurement action resulting from this Certification of Non-Availability must be initiated within 45 calendar days of the date included in this Section (item 40) or complete rescreening is required. Equipment offered by DIPEC in Section IV must be considered if the supplier cannot deliver new equipment before expiration of the period specified in Section IV (item 33).

38. TYPED NAME AND SIGNATURE OF CERTIFYING OFFICIAL	39. DATE CERTIFICATE ISSUED	40. DATE CERTIFICATE EXPIRES	41. CERTIFICATE NUMBER

DD FORM 1 FEB 68 1419 PREVIOUS EDITIONS ARE OBSOLETE

Note: Sample obtained from DSAM 4215.1/AR 700-43.

SECTION VI - CERTIFICATION OF ACCEPTANCE

42. THE ITEM ALLOCATED IN SECTION IV OF THIS FORM

XX HAS BEEN PHYSICALLY INSPECTED AND IS ACCEPTABLE. ☐ IS ACCEPTABLE WITHOUT PHYSICAL INSPECTION

ITEM IS ACCEPTED UNDER ONE OF THESE CONDITIONS: a. XX AS IS CONDITION b. ☐ REPAIR REQUIRED

c. ☐ TEST REQUIRED d. ☐ REBUILD/OVERHAUL REQUIRED e. ☐ OTHER,

☐ IS NOT ACCEPTABLE (A complete description of conditions making item unacceptable must be stated under REMARKS below)

43. TYPED NAME AND TITLE OF CERTIFYING OFFICIAL	44. SIGNATURE OF CERTIFYING OFFICIAL	45. DATE
R. B. JONES CHIEF, STOCK MANAGEMENT BRANCH	S/R. B. JONES	10 AUG 68

SECTION VII - SPECIAL SHIPPING INSTRUCTIONS

46. SHIP TO (Include ZIP Code):	47. FOR TRANSSHIPMENT TO:
LOCKHEED-CALIFORNIA COMPANY BURBANK, CALIFORNIA 91503	

48. MARK FOR:
N0063866C0046

49. APPROPRIATION CHARGEABLE FOR		d. PAYING OFFICE/ACTIVITY NAME AND ADDRESS (Include ZIP Code)
a. PACKING/CRATING/HANDLING	21X2030 865-2951	
b. TRANSPORTATION	27X3027 865-2951	
c. OTHER		

50. SPECIAL DISTRIBUTION OF SHIPPING DOCUMENTS AND OTHER INSTRUCTIONS

1 COPY TO BUREAU OF NAVAL WEAPONS
IND. OFF., NAEC,
PHILADELPHIA, PA. 21203

SECTION VIII - REMARKS

51. REMARKS

42.a. Inspection of item discloses it is acceptable in an "as is condition".

Note: Sample obtained from DSAM 4215.1/AR 700-43.

DOD INDUSTRIAL PREPAREDNESS PROGRAM
PRODUCTION PLANNING SCHEDULE

Form Approved
OMB No. 22-R0251

NOTE: Use of the data entered on this form will be limited to duly accredited officials of the Department of Defense who are subject to penalties for unlawful disclosure. The protection given to data relating to your facility under the Espionage Act and other statutes will confine accessibility within the Government to those responsible for procurement, production preparedness planning, and defense of the United States.

Procuring Activity/Customer Plant Data	Industrial Source (Operating Plant) Data
1. NAME AND ADDRESS *(Include ZIP Code)*	2. NAME AND ADDRESS *(Include ZIP Code)* PLANT INDEX NUMBER
1a. REPRESENTATIVE AND TELEPHONE NUMBER	2a. REPRESENTATIVE AND TELEPHONE NUMBER
1b. CUSTOMER PLANT ASPPO CODE NO. _____ OFFICE AND ADDRESS 1c. REPRESENTATIVE AND TELEPHONE NUMBER	2b. ASPPO CODE NO. _____ OFFICE AND ADDRESS 2c. REPRESENTATIVE AND TELEPHONE NUMBER
1d. THIS SCHEDULE COVERS: ☐ PRIME CONTRACTOR PLANNING ☐ SUBCONTRACTOR PLANNING *(Tier)*	2d. UTM

ACCEPTANCE BY INDUSTRIAL MANAGEMENT AND BY GOVERNMENT

The signatures below attest that the information contained herein is true and correct in the judgment of the signatories at the time of signature. Further the signatures indicate (1) an awareness of the Government's dependence upon these data as a basis for appropriate and often costly measures to insure the adequacy of the US industrial base; (2) recognition of the Government's intention to convert production planning schedules to contracts by negotiation on a selective basis as may be required to minimize materiel shortages during a future Limited War, and (3) recognition that it is also the Government's intention, consistent with such planned production as may be converted to prime contracts by negotiation, to require that planned subcontract support will be similarly converted to subcontracts. Notwithstanding the foregoing basis for acceptance, the signatures hereon in no way bind the named firm(s) nor the Government in any contractual relationship, nor is acceptance to be construed as an agreement by industry to maintain production capability as indicated herein. The signature of industry does not obligate the named firm to accept a military contract if one is offered nor is the Government obligated to convert production planning schedules to contracts, to contract with the named firm if procurement of the items specified herein is required, or to convert planned subcontract support to subcontracts if the planned production is converted to prime contracts. It is understood, however, that the named firm(s) may be required to accept such a military contract(s) under applicable laws and regulations as may be in effect at the time.

3. PROCURING ACTIVITY OR CUSTOMER PLANT	4. OPERATING PLANT I.P.R.	5. OPERATING PLANT ASPPO	6. EFFECTIVE PERIOD
SIGNATURE AND DATE	SIGNATURE AND DATE	SIGNATURE AND DATE	
1ST RENEWAL *(Signature and date)*	1ST RENEWAL *(Signature and date)*	1ST RENEWAL *(Signature and date)*	
7. REFERENCE NUMBER	7a. PREPARED BY		7b. DATE

DD FORM 1519 (PART I) THIS FORM REPLACES DD FORMS 1519 AND 1519-1, 1 DEC 69, WHICH ARE OBSOLETE

9. ITEM DESCRIPTION	8. REFERENCE NUMBER
	9a. UNIT OF MEASURE

MONTHLY SCHEDULES

M+1 2 3	4 5 6	7 8 9	10 11 12	13 14 15	16 17 18	19 20 21	22 23 24	25 26 27	28 29 30	31 32 33	34 35 36
10. REQUIRED DELIVERY SHOULD M-DAY OCCUR DURING FY											
11a. ALLOCATED PRODUCTION							b. SHIFT BASIS				
12. REQUIRED DELIVERY SHOULD M-DAY OCCUR DURING FY											
13a. ALLOCATED PRODUCTION							b. SHIFT BASIS				
14a. *MAXIMUM ATTAINABLE WITH EXISTING FACILITIES FROM MINIMUM SUSTAINING RATE										b. MSR=	
15. *MAXIMUM ATTAINABLE WITH EXISTING FACILITIES FROM COLD BASE											
16. *MAXIMUM ATTAINABLE WITH INDUSTRIAL PREPAREDNESS MEASURES FROM MSR											
17. *MAXIMUM ATTAINABLE WITH INDUSTRIAL PREPAREDNESS MEASURES FROM COLD BASE											

*When completion of items 14 through 17 is not desired, Procuring/Requesting activities will so indicate by entering "N/A."

18. ITEMS/SOURCES - SUBCONTRACTOR PLANNING EXTENDED *(Privileged Information)*

19. DESCRIPTION OF PREPAREDNESS MEASURE

20. REMARKS

APPENDIX I

EQUIPMENT STATUS

AND

CONDITION CODES

APPENDIX I

STATUS AND CONDITION CODES

STATUS CODES

Code (numeric/alpha)	*States*
1 Active:	
A	DoD Components—Other Than Leased Loaned
B	Reserved
C	Reserved
D	Reserved
E	Reserved
F	Leased
G	Loan to Army
H	Loan to Navy
I	Loan to Air Force
J	Loan to DSA
K	Loan to AEC
L	Loan to NASA
M	Loan to OEO (Office of Economic Opportunity)
N	Loan to FAA
★ P	Reactivation of ASD (I&L) Approved PEP *(Army Only)*
Q	Loan to USCG

Note: Sample obtained from DSAM 4215.1/AR 700-43.

2 Intransit:

A DIPEC Shipping Instruction Forwarded to Consignor-Ordering Shipment to Use

B DIPEC Shipping Instruction Forwarded to Consignor-Ordering Shipment to Storage

C Consignor's Notice of Interservice Shipment Received at DIPEC (ID Number Assignment Pending)

D Consignor Reported to DIPEC—Delayed Shipment to Use

E Consignor Reported to DIPEC—Delayed Shipment to Storage

3 Departmental Reserves:

A IPE Awaiting Issue to Active Units, Troops or Ships (In-Use Stocks)

★ B Reserved

★ C Reserved

★ D Plant Equipment Package-ASD(I&L) Certified

★ E Plant Equipment Package Pending ASD (I&L) Approval

F Military Hold Account-Assets in DSA Storage

G Advance Base Package

H IPE in a Government-owned, Government Operated installation or activity, subject to intermittent use, but required to remain in place to support the current assigned mission of the installation or activity.

★ I IPE under control of the Defense Nuclear Agency, subject to intermittent use, but required to remain in place to support the National Nuclear Test Readiness Program.

4 Idle—General Reserve:

A DODIER in DSA Storage

B DODIER On-Site Storage

C Idle (in Process)—30 Day Priority Waived

D Idle (in Process)—30 Day Priority Applies

E Idle—Being Held intact Pending ASD (I&L) Approval to sell IPE as Part of Excess Realty

★ F Idle—but certified by the Armed Services Procurement Planning Officer (ASPPO) and the Procuring Contracting Officer (PCO) that mobilization base requirements are being developed in support of a *planned emergency production schedule*, or that the equipment will be required to support foreseeable future military production. The certification will be made in Section III (Remarks) of each DD Form 1342 upon which a piece of IPE in Status Code 4F is reported idle to DIPEC.

NOTE: Certification by the ASPPO/PCO is required for retention of IPE in idle status under temporary Status Code 4F. See paragraph 30101-2e and Appendix 2B.

★ G and H Reserved.

5 Disposal or Removal From the Inventory:

A In Process

B Nonreportable to DIPEC or Error in ID Number

C Disposal Complete

6 National Industrial Equipment Reserve (NIER)

A Idle--Unassigned

B Loaned

C Leased

D Sold under National Security Clause

CONDITION CODES

Code	*Brief Description*
N-1	New-Excellent

Expanded Definition

New or unused property in excellent condition. Ready for use and identical or interchangeable with new items delivered by a manufacturer or normal source of supply.

Note: Sample obtained from DSAM 4215.1/AR 700-43.

Code	*Brief Description*	*Expanded Definition*
N-2	New-Good	New or unused property in good condition. Does not quite qualify for N-1 (because slightly shopworn, soiled, or similar), but condition does not impair utility.
N-3	New-Fair	New or unused property in fair condition. Soiled, shopworn rusted, deteriorated, or damaged and its utility is slightly impaired.
N-4	New-Poor	New or unused property so badly broken soiled, rusted, mildewed, deteriorated, or damaged, that its utility is seriously impaired.
E-1	Used-Reconditioned-Excellent	Used property, but repaired or renovated and in excellent condition.
E-2	Used-Reconditioned-Good	Used property which has been repaired or renovated and, while still in good usable condition, has become worn from further use and cannot qualify for excellent condition.
E-3	Used-Reconditioned-Fair	Used property which has been repaired or renovated but has deteriorated since reconditioning and is only in fair condition. Further overhauling required or expected to be needed in near future.
E-4	Used-Reconditioned-Poor	Used property which has been repaired or renovated and is in poor condition from serious deterioration such as from major wear-and-tear, corrosion, exposure to weather, or mildew.
O-1	Used-Usable Without Repairs-Excellent	Property which has been slightly or moderately used, no repairs required, and still in excellent condition.
O-2	Used-Usable Without Repairs—Good	Used property, more worn than O-1, but still in good condition with considerable use left before any important repairs would be required.
O-3	Used-Usable Without Repairs-Fair	Used property which is still in fair condition and usable without repairs; however, somewhat deterioriated, with some parts (or portion) worn and should be replaced.
O-4	Used-Usable Without Repairs-Poor	Used property which is still usable without repairs, but in poor condition and undependable or uneconomical in use. Parts badly worn and deteriorated.
R-1	Used-Repairs Required-Excellent	Used property, still in excellent condition, but minor repairs required (repairs would not cost more than 10% of acquisition cost).

Note: Sample obtained from DSAM 4215.1/AR 700-43.

Code	*Brief Description*	*Expended Definition*
R-2	Used Repairs Required-Good	Used property, in good condition but considerable repairs required. Estimated cost of repairs would be from 11% to 25% of acquisition cost.
R-3	Used-Repairs Required-Fair	Used property, in fair condition but extensive repairs required. Estimated repair costs would be from 26% to 40% of acquisition cost.
R-4	Used Repairs Required-Poor	Used property, in poor condition and requiring major repairs. Badly worn, and would still be in doubtful condition of dependability and uneconomical to use if *repaired*. Estimated repair costs from 41% to 65% of acquisition cost.
X	No further value for use as originally intended but of possible value other than as scrap.	Personal property that has some value in excess of its basic material content but which is in such condition that it has no reasonable prospect for use for any purpose as a unit (either by the holding or any other Federal agency) and its repair or rehabilitation for use as a unit (either by the holding or any other Federal agency) is clearly impracticable. Repairs or rehabilitation estimated to cost in excess of 65% of acquisition cost would be considered "clearly impracticable" for purpose of this definition.
S	Scrap	Material that has no value except for its basic material content.

Note: Sample obtained from DSAM 4215.1/AR 700-43.

APPENDIX J

P-TYPE

METAL PRESERVATIVES

P-Type Metal Preservatives

P-No.	Specification No.	Specification title	Grade, type or class	Description	Physical properties: Flash-point minute	Physical properties: Melt or flow point minute	Uses	Application	Removal
P-2	MIL-C-16173	Corrosion preventive compound, solvent cutback, cold application.	Grade 2, Soft film.	An amber colored compound diluted with solvent that remains soft upon evaporation of the solvent. Mixes readily with oil. Must be applied cold because of low flash point.	100° F	----------	Extended under cover protection to interior or exterior surfaces of machinery, instruments, bearings or material with or without the use of supplementary barrier materials, for out-door protection of material for limited periods where metal temperatures do not reach levels which produce prohibitive flow of corrosion preventive film.	Dipping, spraying or brushing at room temperature.	Petroleum solvents or vapor degreasing.
P-3	MIL-C-16173	Corrosion preventive compound, solvent cutback, cold application.	Grade 3, Water displacing. Soft film.	A solvent dispersed compound which deposits a thin non-drying film upon evaporation of solvent. It contains ingredients having a greater attraction to metal surfaces than water, thus giving water displacing characteristics.	100° F	----------	Used where fresh or salt water must be displaced from corrodible surfaces and the corrosion prevented or stopped; for protecting interior surfaces of machinery; instruments, or material under cover for limited periods and for protecting critical bare steel or phosphated surfaces for extended periods when satisfactorily packaged.	Dipping, brushing, spraying of exterior; flushing; filling or slushing of interiors at room temperatures.	Vapor degreasing or petroleum solvents.
P-9	VV-L-800	Lubricating oil, general purpose, preservative (water displacing low temperature).	One grade only.	A highly refined, light, low viscosity oil containing rust inhibiting additives. Its viscosity is similar to SAE 5 oil.	275° F min. *Note.* The oil loses its neutonian properties at very low temperatures: its use at temperatures below −40° F is limited by a number of machine design factors and should be proved for any specific item application by test before adoption.	−70° F (pour point max)	For use in lubrication and protection against corrosion of certain small arms, automatic weapons, fuse mechanisms, components of internal combustion engines, and wherever a general purpose low temperature lubricating oil is required.	Any method at room temperature. Available in gas-pressurized containers for use in areas difficult to preserve	Petroleum solvents or vapor degreasing.

Note: Sample obtained from TM 38-260/NAVSUP Pub 523/AFR 71-18/MCO 4870.62/DSAM 4145.9

P-No.	Specification No.	Specification title	Grade, type or class	Description	Physical properties: Flash-point minute	Physical properties: Melt or flow point minute	Uses	Application	Removal
								by other existing procedures.	
P-10	MIL-L-21260	Lubricating oil, internal combustion engine, preservative and break-in.	Type I, Grade 10	A petroleum product compounded with additive material. Light viscosity equal to SAE No. 10	360° F	−20° F (pour point max)	For preservative and break-in use in reciprocating spark-ignition and compression-ignition engines, in all types of ground equipment at temperatures above −10° F, operating at output levels up to 150 p.s.i., (BMEP) also to protect engine parts from deterioration during shipment and storage. Should be used as factory-fill and break-in oils for all new and rebuilt engines. Oils are also operational and need not be drained till first scheduled oil change.	Any method at room	Petroleum solvents. Removal before use not generally required.
	MIL-L-21260	----------	Type I, Grade 30	Medium viscosity oil with viscosity equal to SAE Grade 30	390° F	0° (pour point max)			
	MIL-L-21260	----------	Type I, Grade 50	Heavy viscosity oil with viscosity equal to SAE Grade 50	400° F	15° F (pour point max)			
	MIL-L-21260	----------	Type II, Grade 10	----------	360° F	−20° F	Same as above except Type II oils are intended for use in super charged compression-ignition engines operating output levels of approximately 150 p.s.i., BMEP, and above.		
	MIL-L-21260	----------	Type II, Grade 30	----------	390° F	0° F			
P-11	MIL-G-10924	Grease, automotive and artillery.	One grade only.	A smooth homogenerous mixture of mineral or synthetic oil or combination thereof with a gelling agent stabilized to give low and high temperature performance between −65° and 225° F.	----------	----------	For lubrication of automotive and artillery equipment operating over an ambient temperature range of minus 65° F to plus 225° F. For protection of lubricated bearings. Particularly suitable for equipment operating at both very low and very high temperatures.	Brush, grease gun or swabbing at room temperature.	Toluene, benzene or hot SAE oil followed by solvent. Removal not generally required.

Note: Sample obtained from TM 38-260/NAVSUP Pub 523/AFR 71-18/MCO 4870.62/DSAM 4145.9

P-No.	Specification No.	Specification title	Grade, type or class	Description	Physical properties		Uses	Application	Removal
					Flash-point minute	Melt or flow point minute			
P-19	MIL-C-16173	Corrosion preventive compound, solvent-cutback, cold application.	Grade 4, Transparent, nontacky film.	Transparent during protective life of film. Solvent-dispersed, amber colored nontacky film.	100° F	--------	General purpose indoor and limited outdoor preservation of corrodible metals, with or without an overwrap, and where handling, stacking, and counting required a tack-free coating. Where a transparent coating is required in addition to protective qualities, where there is no requirement for miscibility with lubricating oil, and where ease of removal with petroleum solvent is important.	Dipping, and brushing at room temperature.	Petroleum solvents or vapor degreasing.
P-21	MIL-C-16173	Corrosion preventive compound, solvent cutback, cold application.	Grade 5, Thin film preservative, soft film cold application low pressure steam removable.	A solvent-dispersed corrosion preventive compound which deposits a thin, easily removable film after evaporation of the solvent.	100° F	--------	Used where fresh or salt water must be displaced from corrodible surfaces; for protecting interior surfaces of materiel under cover for limited periods; and for protection of critical bare steel or phosphated surfaces for extended periods when packaged with satisfactory barrier materials. Used in lieu of grade 3, MIL-C-16173, where chemical "boil-out" cannot be used for removal.	Dipping, brushing, spraying or exterior surfaces and flushing, filling, or slushing of interior surfaces at room temperature (40° F or higher).	Vapor degreasing, petroleum solvents or low pressure steam

Note: Sample obtained from TM 38-260/NAVSUP Pub 523/AFR 71-18/MCO 4870.62/DSAM 4145.9