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Supply Management

STORAGE TECHNIQUES

This pamphlet has been prepared to provide information and guidance to districts and central support services (ASGCS) in the storage of supplies. The information outlined herein is not intended to provide an in-depth presentation of all known storage techniques. It is intended as a guide for districts and central support services' supply personnel to develop storage procedures based on their physical plant and personnel resources.

BY DIRECTION OF THE SECRETARY:

(Signed original copy on file)

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Administration

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STORAGE TECHNIQUES

1. General. Supplies purchased or acquired for support of the Department of Children and Families' clients should be stored consistent with available district/institution resources to provide maximum security and protection. Storage requirements are dependent on:

- a. Types (variety of commodities stored, such as general storage, dry storage (chiller), freezer storage and flammable storage.
- b. Quantity based on usage, square feet and cubic feet of items stored.
- c. Composition and compatibility of items stored; e.g., flammable, combustible, subject to deterioration or infestation, chemical composition and the ability of items to absorb odors.

2. Definitions.

a. Aisle. Any passageway within a storage area.

(1) Cross Aisle. A passageway at right angles to the main aisle used for the movement of supplies, equipment and personnel.

(2) Main Aisle. A passageway wide enough to permit the easy flow of supplies, equipment and personnel. It generally runs the length of the building.

b. Bin Storage Area. The area used for the storage of supply items which are binnable, such as bolts, electrical parts and plumbing supplies.

c. Bulk Storage Area. The area used for the storage of large quantities such as unopened cases of paper products, canned foods and clothing.

d. Cold Storage. Refrigerated storage area used in storage of certain food commodities and other supplies.

(1) Chiller. Controllable temperature between 32 Degrees Fahrenheit and 35 Degrees Fahrenheit.

(2) Cooler. Controllable temperature between 35 Degrees Fahrenheit and 50 Degrees Fahrenheit.

(3) Freezer. Controllable temperature from 32 Degrees Fahrenheit to below 0 Degrees Fahrenheit.

e. Column. The term applied to the vertical storage area which is usually one pallet space on the floor in bulk storage areas, or one bin section in bin storage areas.

f. Planograph. The term applied to a scale drawing of a storage area layout.

g. Row. The term applied to a line of storage aids which face a cross aisle.

h. Shelves. The term applied to the horizontal storage surfaces in bin sections.

i. Security Storage. An enclosed secure area within a storeroom or warehouse used for the storage of supplies which are subject to theft.

j. Storage or Shelf Life. The total elapsed time from date of pack to date of use. The base date is normally indicated by the manufacturer on the exterior package.

k. Storage Aids. The term applied to equipment used in storage of supplies; e.g., pallets, pallet racks, bins and bin boxes.

l. Storeroom. A room used for the storage of supplies.

m. Warehouse. A structure used for the storage of supplies or equipment.

3. Planning Storage Area Layout.

a. The following should be considered in establishing the storage area layout.

(1) Dimensions of the proposed area consisting of the internal length, width and available storage height.

(2) The planned use of the selected area; e.g., general purpose, special purpose, or security storage.

(3) Supplies to be stored and the frequency of issue.

(4) Storage or shelf life or other requirements to turn stock.

(5) Method of receipt and issue and the location of the receiving activity.

(6) Floor load capacity of the proposed storage area. Mezzanines or second floor storage areas require special attention to assure that planned material does not exceed the weight per square foot limitation.

(7) Security requirements.

(8) Material handling equipment available.

(9) Quantity requirements of each item and the peculiarities of them.

b. Layout. The initial phase of storage area layout is a scale drawing of the storeroom or warehouse area. The drawing should indicate all obstructions such as columns, restrooms, doorways and office areas (where applicable). Identification should be made for each area assigned to:

(1) Bin storage.

(2) Pallet rack storage.

(3) Bulk storage.

(4) Hazardous material storage.

(5) Security storage.

(6) Bulk fuel storage.

(7) Receiving and/or shipping.

c. Layout of any storage area should consider placing the fastest moving items nearest the receiving/shipping area. Mezzanines, due to the usual restrictions of floor load capacity, should be planned for small items or, by limiting access, for security storage.

d. Grid Layout. The second phase of storage area layout is the drawing of grids to scale. In pallet rack and bulk storage areas, these grids are spaced 48 inches apart and are consecutively numbered from left to right and bottom to top of the storage area layout. The grid for bin storage areas should be modified for use of existing or standard bins. Where applicable, pallet rack and bulk storage areas are plotted onto the grid layout. Aisle widths are dictated by the turning radius of material handling equipment. For example, minimum aisle widths for a forklift truck with a load length of 48 inches are:

(1) Two thousand (2,000) pound lift truck (sit down rider) 9' 6".

(2) Three thousand (3,000) pound narrow aisle reach truck (stand up) 9'.

(3) Four thousand (4,000) pound lift truck (stand up) 10' plus. These widths are for 90 Degree stacking.

4. Storage Area Marking.

a. General. Upon completion of the planograph of the storage area(s), the floor should be marked as designated for use as bulk storage, pallet racks and bin storage. Floor marking should be painted 3 inches wide using yellow traffic marker paint. For maximum contrast, black numerals should be painted on the yellow lines which correspond to the grid position and storage direction of the pallet rack columns and bin columns. Numbers for the aisles will not be painted, but will be indicated on the planograph.

b. Bulk Storage.

(1) Rows and Columns. In the bulk storage and pallet rack areas of a warehouse, the row number from the planograph should be painted on the line at the main aisle end of each row. Each pallet rack column in each row should have the assigned number painted in black on the line in the center of the designated pallet column location as indicated on the planograph.

(2) Tiers. Each tier should be lettered alphabetically beginning with the floor and continuing to the storage height of the pallet rack. If it is necessary to sub-divide a pallet rack opening, the subdivision should be in four quarters with each identified alphabetically beginning at the lower left quadrant and continuing counter-clockwise.

c. Bin Storage.

(1) Rows and Columns. In storerooms and bin storage areas of warehouses, each bin row should have the row number painted on the main aisle end of each storage aid or painted on a placard fastened to the storage aid. The number should be black numerals on a white background for best contract and should be located approximately 5-1/2 feet from the floor. The location number for each bin column in each bin row should be painted in black on the floor in the center of each section.

(2) Shelves. Each shelf within each bin column should be lettered alphabetically, beginning at the floor level and continuing through the height of the bin column. Each shelf in each bin column should be subdivided into thirds and the subdivision numbered from left to right. If bin boxes are used for the storage of many small items, they should be numbered consecutively beginning from the left on each shelf in the bin column.

d. Security Storage. Security storage areas should be laid out in the same manner as bin storage areas.

5. Stock Location Identification. The locator card file may be maintained either as a centralized file or decentralized file.

a. The centralized file is maintained by storage personnel. All issue documents are processed from inventory control through this location to have the location(s) annotated on the issue document prior to being sent to the applicable warehouse. On receipt, the receiving section attaches a Location Assignment Card to each shipment prior to forwarding to the storage area. The location is entered on the card by storage personnel and the completed card is forwarded to the central locator file for updating of the records.

b. A decentralized file is maintained by the storage personnel in each storage area where the items are stored. Issue documents are forwarded by inventory control to the storage area where the location is annotated on the issue document. Receipts are processed in the same manner as in 5a above and the completed Location Assignment Card is used to update the file the storage area. The card is destroyed upon completion of the updating process.

6. Document Register. The warehouse supervisor should establish a separate register for receiving and issue/shipping transactions. Each register should be in a separate binder and one set, i.e., receiving binder and shipping binder, maintained in the central receiving section; or one set in each warehouse when the central receiving is not integrated in the warehouse. In storage operations, the registers may be used to provide documented evidence of the movement of supplies into and out of a warehouse.

7. Issues and Transfers.

a. When a requisition or transfer document is received in a supply operation, supply personnel should check the locator file, if in use and annotate the location on the requisition.

b. The appropriate information (stock number, unit of issue and description) should be verified prior to removing the item from stock. Care should be taken to assure that the oldest stock or accepted damaged stock is issued first.

c. The requested material should be removed from stock, segregated by destination and delivered to the shipping point or issue counter.

d. Delivery personnel should verify the accuracy of the issue and record the transaction in the document register prior to placing the shipment/issue in the vehicle.

e. If the requested material is to be shipped or transferred to another district facility, the most practical and economical method should be used; e.g., courier, state vehicle or common carrier.

8. Stock Surveillance. An inspection of stored material should be conducted each week by supply supervisory personnel. In performing this inspection, supply supervisory personnel should assure that:

a. Good storage practices are being observed; e.g., cleanliness of the storage areas, proper and safe stacking, movement of oldest materials, trash removal and inspecting stock for deterioration or damage.

b. Material found to be broken, contaminated, or leaking will be segregated and reported to the supply supervisor for appropriate disposal action.

c. Indications of pilferage should be reported to institutional security or the local law enforcement agency for investigation.

9. Material Handling Equipment (MHE).

a. General. Equipment used in the movement, within a storage area of large quantities or weights of materials is MHE. Each piece of MHE is designed for a specific purpose within its designed load capacity, such as:

(1) Forklift trucks are used in the movement of materials in large quantities throughout warehouses and for raising palletized loads to the storage height of a warehouse.

(2) Pallet jacks are used in the movement of palletized loads for short distances.

(3) Two-wheel hand trucks are designed for the movement of lightweight materials in small quantities.

b. Maintenance. MHE, especially forklift trucks and pallet jacks, should be placed on a preventative maintenance schedule. The frequency of this maintenance will vary depending on the type of equipment involved. Examples are:

(1) Electric MHE forklift trucks require an equal amount of battery charging for each hour of operation. Additionally, the battery water should be checked weekly and water added as necessary.

(2) Gasoline/propane MHE requires a daily check of battery, engine oil, fuel levels and cooling system.

(3) On all equipment, grease should be added as specified by the manufacturer. The preventive maintenance schedule must include cleaning and lubrication of key ways.

c. MHE Operating Safety. Each district supply manager and/or facility supply supervisor, should institute a safety program designed for the type of MHE in use. Examples of points to be included in the safety program are:

(1) MHE should be used only for its designed purpose and within its rated load capacity.

(2) Pallet load weight is reduced proportionately to the height of storage. This reduction is approximately 100 pounds of load for each foot the load is raised above 10 feet.

(3) MHE of all types, should not be used to transport nor raise personnel to mezzanines or off pallet racks without the use of a safety pallet.

(4) Pallet loads should be squared and interlocked before movement is started.

(5) MHE should be operated only by authorized personnel and only within the safety limits of the equipment.

d. Operators. Districts should establish an MHE training course consistent with the type(s) of MHE equipment in use. Supply personnel authorized to operate MHE should attend the initial training course and subsequent refresher courses. Training courses and refresher courses should include maintenance of equipment, operating safety, pallet load patterns interlocking equipment usage including capacities and equipment operation including an obstacle course.

10. Storage of Perishables. All chilled and frozen foods are highly perishable and subject to rapid deterioration when improperly stored. Storage of foods at temperatures which are too high or too low, under unfavorable humidity, without proper air circulation, or in unsanitary storerooms will result in rapid spoilage and eventual loss of the product.

a. Prevention of Deterioration. Most spoilage of chilled and frozen foods is caused by micro-organisms, particularly certain species of bacteria and fungi. The contamination spreads rapidly from the decayed items to the surrounding sound food and walls. Therefore, frequent inspection while in storage followed by sorting, removal and segregation of the decayed items or portions thereof, is of basic importance in maintaining the products in top condition and in keeping losses to a minimum.

b. Marking of Receipts. All receipts of food items should be segregated and dated upon receipt to assure that the oldest lots are issued first. Issuance of foods out of receipt sequence to avoid loss from spoilage is the only accepted deviation.

c. Fruits and Vegetables. The containers should be raised off the floor by the use of pallets and individual lots should be stacked to permit free air circulation. The use of a fan or duct system may be desirable in some cases, to maintain proper circulation in all parts of the room. To avoid absorption of an earthy aroma, fresh apples and pears should not be stored with raw potatoes. Lettuce should not be stored with fruits, onions, tomatoes, cabbage, cantaloupe, celery, or similar items from which odors can be absorbed.

d. Quick-Frozen Fruits and Vegetables. Quick-frozen fruits and vegetables are highly perishable unless properly stored. Upon delivery, these items should be transferred promptly to a low temperature storage space. Temperature of the load should be checked upon arrival by taking the temperature readings of cartons selected from the top layer. If the temperature is higher than freezing room temperature, shipping cases should be scattered loosely about the room on pallets to permit rapid lowering of the product temperature. When the product temperature has been lowered sufficiently or the product upon delivery is the same as or lower than the temperature of the freezer room, the cases should be stacked compactly immediately.

e. Meat, Meat Products and Poultry. Meat items should not be stored on the bare floor. Pallets should be placed on the floor to allow free circulation of air under all items stored in the space.

f. Dairy Products and Eggs. To keep the air in a cold storage room fresh, the room must be kept clean and the air circulated slowly. Ordinarily, adequate air circulation can be provided by the use of pallets on the floor. Egg cases should not be stacked more than 5 cases high to avoid pressure damage.

11. Air Circulation. Along with proper temperature and humidity, air circulation in a storage room is an important factor in the proper storage of chilled and frozen foods. This is facilitated by stacking the products on pallets so that 4" wall clearance, a 2 foot ceiling and sufficient aiseways are provided.

12. Semi-Perishable Foods in Dry Storage. The term semi-perishable foods, refers to food items that are canned, dried, dehydrated, or otherwise processed to the extent that under normal circumstances such items may be stored in non-refrigerated spaces. Semi-perishable foods too often are regarded as non-perishable commodities which do not require care or protection in storage. While semi-perishable foods are not nearly as susceptible to spoilage as perishable foods, spoilage can and will occur if the products are mishandled, improperly stored, or stored for excessive periods of time. It is important to remember that the length of storage should be based on the date of packing and not on the date of receipt.

13. Storage Methods. Careful, correct storage methods not only prevent damage to items in storage, but assure speed and efficiency in the receipt, handling and issue of such items. The particular method

used for storing each item depends on the nature of the container, the nature of the commodity and the bursting or breaking strength of the bottom layers.

a. Storage Precautions. Care should be taken that items are not stacked so high as to cause a bursting or crushing of the bottom layer. Additionally, they should not be stacked so high that the top layer is subject to the higher temperatures near the ceiling or overhead. Stacking in close proximity to steam or other heated pipes should be avoided. Bagged items and those requiring fumigation and insect control should not be stored in large masses in corners of the warehouse or directly against the wall.

b. Storage Periods for Dry Foods. The safe storage period for dry food items varies greatly, depending on such elements as temperature, humidity, care in handling, protection from the weather, the quality of the food when received and the packing. Safe storage periods become very uncertain at extremes of temperature. The fact that the food has been on hand up to the limit of the "safe" storage period does not mean that the food should be surveyed, but should be consumed as soon as practicable. Food which has been on hand beyond the safe storage period should be carefully inspected for spoilage, leakage, or other damage. If it is still good, it should be issued as soon as possible with priority of issue over newer stock. When the suggested storage life has been exceeded and there is a question of fitness for human consumption, designated food service personnel should be requested to inspect the contents and accept or reject the items. An alternate method is to request the item be tested by the Commodity Testing Laboratory, Department of Agriculture and Consumer Affairs. All items of the same brand and received at the same time as the sample being tested should be set aside and marked "HOLD" pending receipt of the laboratory results. Upon receipt of the test results, the applicable action should be taken, i.e., issue or destroy.

c. Storage of Batteries. Dry cell batteries are a perishable commodity and whenever possible, should be stored in refrigerated spaces or in a warehouse having a constant and controlled temperature. Batteries should remain in their original containers until ready to use.

d. Storage of Sensitized Materials. Unexposed photosensitized materials are perishable and deteriorate with age. Improper storage results in loss of emulsion sensitivity, inferior tone reproduction, increased fog and other defects that may render the material useless. Sensitized material should be stored in a controlled humidity area with 50 percent humidity considered the ideal. Assets and consumption reporting, rapid turnover and careful handling will maximize the usage of this commodity.

e. Storage of Lubricating Oils and Greases. When storing oils and greases, the following precautions should be observed:

(1) Store in fire resistant, sprinklered buildings.

(2) If a general warehouse is used, storage should be in the end zones with immediate access to exterior doors.

(3) Oils and greases should be separated from blocks of other materials by aisles not less than three feet wide.

(4) Oils and greases should be segregated from highly combustible supplies.

(5) Exteriors of containers should be free of oil and grease.

(6) Containers should be inspected before being placed in storage.

f. Storage of Paints. Paints, varnish, lacquers, shellac and thinners, should be stored in a fire resistant storage building where possible. Paints, in general, should be stored in a cool, dry place with

the exception of water emulsion and latex type paints. If a general storage warehouse is used, storage should be in the end zone with immediate access to exterior doors. Containers of paint should be located to facilitate issue on a first in, first out basis.

g. Storage of Cement. Cement should be stored in dry, covered storage areas. The circulation of air should be held to a minimum to reduce the amount of moisture. Cement should be stacked away from walls to avoid condensation or moisture. Cement should be palletized not to exceed four courses high per pallet. Pallet loads should not be stacked more than two high unless storage aids are used to support the weight of super-imposed pallet loads.

h. Storage Life Tables. The storage life, by indicated temperature for dry storage of semi-perishable foods, is based on a constant temperature. Any prolonged temperature change will have a marked effect on the storage life. Temperature averages cannot be used to arrive at a storage life.

14. Physical Environmental Factors.

a. Freezing. Dry products, such as grain, flour, sugar, starch, cereals and dehydrated foods ordinarily are not injured by freezing. If foods containing relatively large amounts of water, such as canned products are frozen, the usefulness and palatability of such products have not been harmed, although the physical appearance may suffer. Emulsions, such as canned cheese, butter, prepared mustard and mayonnaise will be destroyed by freezing, although these items are not spoiled.

b. Heat. A high temperature over long periods of time is detrimental to keeping almost all food products. High storage temperature encourages bacterial growth, mold growth and insect infestation and is particularly dangerous when accompanied by high humidity. Chemical action is accelerated, causing rancidity in many items. The food acids naturally present within the cans are activated which results in pinholding, blackening of the interior and hydrogen swells. High temperature is the chief cause of accelerated spoilage in canned foods and should be controlled when possible, by providing adequate ventilation.

c. Moisture. High humidity is detrimental to stored food in many respects. It accelerates the growth of bacteria and molds, promotes insect infestation and causes mustiness in flour, rice and similar foods. High humidity causes products which readily absorb moisture, such as sugar and salt to cake and become hard. The use of fans with opened doors induces air circulation and provides some reduction to high humidity in storage areas.

d. Light. Damage from light is restricted to products that are packed in glass or transparent containers. Exposure causes color changes and may affect the flavor of foods composed of or containing edible oils and fats.

15. Storage of USDA Donated Foods. Donated foods require segregation from similar purchased (non-donated) foods in accordance with Code of Federal Regulations, 7 Agriculture, Part 250 (revised), Sub-Chapter B. This is accomplished by maintaining the foods on separate pallets. With the use of a stock location identification outlined in paragraph 5 above, each pallet location is distinct from adjoining pallets. Each line item of USDA food is assigned a unique stock number which contributes to the distinction in storage.