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Performance-Oriented Packaging - A Guide to Identifying, Procuring, and Using

Procurement and Use of Packaging Using
HM-181 Regulations

Date Published
July 1994

**United States
Department of Energy**
P.O. Box 550
Richland, Washington 99352

TTP Number: RL439005
Date: September 1994
Revision: 0

Approved for Public Release

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LIST OF TERMS

DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
HMT	Hazardous Material Table
ID	identification
ORM-D	other regulated materials
RQ	regulated quantity
UN	United Nations

**PERFORMANCE-ORIENTED PACKAGING
A GUIDE TO IDENTIFYING, PROCURING, AND USING
Procurement and Use of Packaging Using HM-181 Regulations**

1.0 INTRODUCTION

1.1 PURPOSE

This document guides users through the process of correctly identifying, obtaining, and using performance-oriented packaging as implemented by HM-181 (DOT 1990) and as revised in response to petitions for reconsideration (DOT 1991). Almost all hazardous material shipments can be made in commercially available performance-oriented packagings. To cover the remaining shipments requiring specially designed packaging, a design guide is being developed. The design guide is scheduled to be issued 1 year after this procurement guide.

The U.S. Department of Energy (DOE) Transportation Management Division (DOE EM-51) is supporting the development and issuance of this procurement guide.

1.2 SCOPE

This document addresses procurement of nonbulk packaging used for nonradioactive, hazardous materials that are transported by highway. The basic procedure is the same when making shipments by other modes. However, other sections of the regulations may affect the packaging requirements when shipping by other modes. The variation in requirements is extensive when air transportation is selected. A packaging engineer or transportation specialist should be contacted for guidance when transport is by a mode other than highway.

In this document, the procurement process is divided into five major activities:

1. Identify the material to be shipped
2. Select a packaging
3. Identify requirements needed to describe the packaging in the procurement documentation
4. Verify receipt of the requisitioned packaging and its proper storage
5. Verify proper use of the procured packaging.

To guide document users through the procurement procedure, a check list was developed for each of the activities. The titles of the check lists are as follows:

1. Material Characterization
2. Packaging Selection
3. Packaging Requisition
4. Receiving Inspection and Storage
5. Routine Determination.

The following is a brief overview of the procurement process with the check list associated with the activities identified.

The procurement process starts with identifying the characteristics of the material to be transported. Physical characteristics (solid, liquid, or gas) and chemical characteristics (e.g., corrosivity, flammability, or explosivity) are important in determining the proper packaging. The Material Characterization Check List provides guidance for the identification process and a means of documentation.

Normally, the packaging selection process considers: (1) the amount of material to be transported; (2) the ease of filling, closing, and transporting the package; and (3) the packaging costs. For most hazardous materials, the DOT identifies a set of authorized packagings. If the specific packaging type initially selected is included in the set of authorized packagings, the initial selection is satisfactory. The Packaging Selection Check List uses information on the Material Characterization Check List to identify the packagings authorized by DOT for transport of that specific material.

The DOT uses a graded approach for the required packaging integrity. Materials with higher hazards during transport require stronger packagings. The Packaging Requisition Check List ensures the proper requirements are included in the packaging requisition for each specific type and hazard level. This includes those requirements identified in the DOT regulations for the packaging manufacturer to fulfill. For example, the DOT regulations require that the manufacturer provides all instructions the shipper needs to fill and close the packaging in the same manner as the packagings that passed the required performance tests. The Packaging Requisition Check List ensures that the packaging requisition includes a requirement for the manufacturer to do the following:

1. Furnish this information to the package purchaser
2. Mark the packaging, indicating the level of performance tests successfully passed.

When received, the requisitioned packaging requires inspection, handling, and storage. The receiving inspection is to verify receipt of the requisitioned packaging. The Receiving Inspection and Storage Check List guides the identification of the functional requirements for each packaging component. It then assists in translating those functional requirements into requirements for receiving, inspecting, and handling and storage of the empty, unused packagings.

The Material Characterization Check List, Packaging Selection Check List, Packaging Requisition Check List, and the Receiving Inspection and Storage Check List form a set of material specifications and packaging requirements that ensure the following:

1. The packaging used is authorized for the material described on the Material Characterization Check List.
2. The packaging has successfully passed a stated performance level.
3. The packaging meets DOT design and fabrication standards.
4. The packaging was stored and handled to preclude any degradation to the functional capability of each packaging component.
5. The shipper is furnished with the manufacturer's instructions for properly filling and closing the packaging.

These four check lists cover the scope that the U.S. Nuclear Regulatory Commission calls the "preliminary determination." This includes all requirements necessary for packaging design, fabrication, testing, and availability for filling and closing.

In this document, the final step in the procurement process is when the packaging is used. At that time, a final check is made to verify compliance with packaging requirements. This check verifies the previously described activities and the process of filling and closing the packaging. The Routine Determination Check List provides guidance for verifying those activities.

1.3 APPROACH

This document is based upon the premise that mere compliance is insufficient; compliance must be shown. A common approach (and perhaps the best) for showing compliance is using check lists that are initialed by the performer as specific activities are completed.

This document contains check lists in the Appendix A that cover material characterization, packaging selection, requisitions, receiving inspection, and routine determinations. The check lists in Appendix A should include all packaging requirements for materials with a single hazard class. Appendix B contains a check list that covers shipping papers, emergency response information, and placarding. Appendix C contains several copies of the Packaging Requisition Check List that has been filled out to illustrate the use of that check list. Appendix D contains several filled out copies of the Receiving Inspection and Storage Check List that illustrate the use of that check list. These sample check lists illustrate the requisition requirements for the following:

1. Combination packaging, fiberboard outer packaging, 1-L glass receptacle inner packaging, packing group I
2. Steel box for packing group I

3. Steel drum for liquids, 55 gal, packing group I
4. Steel drum for liquids, 55 gal, packing group II
5. Steel drum for liquids, 55 gal, packing group III
6. Steel drum for solids, 55 gal, packing group I
7. Steel drum for solids, 55 gal, packing group II
8. Steel drum for solids, 55 gal, packing group III.

Note that some shipping requirements for materials with subsidiary hazard classes are not addressed in these check lists. It appeared the added complexity was not warranted.

The check lists in Appendixes A and B may be copied as they appear. After using them long enough to become familiar with them, experienced users may want to eliminate some of the guidance information. This should be a gradual process. Leave enough guidance or requirement statements that the check lists retain their value as documents that verify compliance with regulations.

These check lists are based upon the DOT regulations as revised in December 1991 that were implemented with HM-181 (DOT 1990). The remainder of this document discusses these check lists. The check list subjects and a recommendation for the preparer are listed below.

Check List Subject	Person Filling Out Check List
Material Characterization	Material custodian
Packaging Selection	Package engineer/specialist
Packaging Requisition	Package engineer/specialist
Receiving Inspection and Storage	Package engineer/specialist
Routine Determination	Shipper

Review, sign-off, approval, or other interaction with Quality Assurance, Quality Control, Procurement, Purchasing, Travel, Operations, or other functional groups may be required (as desired by each DOE site) by Site operational manuals.

1.4 DEFINITIONS

The following definitions are used in this document.

Material Custodian--Person assigned responsibility for custody of the material.

Package (or Packaging) Engineer--Person understanding the packaging portions of the transportation regulations and having specialized knowledge about packagings for hazardous materials.

Specialist (or Transportation Specialist)--Person having detailed knowledge about transportation regulations and package selection for hazardous materials.

Shipper--Person signing the shipping papers. The shipper should be knowledgeable of the transportation regulations and of the shipment. By signing the shipping papers, the shipper certifies that the package is properly prepared for shipment.

Manufacturer--Person who certifies that a packaging complies with a United Nations (UN) or DOT standard. This includes a person who applies or directs another to apply a DOT specification marking or a UN marking to a packaging.

1.5 MANUFACTURER'S PACKAGING RESPONSIBILITY

In HM-181 (DOT 1990), DOT assigned some responsibility for packaging integrity to the following:

- The packaging manufacturer
- The shipper
- The packaging manufacturer and the shipper.

Understanding this division of responsibility between manufacturer and shipper is essential in properly buying and using hazardous material packagings. If the manufacturer's responsibility is not clearly understood, the shipper might unknowingly assume some of that responsibility and the associated liability.

In the preamble to the final rulemaking on HM-181 (DOT 1990), the DOT discussed this division of responsibility in some detail. This subject is deemed sufficiently important that DOT's discussion in that preamble (December 21, 1990) is repeated below.

The regulation 49 CFR 178.2 ... "contains requirements for the manufacturer or the subsequent distributor of a packaging to notify in writing each person to whom that packaging is transferred of all part 178 requirements not fully complied with at the time of transfer, and of all actions that need to be taken to bring that package into compliance with part 178. Reliance is placed on a manufacturer's instructions to a shipper for the proper preparation of a package for transport. In accordance with new paragraph (a)(4) in section 173.22, and in section 173.24, the shipper is responsible for making sure that a package is assembled, closed or otherwise prepared for transport in full compliance with the specification or standard under which the packaging was manufactured, including any conditions for use set forth by the manufacturer under the notification provisions of section 178.2(c).

Section 178.2 previously contained a statement that the manufacturer of a packaging should inform each person to whom a packaging is transferred of any specification requirements which have not been met at the time of transfer. By making this a requirement rather than a recommendation in the final rule, RSPA¹ is placing a responsibility on the manufacturer to assist the shipper in assuring compliance.

If the way a shipper assembles a package, fills it with a hazardous material and closes it, does not depart from the manner in which a manufacturer certifies that package for use, the shipper may assume the package is capable of meeting UN standards.

The shipper's actions in preparing a package should not adversely affect the performance capability of that package if it is prepared in accordance with procedures established by the manufacturer (and if those procedures are correct). The shipper cannot alter or amend a package design or specification without assuming full responsibility for doing so. Thus, if a shipper takes it upon himself to introduce any change to a package, he bears responsibility for compliance. RSPA believes the changes adopted in this final rule do not alter basic shipper/manufacturer responsibilities for determining package suitability, which could be defined as follows:

1. The manufacturer designs, constructs, and tests packagings in accordance with part 178 subparts L and M; notifies the shipper of all specification shortfalls in accordance with section 178.2; and performs any section 173.24 or 173.24a functions for which he is assuming responsibility through contractual arrangements with the shipper.
2. The shipper relies on the manufacturer's mark as required in existing section 173.22(a)(i); performs any packaging functions required by sections 173.24, 173.24a and 173.24b for which the shipper is responsible; and fulfills conditions for use prescribed by the manufacturer under section 178.2(c)."

The last 2 paragraphs of the quote describe specific manufacturer and shipper responsibilities. However, those paragraphs rely heavily upon referencing specific sections and paragraphs in the regulations. To better understand what the DOT means, the subjects of references--49 CFR 173.24 and 173.24a--are summarized in Tables 1-1 and 1-2. Table 1-1 discusses the requirements in 49 CFR 173.24. Table 1-2 discusses the requirements in 49 CFR 173.24a. The requirements in 49 CFR 173.24b are not within the scope of this document. In each table, the requirements in each paragraph are summarized. It is noted whether the manufacturer, the shipper, or both are

¹RSPA stands for Research and Special Programs Administration.

Table 1-1. General Requirements for Packagings and Packages
(49 CFR 173.24). (sheet 1 of 2)

Paragraph number	Paragraph topic	Responsible organization
(a)	Applicable to all packagings	Both
(b)(1)	No leakage during transport	Both
(b)(2)	No package degradation during transport	Both
(b)(3)	No unstable gases in package	Shipper
(c)(1)	Packagings authorized only if specified in HMT for the contents	Shipper
(c)(1)	Packaging authorized only if it conforms to parts 178 and 179	Manufacturer
(c)(2)	Packaging is authorized if permitted under, and conforms to provisions in: 171.11 ICAO Instructions 171.12 Import and export instructions 173.3 Manufacturing, packaging, and storage facilities must be open for inspection by DOT 173.4 Exceptions for small quantities 173.5 Agricultural operations 173.7 Permits DOE to use equivalent packagings (does not apply to GOCO) 176.11 Pertains to carriage by vessel	Not in scope Not in scope Both Shipper Not in scope N/A N/A
(d)	Packagings must be capable of meeting standards of parts 178 and 179	Manufacturer
(e)(1)	Shipper must assure compatibility of contents and packaging (corrosivity, permeability, softening, premature aging and embrittlement)	Shipper
(e)(2)	No chemical or galvanic reactions between contents and packagings permitted	Shipper
(e)(3)(i)	Plastics must be compatible with contents	Shipper
(ii)	Plastics used for liquids must be capable of passing compatibility and permeation tests	Shipper

Table 1-1. General Requirements for Packagings and Packages
(49 CFR 173.24). (sheet 2 of 2)

Paragraph number	Paragraph topic	Responsible organization
(e)(4)	Multiple inner packagings with different contents must be precluded from causing dangerous gases, heat, or corrosion	Shipper
(e)(5)	Solid contents which become liquid during transport must be contained	Shipper
(f)(1)	Closures must be properly designed	Manufacturer
(f)(1)	Closures must be properly closed	Shipper
(f)(2)	Closures on specification packagings must conform to specifications	Both
(g)	Package venting is limited	Shipper
(h)	Sufficient ullage must be left in liquid packages	Shipper
(i)	Air transport must meet general requirements	N/A

responsible for compliance with that paragraph. The notation in the tables are based on the regulations as revised December 20, 1991 (DOT 1991).

According to Tables 1-1 and 1-2, the last two paragraphs in the preamble require the manufacturer to comply with the following paragraphs in 49 CFR 173.24(a), (b)(1), (b)(2), (c)(1), (c)(2), (d), (f)(1), and (f)(2). These paragraphs require the manufacturer to ensure the packaging is designed and fabricated so there is no leakage or package degradation during transport and that the packaging meets design, fabrication, and performance standards of 49 CFR 178. The design and fabrication standards for some drums specify materials and minimum wall thicknesses, manufacturing procedures for chimes, and design alternatives for rolling hoops. The performance standards provide specifications for the performance testing.

The manufacturer is expected to comply with 49 CFR 173.24a (a)(1), (a)(2), (a)(3), (a)(4), and (a)(5). This requires the manufacturer to ensure the following:

- Closures are properly designed and conform with any applicable closure specifications
- Closures for inner packagings can be upright
- Friction is not a problem
- Cushioning of inner packaging is properly designed
- Any nails or staples do not protrude into the packaging and that vibration is not a problem.

Table 1-2. Additional General Requirements for Nonbulk Packagings and Packages.

Paragraph number	Paragraph topic	Responsible organization
(a)(1)	Closures must be designed to be upright on inner packagings containing liquid in a combination package	Manufacturer
(a)(1)	Closures must be upright on inner packagings containing liquid in a combination package	Shipper
(a)(2)	Design of outer packaging must preclude friction from altering chemical stability of contents	Manufacturer
(a)(3)	Cushioning for inner packagings of combination packagings must be designed to prevent breakage or leakage of inner packaging	Manufacturer
(a)(3)	Cushioning for inner packagings of combination packagings must be compatible with their contents and installed to prevent their breakage or leakage	Shipper
(a)(4)	Nails, staples, etc., must not protrude into the packaging	Manufacturer
(a)(5)	Packaging must be capable of withstanding vibration test	Manufacturer
(b)(1)	Specific gravity of liquid must not exceed that marked on the packaging	Shipper
(b)(2)	Gross weight must not exceed that marked on the packaging	Shipper
(b)(3)	Gross mass of solid packed in a container for liquid is limited	Shipper
(b)(4)	Vapor pressure of liquids must be limited according to the tested pressure	Shipper
(b)(5)	No hazardous material may remain on the outside of a package after filling	Shipper
(c)	Ability to include multiple inner packagings of different hazardous materials in an outer packaging is limited	Shipper
(d)	Liquids must not completely fill a receptacle at a temperature of 131 °F or less	Shipper

The manufacturer's responsibilities are for the packaging design, fabrication, and testing. Therefore, the Packaging Requisition Check List specifically identifies the manufacturer's responsibilities as stated in Tables 1-1 and 1-2 and ensures they are listed as requirements on the packaging purchase requisition.

The following sections (2.0 through 6.0) describe individual check lists (Material Characterization, Packaging Selection, Packaging Requisition, Receiving Inspection and Storage, and Routine Determination) and provide guidance in completing them. While reading these sections, the applicable check list should be made available for easy reference. Referring to the check list while reading about it should provide a more complete understanding of the process being described.

2.0 MATERIAL CHARACTERIZATION CHECK LIST

This check list (in Appendix A) is intended as a guide to and documentation of the information needed to classify a hazardous material for transport, in accordance with DOT regulations. The material custodian should complete this check list. The package engineer and the transportation specialist use the information to select the packaging (authorized by the DOT for this material). This check list is also used to ensure the packaging is properly marked and labeled.

Completion of this check list is only necessary the first time a specific material is prepared for shipment. All subsequent shipments may reference that initial Materials Characterization Check List. This check list is part of the preliminary determination.

The following discusses the information to be entered in the various sections of the form.

2.1 CHECK LIST IDENTIFICATION

The following instructions are for Section A of the check list.

- Write in today's date.
- Write in the check list identification (ID) number. The check list ID number should be a number or combination of numbers and letters unique to the specific material being characterized.
- Write in the name of the cognizant person. The cognizant person should be someone who can answer questions about the material characterization.
- Write in the phone number and the organization of the cognizant person.

2.2 MATERIAL DESCRIPTION

The DOT requires identification of the proper shipping name. An accurate material description is required to assure selection of the proper shipping name. Identification of the chemical name of the material is an important and often difficult part of the description. The following provides some guidance for selecting the chemical name of the material to be shipped.

Examples of specific chemical names (or technical names) are hydrochloric acid and dichlorodifluoromethane. Examples of generic chemical names are acid

and refrigerant gas. Examples of industrial or commercial names are cleaner and Freon².

When the material being shipped is described by a chemical-like name, it is often a challenge to know how to comply with all transport regulations. Primarily, this is because there are many synonyms for most chemicals. If the material is described by a synonym that is not listed in the DOT Hazardous Materials Table (HMT) (49 CFR 172), the chemical could be shipped as a nonhazardous material even though it actually is listed by DOT under some other name as a hazardous material.

For example, the following are listed as synonyms in a database of hazardous substances:

1. Azide	9. Nci-co6462
2. Azium	10. Nsc 3072
3. Azoture de sodium	11. Smite
4. Hydrazoic acid, sodium salt	12. Sodium azide
5. Kazoe	13. Sodium, azoture de
6. Natriumazid	14. Sodium di azoturo
7. Natriummazide	15. U-3886.
8. Nemazyd	

Only one of these names is listed in the HMT; "sodium azide" is listed with Hazard Class 6.1, packing group II, UN-1687, and labeled poison. None of the other names even reference sodium azide. A material described as "smite" would be shipped as a nonhazardous material unless the toxic nature of the material was recognized, and it was shipped as "Poisonous solids, n.o.s." Hazard Class 6.1, and UN-2811. Its toxic nature would have to be adequately known to assign it the correct packing group.

Even if "smite" were shipped as a hazardous material, the emergency responders would have to use a synonym cross-reference in their database to determine what precautions they needed to take in handling any emergency. Thus, the material description should include as many names and synonyms as are known so the material can be identified as precisely as possible.

Another example of synonyms involves freon. Freon, a commercial name for refrigerant gas, is not listed in the HMT (49 CFR 172). Refrigerant gas, n.o.s. is listed as nonflammable gas with UN-1078. There are 16 different refrigerant gases listed in the HMT. Each is listed with a different UN number for identification by emergency responders. There is no way for an emergency responder to use a cross reference in a database to determine the precise material being shipped. This is one reason DOT requires the proper shipping name to be as specific as possible. Thus, the material "dichlorodifluoromethane" should be shipped with that as the proper shipping name instead the more generic "Refrigerant gas, n.o.s." Choosing the correct proper shipping name is more likely if the material description includes as many names and synonyms as possible.

²A trademark of E. I. duPont de Nemours and Company.

The following are instructions for filling out Section B of the check list.

- Under package contents, fill in the name that the material custodian normally uses when referring to this material.
- Check the proper blank to indicate what physical form the material will have when it is being transported (solid, liquid, gas, other).
- If the material will be shipped as a liquid, list the specific gravity and vapor pressure.
- Write in the specific chemical name (technical name) of the material. The specific chemical name (technical name) is the recognized chemical name currently used in scientific or technical handbooks, journals and texts (49 CFR 171.8).
- Write in the generic chemical name.
- Write in the industrial or commercial name.
- Write in all known synonyms.
- Write in "yes" or "no" to the question about whether or not the material is a waste.

2.3 MATERIAL CHARACTERISTICS

The transportation specialist uses this information to determine how the material is to be transported. These characteristics determine the following:

1. Correct packaging for the material
2. What performance tests the packaging must withstand
3. How the packaging is labeled
4. How the packaging should be marked.

Thus, some time and effort are warranted to have this information correct and complete. Additional sheets of paper should be used, if appropriate.

The following instructions are for Section C of the check list.

- Check the characteristics that apply to the material (flammability, toxicity, chemical instability, corrosivity, explosivity).
- If the material is flammable or combustible, write the flashpoint of the material.
- If the material is toxic, write the LD-50 value, if known.
- If the material would melt, sublime, solidify, or otherwise change phase because of temperature or pressure changes that might occur during transport (i.e., chemical instability), include that

information. If any potential phase change is accompanied by a sudden release of heat or energy, inform the transportation specialist of this explosivity characteristic.

- If the material is corrosive toward skin, metal, plastic, or other material, include the degree of corrosivity and the materials that are attacked.
- If the material has any other properties that might make it unpleasant or dangerous for the workers during transport, provide that information.
- Contact the transportation specialist about any unusual circumstances or questions about describing the materials characteristics. Contact the transportation specialist if the material has any tendencies toward flammability, toxicity, chemical instability, corrosivity, explosivity, or any other unpleasant or unusual characteristic.

2.4 CHEMICAL COMPATIBILITY

The following are common packaging components:

• Steel	• Aluminum
• Other metals	• Wood
• Plywood	• Fiberboard
• Polyvinyl chloride
and other plastics	• Glass
• Polyethylene	• Stoneware
	• Porcelain.

Elastomers, rubber, and various gasket materials are used for seals and gaskets. Thus, these and other less common materials may come into contact with hazardous materials during transport. The material custodian may need to discuss this with the packaging engineer or transportation specialist before completing Section D of the check list.

The chemical compatibility of materials is sometimes very sensitive to low concentrations of impurities. In these instances, the custodian of these materials will generally be better informed about chemical compatibilities than any one else. Therefore, this information must be conveyed to the packaging engineer or transportation specialist.

In Section D of the check list, describe any chemical incompatibilities that are known, suspected, or questionable. If experience has shown specific materials are definitely compatible, include that information.

If the material custodian is uncertain about how to complete Section D of this check list, communicate directly with the packaging engineer or transportation specialist.

3.0 PACKAGING SELECTION CHECK LIST

This check list (in Appendix A) is a guide to and documentation of the information needed to select a package for a hazardous material in compliance with the DOT regulations. A package engineer or a transportation specialist should fill out this check list. Information from the Material Characterization Check List is used during the completion of this check list to identify all applicable hazard classes for the material to be shipped. Thus, the Packaging Selection Check List ensures subsidiary hazard classes are considered in selecting the packaging. Finally, the Packaging Selection Check List requires consideration of any special packaging provisions identified in column 7 of the HMT.

Completion of the Packaging Selection Check List is only necessary the first time a specific material is shipped. Subsequent shipments made in the same packaging may reference that initial Packaging Selection Check List. This check list is part of the preliminary determination.

The following discusses the information to be entered in the various sections of the form.

3.1 CHECK LIST IDENTIFICATION

The following are instructions for filling out Section A of the check list.

- Write in today's date.
- Write in the check list ID number. The check list ID number should be a number or combination of numbers and letters unique to the specific material being characterized.
- Write in the name of the cognizant person. The cognizant person should be someone who can answer questions about the package selection.
- Write in the phone number and the organization of the cognizant person.

3.2 MATERIALS IDENTIFICATION

The following are instructions for filling out Section B of the check list.

- On the line for package contents, fill in the common name of the material being shipped.
- Put a check in the blank next to the physical form the material will have during transport. This information should be the same as that on the referenced Material Characterization Check List (Section B).

- Write in the date and number of the Material Characterization Check List that describes the material to be transported in the packaging being selected.

3.3 HAZARD CLASS

Section C cites the references in 49 CFR 173 for the hazard class and packing group definitions. The information from the Materials Characterization Check List is used in conjunction with the references to determine which hazard class definitions are met.

The following are instructions for filling out Section C of the check list.

- Use the information on the Material Characterization Check List along with 49 CFR 173 to determine which hazard class definitions the material meets. NOTE: The material may meet more than one definition. For example, it could be a flammable solid (Hazard Class 4.1) if it meets the definition in 49 CFR 173.124 and also a poisonous material (Hazard Class 6.1) if it also meets the definition in 49 CFR 173.132. In this example, list both 4.1 and 6.1 as the hazard classes that the material meets. When selecting a packaging, be sure to list all hazard classes whose definitions were met. Identify the hazard class the material meets in the spaces provided.
- Determine if the material, or one of its synonyms, is listed in the HMT appendix, 49 CFR 172.101 Appendix. Write down the information listed in the space provided.
 - If the material is listed in this appendix, it is regulated by the U.S. Environmental Protection Agency as a hazardous substance under Section 101(14) of the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA).
 - If more than a "regulated quantity" (RQ) is being shipped in a single package, it must be packaged as a hazardous material and comply with the DOT regulations.
- List the appropriate RQ value in the space provided.
- Check on the Material Characterization Check List if the material is to be transported as a hazardous waste.
- Write down the correct hazard class for the material to be shipped. The correct hazard class should be determined in accordance with 49 CFR 173.2a and 172.101(c)(12)(iii).

3.4 PACKING GROUP

Section D of the check list provides for identification of the correct packing group for Hazard Classes 3, 4.1, 4.2, 4.3, 5.1, 5.2, cited 6.1, 6.2, 8, 9, and for other regulated materials (ORM-D). The definitions cited in Section C of the check list are used to make these determinations. **NOTE:** If the material is a hazardous waste or hazardous substance (determined in Section C), the requirements in 49 CFR 172.101(f) must also be met.

The following instructions are for Section D of the check list.

- Write in the assigned packing group.

3.5 PROPER SHIPPING NAME

Section E of the check list provides space for identifying the proper shipping name using the requirements in 49 CFR 172.101(b) and 172.101(c).

The following instructions are for Section E of the check list.

- Using information from Section C, select the proper shipping name from the HMT.
 - List the name in the space provided in the check list.
- NOTE:** Proper shipping names are listed in Roman type in the HMT.

Materials that: (1) do not meet any definition of hazard class, (2) are listed in the HMT appendix, and (3) are to be shipped in packages containing more than an RQ per package must be classed as Class 9 and must be assigned one of the following HMT proper shipping names:

- Environmentally hazardous substances, liquid, n.o.s.
- Environmentally hazardous substances, solid, n.o.s.
- Other regulated substances, liquid, n.o.s.
- Other regulated substances, solid, n.o.s.

Materials that do not meet any definition of hazard class but do qualify as hazardous waste must be categorized as Class 9 and assigned one of the following HMT proper shipping names:

- Waste environmentally hazardous substances, liquid, n.o.s.
- Waste environmentally hazardous substances, solid, n.o.s.
- Hazardous waste, liquid, n.o.s.
- Hazardous waste, solid, n.o.s.

3.6 AUTHORIZED PACKAGINGS

Section F provides space for identifying the section number of 49 CFR 173 describing the authorized nonbulk packagings. This information is found in HMT column 8B associated with the correct proper shipping name, hazard class and division, and packing group.

The following instructions are for Section F of the check list.

- Write in the paragraph number from column 8B of the HMT.

3.7 PACKAGING SELECTED

Packaging selection may be a repetitive process.

- Review the authorized packagings listed in the paragraph of 49 CFR 173 identified in Section F and tentatively select a packaging. A tentative selection from the authorized list would be based upon quantity to be transported, ease of use, packaging cost, packaging availability, and other relevant factors. NOTE: If the tentative selection is not disqualified by the special provisions in column 7 of the HMT, the tentative selection could become the final selection. The selected packaging should be identified using nomenclature specific to 49 CFR.

The following are instructions for filling out Section G of the check list.

- In the first space, list the package type (e.g., steel drum).
- If combination packaging (e.g., a glass bottle inside a fiberboard box) is selected, list both the inner and outer packaging types in the space provided.
- Identify the packaging identification code (e.g., for a steel drum the code would be 1A1). The code rules are described in 49 CFR 178.502.
- Identify the packaging marking required by 49 CFR 178.503 in the space provided (e.g., for a steel drum the marking would be /Y400/S or /X1.4/150). These markings identify packaging performance test requirements and capacity limits.
- Identify any special provisions that start with the letter "N" (for nonbulk packagings) or start with a number (for multimodal). There are no special provisions specifically for the highway transportation mode.

NOTE: Column 7 of the HMT lists special provisions (additional packaging requirements) for certain materials being shipped. Some of these special provisions are applicable only to bulk packagings. Others apply to packages shipped by a specific mode of transportation, such as air. The special provisions in each category are identified by a unique prefix. Because the scope of this document includes only nonbulk packagings being transported by highway only, the special provisions applicable to those categories need to be identified on the check list.

- If all of the special provisions identified were met by the package selected, write "yes." If not, write "no," and explain why.
- If the packaging authorized for this material was relatively economical write "yes." If not, write "no."
- If the packaging was easy to use, write "yes." If not, write "no."

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4.0 PACKAGING REQUISITION CHECK LIST

This check list (in Appendix A) is a guide to and documentation of the information needed to procure a hazardous material packaging in compliance with DOT regulations. This check list should be filled out by a packaging engineer or transportation specialist. This check list compiles the information needed to ensure all appropriate requirements are included in the packaging requisition. The requirements that result from this check list should be incorporated into procedures for purchasing packagings.

Completion of this check list is only necessary the first time a specific packaging design is requisitioned. This check list is part of the preliminary determination.

4.1 CHECK LIST IDENTIFICATION

The following are instructions for filling out Section A of the check list.

- Write in today's date.
- Write in the check list ID number. The check list ID number should be a number or combination of numbers and letters unique to the specific packaging code, packaging size, and packing group (e.g., 1A1-55-II) being described in this check list.
- Write in the name of the cognizant person. The cognizant person should be someone who can answer questions about the packaging requisition requirements.
- Write in the phone number and the organization of the cognizant person.

4.2 PACKAGE DESCRIPTION

Section B of the check list describes, using DOT terminology, the package being requisitioned. The following are instructions for filling out Section B of the check list.

- Fill in the blanks in Section B with the information listed in Section G of the applicable Packaging Selection Check List.

4.3 U.S. DEPARTMENT OF TRANSPORTATION DESIGN AND FABRICATION STANDARDS

Section C lists the citations for the DOT design and fabrication standards. For example, 49 CFR 178.504 specifies minimum drum wall thickness, and the required design features for rolling hoops and chimes. This section of the check list is intended to ensure that the requisition requirements cite

the appropriate design and fabrication standard for compliance. Identification of the applicable references is made in Section D of this check list.

4.4 REQUISITION REQUIREMENTS

Section D establishes the requirements to be included in the requisition for a specific packaging type. The following are instructions for filling out Section D of the check list.

- In part 1, describe the packaging and its size. This description should be one of the 21 packagings listed in Section G of the Packaging Selection Check List.
- In part 2, if the material is a liquid, list the specific gravity and vapor pressure. Information about the physical characteristic of the material to be shipped is requested. This is because the performance testing requirements for a packaging to ship liquid depend upon the specific gravity of the liquid (see 178.603(e)(2)) and the vapor pressure of the liquid (see 178.605(d)). Therefore, the requisition requirements must include information on these two liquid characteristics for liquid packagings.
- In part 2, if the material is a solid, list the maximum weight of the contents. The maximum weight of solid material must be known to be shipped in a package to properly test that packaging.
- In part 2, list the packing group that the packaging is required to meet.

NOTE: If more than one liquid or more than one solid material might be shipped from a site using the same packaging type, it may be economical to specify upper limits for the appropriate characteristics. This would permit various hazardous liquid materials to be shipped in one packaging type, provided the specific gravity and vapor pressure were below those values. The maximum values could be specified on the requisition requirement document. This would permit all those liquid materials to be shipped in identical packagings (if there are no compatibility problems). This would minimize packaging inventory in the warehouse. However, if the upper limit for either specific gravity or vapor pressure is too high, the purchase price on the packaging may be excessive. Therefore, communicate with the potential packaging suppliers or manufacturers. The goal is to see what upper limits on specific gravity or vapor pressure they can routinely accommodate with no cost penalty. These would then be the values to specify on the requisition requirements document for a generic packaging, such as steel drums.

A similar consideration is applicable to the specification of packing group. If you have some hazardous material requiring various packing groups including packing group I for a certain packaging type, communicate with package suppliers or manufacturers to determine the cost

premium to obtain all needed packagings of that type qualified for packing group I.

Specific packaging needs of each site and the cost penalty associated with purchasing and using some overqualified packagings is worth investigating.

- Part 3 identifies a statutory requirement that the manufacture mark the package in compliance with 49 CFR 178.503.
- Part 4 identifies the need for requiring the manufacture to supply information about the materials that may come into contact with the package contents during transport. This information is needed by the shipper to ensure chemical compatibility of these materials. The only source for this information is the packaging manufacturer. Thus, obtaining information about materials that may come into contact with packaging contents during transport must be identified as a requirement in the requisition.
- Part 5, item 1, record the appropriate information from Section C of this check list.
- The responsibilities in part 5 are assigned to the manufacturer by DOT. (See Section 1.4 of this document for a discussion of that assignment.) These requirements must be specifically called to the attention of the manufacturer, through requisition and purchase orders, to document that the shipper expects the manufacturer to accept the assigned responsibility. In part 5, item 3 is particularly important. This requires the manufacturer to furnish the package user with any instructions needed to ensure the package can be filled and closed in the same manner as the package that the manufacturer tested.
- In part 6, list any packaging requirements that are a result of the users needs. Include requirements such as any dimensional constraints, paint color, special instructions for delivery or dual marking of packagings (i.e., both DOT 17C and UN 1A2 or 4G/Y 26/S and DOT 12B-65).

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5.0 RECEIVING INSPECTION AND STORAGE CHECK LIST

This check list (in Appendix A) is a guide to and documentation of the information needed to receive and store hazardous material packagings. This check list does the following:

- Identifies the packaging features important to containment for a specific packaging design.
- Identifies the required activities during receiving inspection, storage, and handling of the empty packaging
- Identifies the requirements needed to develop the applicable operating procedures for receiving inspection, storage, and handling of the empty packaging.

A packaging engineer (or a transportation specialist) should complete this check list.

This check list is filled out only the first time a specific packaging design is requisitioned. Subsequent requisitions may use the information on the initial check list. This check list is part of the preliminary determination.

5.1 CHECK LIST IDENTIFICATION

The following are instructions for filling out Section A of the check list.

- Write in today's date.
- Write in the check list ID number. The check list ID number should be a number or combination of numbers and letters unique to the specific package type being described.
- Write in the name of the cognizant person. The cognizant person should be someone who can answer questions about the packaging requisition requirements.
- Write in the phone number and the organization of the cognizant person.

5.2 PACKAGE DESCRIPTION

Section B of the check list describes the package being requisitioned, using DOT terminology. The combination of packaging type, ID code, package marking, and descriptions of the outer and inner packagings of a combination packaging, make up a unique package type. When one of these packaging characteristics changes, a different Receiving Inspection and Storage Check

List is required. The following are instructions for filling out Section B of the check list.

- Fill in the packaging type, ID code, outer and inner packaging, if required, and required markings. This information is listed in Section G of the applicable Packaging Selection Check List.

5.3 FUNCTIONAL REQUIREMENTS OF PACKAGING COMPONENTS

A packaging engineer or transportation person specializing in packaging should fill out this section. The goal of this section is to define the containment boundary, identify the components that make up that containment boundary, and then to identify the requirements that are necessary to ensure those components perform adequately. This information is used when identifying receiving inspection requirements. The following are examples of that identification process.

Example 1. In a combination packaging consisting of a fiberboard box with an inner glass bottle, the bottle, the cap, and the cap gasket are the containment boundary. The box and cushioning material are, primarily, to divert high loads from the closed bottle during normal and off-normal transport.

Example 2. The drum, lid, and lid gasket provide the containment boundary for a removable head drum. The closure ring, the lugs on the closure ring, and the bolt apply forces to the gasket to cause the gasket to seal.

The following are instructions for filling out Section C of the check list.

- Identify the containment boundary and the specific packaging components that make up that containment boundary. Determine the function the components have in maintaining confinement during both normal and offnormal conditions. Write this information in the space provided.
- Determine what function, if any, all other packaging components have in maintaining the integrity of that containment boundary during both normal and off-normal transport conditions. Write this information in the space provided.

5.4 RECEIVING INSPECTION REQUIREMENTS

Section D identifies receiving inspection requirements for this package type. These inspection requirements come from the following:

1. Requirements identified in the packaging requisition
2. Functional requirements identified in the previous section of the check list (Section C).

These requirements should be incorporated into the site receiving inspection procedures.

Requirements 1 through 6 are from the packaging requisition check list. Immediately following those six requirements is a place to list additional requirements, important to containment, that come from the functional requirements identified in Section C of the check list.

Example 1. In the fiberboard box and a glass bottle example mentioned in Section 5.3, the bottle, lid, and gasket provide the containment boundary.

The sealing surface of the glass bottle is the most critical item in the containment boundary and requires the most inspectional rigor. Therefore, the most rigorous inspection is appropriate for the bottle and gasket.

A large number of 1-L glass bottles in fiberboard boxes are transported successfully each year. A minority of these shipments include hazardous materials. The total experience strongly suggests this packaging configuration has performed very well in the past. The majority of those shipments was with 2, 4, 6, or 8 glass containers in a box. This configuration is for a single glass container inside a fiberboard box. History indicates this is a very low risk shipment using the standards for commercial nonhazardous shipments. In addition, the functional requirements of the previous section of the check list (Section C) requires the manufacturer to certify this package configuration has passed the DOT performance-based set of tests. This requires a significantly stronger fiberboard box with interior cushioning. Thus, only a visual inspection of the sealing surfaces on the gasket, the bottle for nicks and rough areas, and visual inspection of all other components for obvious damage is required.

Example 2. In the drum example mentioned in Section 5.3, the removable head drum (1A2), lid, and lid gasket provide the containment boundary. Thus, the receiving inspection should include the following:

1. A visual inspection of the drum and lid for damage
2. A visual inspection of the sealing surfaces on the drum and gasket for nicks and rough spots.

The closure ring, closure ring lugs, and closure bolt are required to provide the forces on the gasket to retain the seal on the drum. If one of these components fails, the containment boundary is breached. Also, these components do not have an outer packaging to mitigate any localized forces during transport. Thus, the receiving inspection should also include the following:

3. A visual inspection of the closure ring, closure ring lugs, and bolt for damage
4. A visual inspection of the joint between the closure ring and the closure ring lugs for good workmanship.

The sample size to be inspected must be determined locally. The factors considered in making that determination include the size of the purchase order; the size of the DOE site; the degree of involvement of a quality assurance organization in the inspection; the potential degree of hazard from the material to be shipped in the packaging, and other similar factors.

If minor flaws, damage, or poor workmanship are found, the manufacturer of that packaging should be contacted to determine the disposition of that packaging. This is because the manufacturer is responsible for the integrity of the packaging. Any decision regarding the packaging integrity should be made by the manufacturer (see Section 1.4). Pictures of flaws, damage, or poor workmanship might be helpful in the initial communication with the manufacturer.

The following are instructions for filling out Section D of this check list.

- In requirement 1, write the citation for the applicable DOT design and fabrication standard.
- In requirement 7, write the receiving inspection requirements (see examples 1 and 2). The requirements in part 7 are developed from the functional requirements listed in Section C of this check list. (See Appendix D for examples.)
- In requirement 7, list any site-specific requirements for the receiving inspection. Those receiving inspection requirements are developed from the packaging requirements listed in the Packaging Requisition Check List, Section 4.4, paragraph 6.
- Incorporate the requirements identified in this section into the receiving inspection procedures.
- In requirement 8, identify the documentation to be used to ensure those requirements that are important to containment and the package safety are met.

5.5 STORAGE AND HANDLING

Section E identifies requirements for storage and handling of this packaging type. These requirements are derived from the functional requirements identified in Section C of this check list. The following are examples of the identification of storage and handling requirements.

Example 1. In the fiberboard box and glass bottle example in Section 5.3, the fiberboard box material is required to be kept dry. The function of the box is to withstand forces incurred during handling and transport and to prevent those forces from being imposed on the glass bottle. If the box is wetted, it loses strength that it does not regain when it dries. Thus, it must be kept dry.

The cushioning material in this packaging configuration is often fiberboard. The function of the cushioning material is to withstand impact forces and prevent those forces from being imposed on the bottle. Thus, the cushioning material must be kept dry.

The function of the absorbent material is to absorb any liquid from the bottle resulting from either leakage or breakage. It must be dry to perform this function.

The function of the bottles and lids is to provide the containment boundary. Any dirt in the bottles or lids could prevent a leak-tight seal. Therefore, the bottles and lids must be kept clean during storage and handling.

Example 2. In the drum example in Section 5.3, the function of the drum, lid, closure ring, and closure ring lugs and bolt are to withstand the forces applied during transport. Steel is not degraded by water unless it rusts. The lid gasket is not affected by water. Therefore, it is not required that this packaging remain dry. However, it is a requirement during storage and handling that rusting of these components be prevented.

The function of the lid gasket is to seal the drum. To do this, it must be smooth and mate with a smooth surface. Any dirt or dust that accumulates on the lid gasket or the sealing surface of the drum detracts from the sealing capability of the drum. Therefore, the drum lid should be secured to the drum by the closure ring during storage and handling. However, the bolt on the closure ring should not be fully tightened because that might cause a permanent deformation in the lid gasket. Therefore, the closure ring should only be tightened lightly.

The following are instructions for filling out Section E of the check list.

- List any additional requirements that are important to containment. The requirements identified in this section should be incorporated into the receiving inspection or other appropriate procedures for that packaging.
- Identify the documentation to be used that ensures those requirements, important to containment and package safety, are met.

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6.0 ROUTINE DETERMINATION CHECK LIST

This check list (in Appendix A) is a guide to and documentation of the proper selection and use of a hazardous material packaging in compliance with the DOT regulations. This check list is the master check list for a specific shipment of material. This check list is completed by the shipper for each shipment to verify the proper packaging was provided and used. It uses information from other check lists. For example, the proper shipping name, hazard class and division, packing group, and packaging type were determined using information from the Packaging Selection Check List. Thus, places are reserved on this check list to reference other applicable check lists. This ensures, by reference, that the preliminary determination is completed for every shipment. Completion of this check list will ensure that the proper packaging was procured for the shipment and that it was properly prepared for shipment. This check list ensures the final determination of proper packaging.

The routine determination part of this check list ensures the following:

1. The packaging is not overloaded.
2. The contents are compatible with the packaging.
3. All packaging and manufacturer's instructions for filling and closing the packaging are followed.
4. The package is properly marked.
5. The package is properly labeled.

6.1 CHECK LIST IDENTIFICATION

The following are instructions for filling out Section A of the check list.

- Write in today's date.
- Write in the check list ID number. The check list ID number should be a number or combination of numbers and letters unique to this shipment.
- Write in the name of the cognizant person. The cognizant person should be someone who can answer questions about the packaging requisition requirements.
- Write in the phone number and the organization of the cognizant person.

6.2 PACKAGE INFORMATION

The following are instructions for filling out Section B of the check list.

- Write in the package contents and physical form with information from the Material Characterization Check List.
- Use the Packaging Selection Check List to fill in the blanks for hazard class and division, packing group, proper shipping name, package type, and marking.
- Write the shipment date, shipment ID number, and consignee.
- List the names (with first and middle initials) and organizations of the individuals completing this check list.

The information on shipment date, shipment ID number, and consignee is requested because it is useful in developing summary reports of shipping activities. However, if the information is not of use at a particular DOE site, delete it from the form. If other information would be of use at a specific DOE site, a request for that information could be added, by that site, in this section.

6.3 SUPPORTING DOCUMENTATION

The following are instructions for completing Section C of the check list.

- Write the date and ID number of the other four check lists that make up the preliminary determination for this packaging type and the contents of this shipment.
- Write the date and ID number of the receiving inspection report. The person who received the package should report the results of the inspection in a written report.

Preliminary determination check lists only have to be completed once for each packaging type and material because of their subject matter. Including all verification information contained on those check lists in the check list for each shipment would be very inefficient. However, by references in this section, the preliminary determination check lists are made part of this check list.

6.4 MATERIAL AMOUNT

Section D of the check list ensures the amount of material put into the packaging is authorized for that packaging. This section also checks that the specific gravity and vapor pressure of the material are suitable for the

packaging used. Finally, this section ensures that whenever solid material is shipped in a packaging marked for a liquid, the packaging is not overfilled.

The following are instructions for filling out Section D of the check list.

- After question 1, write the amount of material being shipped in this package (e.g., number of kilograms for a solid, number of liters for a liquid).
- If there is more than one package of this type in the shipment, list the actual maximum amount in the most highly loaded package. This information is unique to each shipment and must be obtained from the records for that specific shipment.
- After question 2, write the authorized amount for this packaging type from the shipping records for the specific shipment. This information is included in the marking on the packaging used.
- In question 3, determine whether a liquid having too high a specific gravity is being shipped in a packaging by comparing the specific gravity of the material on the Material Characterization Check List with the information on the package marking.
- In question 4, determine whether too large an amount of solid is being shipped in a packaging tested and marked for a liquid.
 - Compare the maximum net weight per package with the weight of the authorized volume of liquid.
 - Calculate the authorized liquid weight. This can be calculated by only knowing the authorized specific gravity and the authorized volume. The authorized specific gravity is included in the package marking. The authorized volume is in the applicable section of the regulations 49 CFR 178.504 through 178.523.
- In question 5, determine if a liquid having too high a vapor pressure is being shipped in a packaging.
 - Compare the vapor pressure for the liquid listed on the Material Characterization Check List with the vapor pressure inferred by the hydrostatic test pressure used. The relationship between the inferred vapor pressure and the hydrostatic test pressure is in 49 CFR 178.605(d).
- In question 6, state if the package is within authorized limits. This question is basically a summary of the results of the previous five questions.

6.5 MATERIAL COMPATIBILITY

Section E ensures compatibility of the material and packagings for single or composite packagings and for multiple inner packagings of different hazardous materials in an outer packaging.

The following instructions are for filling out Section E of the check list.

- In part 1, write the packaging components (generally, the components that form the containment boundary) that may come into contact with the package contents.
- List the material used to make the packaging components.
- If the component is compatible, write "yes." If not, write "no."
- List the basis for the previous answer. In general, the basis will be previous operating or shipping experience. If the basis is not experience, list the documentation that provides the basis.
- In part 2, list the materials identified on the Material Characterization Check List as incompatible with the material being shipped.
- In part 3, summarize the information in paragraphs 1 and 2 with a "yes" or a "no."
- For part 4, provide an assessment of the volatility and chemical stability of the package contents. An assessment from the material custodian, based upon experience, or a materials specialist, based upon technical factors is recommended. Part 4 ensures the requirements of 49 CFR 173.24(b)(3) are met.
- Indicate the source of this assessment.
- For part 5, provide an assessment of the chemical stability of the package contents. An assessment from the material custodian, based upon experience, or a materials specialist, based upon technical factors is recommended. This part provides space to ensure the requirements of 49 CFR 173.24(e)(2) are met.
- Indicate the source of this assessment.
- In part 6, provide an assessment of the chemical compatibility of the package's contents with the plastic packaging component (49 CFR 173.24(e)(3)(i)). An assessment from the material custodian, based upon experience, or a materials specialist, based upon technical factors is recommended. The text of 49 CFR 173.24(e)(3)(i) specifically requires that "...plastic used in packagings and receptacles must be of a type compatible with the lading and may not be permeable to an extent that a hazardous

condition is likely to occur during transportation, handling or refilling." This requirement applies to both solids and liquids.

- Indicate the source of this assessment.
- In part 7, provide an assessment of the ability of the plastic packaging to withstand the test procedure, in Appendix B of 49 CFR 173. An assessment from the material custodian, based upon experience, or a materials specialist, based upon technical factors is recommended. The text in 49 CFR 173.24(e)(3)(ii) provides additional requirements for plastic packaging using liquids. This regulation says "Each plastic packaging or receptacle which is used for liquid hazardous materials must be capable of withstanding without failure the procedure specified in Appendix B of ..." 49 CFR 173. Note that the test must be actually performed on plastic packaging or receptacle used for packing group I materials.
- Indicate the source of this assessment in the space provided. For packaging group I materials, list the citation for the test report documentation.
- In part 8, provide an assessment of the chemical venting characteristics of the package and its contents (49 CFR 173.24(g)). An assessment from the material custodian, based upon experience, or a materials specialist, based upon technical factors is recommended.
- Indicate the source of this assessment.
- In part 9, find out if the packaging complies with 49 CFR 173.24(e)(4), which prohibits the packing or mixing hazardous materials together in the same outer packaging if those materials are capable of reacting dangerously with each other. This assessment is best provided by the material custodian, based upon experience, or a materials specialist, based upon technical factors.
- Indicate the source of this assessment in the space indicated.
- In part 10, provide an assessment of the packaging's compliance with 49 CFR 173.24(e)(5), which requires that the packaging is capable of containing the liquid phase of any material being shipped as a solid that may become liquid during transport. This assessment is best provided by the packaging engineer or a transportation specialist, based upon the package design.
- Indicate the source of this assessment.

6.6 FILLING AND CLOSING

Section 4.0 of this document indicates the responsibility for package performance is shared by the shipper and the manufacturer. The shipper must fill, close, and prepare the package for shipment in the same way as was done for the performance tests. The DOT regulations require the manufacturer to

furnish the necessary instructions so the shipper can perform this function properly. Section F of the check list ensures that those instructions were received by the shipper and were followed. In addition, the DOT regulations have some requirements for filling and closing a packaging. This section also ensures that these are met.

The following instructions are for filling out Section F of the check list.

- Write the instructions received from the packaging manufacturer for filling and closing the packaging into the space provided, if possible, and initial each step as it is completed.
- Attach instructions that are too long for the space provided to this check list. Note that they are attached.
- On the attached page(s), indicate those pages are attachments to this check list; write the check list ID number on the attached pages.
- Initial each step as it is completed.
- In part 2 (which is optional), list any additional routine determination requirements. These requirements could be any site-specific requirements. An example is having the package inspected immediately before closing by a company inspector or Quality Assurance individual.
- In part 3, list the citation of the written procedures that require leaving sufficient ullage in liquid packages to comply with 49 CFR 173.24(h).
- In part 4, list the citation of the written procedures that require installing inner liquid packages in a combination package in an upright orientation to comply with 49 CFR 173.24a(a)(1).
- In part 5, list the citation of the written procedures that ensure cushioning material is properly installed in combination packages to comply with 49 CFR 173.24a(a)(3).
- In part 6, list the procedure citation requiring inspection of a package after filling and closing to ensure that there is no hazardous material on the outside of the package in compliance with 49 CFR 173.24a(b)(5).
- In part 7, list the citation for the written procedures used for filling and closing this package type.
- In part 8, summarize the results of the previous seven paragraphs. This summary certifies that all filling and closing requirements were met. Also, list the name of the individual answering this question.

6.7 PACKAGE MARKING AND LABELING

Section G of the check list lists the requirements for package marking and labeling. There are a few additional requirements for special situations, such as a material with multiple hazards. Blank spaces are left on the check list to document meeting those requirements.

The individual completing a requirement or attesting to its completion initials the appropriate blank space to indicate compliance with the regulation.

6.8 SHIPPING LOGISTICS

The requirements for completing shipping papers, providing emergency response information, and vehicle placarding are not part of packaging usage. Therefore, those subjects are not discussed here. However, a check list similar to those discussed above is included in Appendix B.

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7.0 REFERENCES

Comprehensive Environmental, Response, Compensation, and Liability Act of 1980, as amended, 42 USC 7401 et seq.

7.1 CODE OF FEDERAL REGULATIONS

- 49 CFR 171, "General Information, Regulations, and Definitions," Title 49, *Code of Federal Regulations*, Part 171, U.S. Department of Transportation, Washington, D.C.
- 49 CFR 172, "Hazardous Materials Tables, Hazardous Materials Communications Requirements and Emergency Response Information Requirements," Title 49, *Code of Federal Regulations*, Part 172, U.S. Department of Transportation, Washington, D.C.
- 49 CFR 173, "Shippers--General Requirements for Shipments and Packagings," Title 49, *Code of Federal Regulations*, Part 173, U.S. Department of Transportation, Washington, D.C.
- 49 CFR 174, "Carriage by Rail," Title 49, *Code of Federal Regulations*, Part 174, U.S. Department of Transportation, Washington, D.C.
- 49 CFR 175, "Carriage by Aircraft," Title 49, *Code of Federal Regulations*, Part 175, U.S. Department of Transportation, Washington, D.C.
- 49 CFR 176, "Carriage by Vessel," Title 49, *Code of Federal Regulations*, Part 176, U.S. Department of Transportation, Washington, D.C.
- 49 CFR 177, "Carriage by Public Highway," Title 49, *Code of Federal Regulations*, Part 177, U.S. Department of Transportation, Washington, D.C.
- 49 CFR 178, "Shipping Container Specifications," Title 49, *Code of Federal Regulations*, Part 178, U.S. Department of Transportation, Washington, D.C.
- 49 CFR 179, "Specifications for Tank Cars," Title 49, *Code of Federal Regulations*, Part 179, U.S. Department of Transportation, Washington, D.C.

The CFRs, which were published in October 1, 1991, contain all applicable regulations implemented with HM-181A.

7.2 FEDERAL REGISTER

- DOT, 1990, "Performance-Oriented Packaging Standards; Changes to Classification, Hazard Communication, Packaging and Handling Requirements Based on UN Standards and Agency Initiative," *Federal Register*, Vol. 55, No. 246, pp. 52402 - 52729, U.S. Department of Transportation, Washington, D.C.

DOT, 1991, "Performance-Oriented Packaging Standards; Revisions and Response to Petitions for Reconsideration," *Federal Register*, Vol. 56, No. 245, pp. 66124 - 66287, U.S. Department of Transportation, Washington, D.C.

APPENDIX A
PACKAGING CHECK LISTS

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MATERIAL CHARACTERIZATION CHECK LIST

Date: March 12, 1992

Page 1 of 2

Revision No: 0

SOP No: W-MTLCHR

A. Material Characterization Check List Identification

Date _____ Check List ID Number _____

Cognizant Person _____ Phone _____

Cognizant Organization _____

B. Materials Description

Package Contents _____

Physical Form (check one) Solid ____ Liquid ____ Gas ____ Other ____

If the material is a liquid list its specific gravity, _____
and its vapor pressure at 131°F (55°C), _____

Specific chemical name (technical name) _____

Generic chemical name, _____

Industrial or Commercial name, _____

All known synonyms. _____

Is this waste material? _____

C. Material Characteristics

Does the material have any characteristics of:

Flammability _____, Toxicity _____, Chemical Instability _____,

Corrosivity _____, Explosivity _____, or other characteristic

which may make it hazardous during transport or accident? _____
(Check all applicable)Provide details about any characteristics checked. Identify additional
sheets with ID number above.

(continued on next page)

MATERIAL CHARACTERIZATION CHECK LIST

Date: March 12, 1992

Page 2 of 2

Revision No: 0

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[illegible]

D. Chemical Compatibility

List all common packaging component materials incompatible with the material to be shipped. _____

PACKAGING SELECTION CHECK LIST

Date: March 23, 1992

Page 1 of 4

Revision No: 0

SOP No: W-PKGSEL

A. Packaging Selection Check List Identification

Date _____ Check List ID Number _____

Cognizant Person _____ Phone _____

Cognizant Organization _____

B. Materials Characterization Check List

Package Contents _____

Physical Form (check one) Solid _____ Liquid _____ Gas _____ Other _____

What is the date and ID number on the latest Materials Characterization Check List for this material?

Date _____ ID Number _____

C. Hazard Class (172.101(d))

Citation for Hazard Class and Packing Group definitions:

Hazard Class and Div.	Name of Hazard Class or Division	49 CFR Reference for: Hazard Class Definition	Packing Group Assignment
None	Forbidden Materials	173.21	None
None	Forbidden Explosives	173.53	None
2.1	Flammable Gas	173.115	None
2.2	Non-flammable Compressed Gas	173.115	None
2.3	Poisonous Gas	173.115	None
3	Flammable and Combustible Liquid	173.120	173.121
4.1	Flammable Solid	173.124	173.125(b)
4.2	Spontaneously Combustible Mtl	173.124	173.125(c)
4.3	Dangerous When Wet Material	173.124	173.125(d)
5.1	Oxidizer	173.128	173.127
5.2	Organic Peroxide	173.128	173.129
6.1	Poisonous Material	173.132	173.133
6.2	Infectious Substance	173.134	173.134(c)
7	Radioactive Material	173.403	None
8	Corrosive Materials	173.136	173.137
9	Miscellaneous Hazardous Material	173.140	173.141
None	Other Regulated Material, ORM-D	173.144	173.145

PACKAGING SELECTION CHECK LIST

Date: March 23, 1992

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SOP No: W-PKGSEL

Which Hazard Class definitions, cited above, does the material meet

a. _____ b. _____ c. _____

Is this material, or one of its synonyms,

a. listed in the HMT Appendix (172.101(c)(8)) _____

b. listed in the Hazardous Material Table (HMT) in Roman
Type (49 CFR 172.101) _____
What is the RQ amount _____

c. qualified as Hazardous Waste (40 CFR 261.3) _____

The assignment of the Hazard Class, and Division, must be consistent with definitions cited above. Materials which do not meet any definition cited above but are listed in the Appendix to the HMT or qualify as Hazardous Waste are assigned Hazard Class 9.

For materials with multiple hazards the Hazard Class assignment must be in accordance with 49 CFR 173.2a and 172.101(c)(12)(iii).

What is the correct Hazard Class for the material to be shipped?

D. Packing Group (172.101(f) and 173.2)

For Hazard Classes 3 through 9 the Packing Group is assigned in accordance with the Packing Group definitions cited in the above tabulation of references (and requirements of 49 CFR 172.101(f) for hazardous wastes and hazardous substances).

What is the assigned Packing Group? _____

E. Proper Shipping Name (172.101(b) and (c))

The Proper Shipping Name must be the most specific name appearing in the Hazardous Materials Table which occurs on the same line with the appropriate Hazardous Class and the Packing Group.

What is the Proper Shipping Name? _____

F. Authorized Packagings (172.101(i))

The package used must be authorized in the Hazardous Materials Table on a line having the correct entries for the Proper Shipping Name, Hazard Class, Hazard Division, and Packing Group number.

What paragraph number is listed in HMT Column 8B? _____

PACKAGING SELECTION CHECK LIST

Date: March 23, 1992

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SOP No: W-PKGSEL

G. Packaging Selected

Which of the following packaging types was selected? _____

1. Steel drum
2. Aluminum drum
3. Metal drum other than steel or aluminum
4. Plywood drum
5. Fiber drum
6. Plastic drum and jerry can
7. Wooden barrel
8. Steel jerrycan
9. Steel or aluminum box
10. Natural wood box
11. Plywood box
12. Reconstituted wood box
13. Fiberboard box
14. Plastic box
15. Woven plastic bag
16. Plastic film bag
17. Textile bag
18. Paper bag
19. Composite packagings with inner plastic receptacles
20. Composite packaging with inner glass, porcelain, or stoneware receptacles
21. Combination packaging

If this is a combination packaging what is:

Outer Packaging? _____

Inner Packaging? _____

What is the package identification code (178.502)? _____

What marking is on this package to designate the packing group test requirements and capacity limits (178.503)? _____

What special provisions, either "numeric" or starting with the letter "N", are listed in HMT Column 7 on the line with the correct Proper Shipping Name, Hazard Class and Packing Group (172.101(h) and 172.102)?

PACKAGING SELECTION CHECK LIST

Date: March 23, 1992 Page 4 of 4 Revision No: 0 SOP No: W-PKGSEL

Special Provision

Brief Description of that Provision

Were all special provisions identified above met by the package selected?

In comparison with other packaging configurations authorized for this material, is the packaging selected relatively economical? Is it relatively easy to use?

PACKAGING REQUISITION CHECK LIST

Date: March 12, 1992

Page 1 of 4

Revision No: 0

SOP No: W-REQ18N

A. Requisition Check List Identification

Date _____ Check List ID Number _____

Cognizant Person _____ Phone _____

Cognizant Organization _____

B. Package Description

Packaging type _____ ID Code _____

If this is a combination packaging, what is the outer packaging? _____
Inner packaging? _____

What marking on this package designates the packing group test requirements and capacity limits (178.503)? _____

C. DOT Design and Fabrication Standards

<u>Packaging Type</u>	<u>Packaging Identification Code</u>	<u>49 CFR 178.XXX</u>
Steel drum -----		504
non-removable head	1A1	
removable head	1A2	
Aluminum drum -----		505
non-removable head	1B1	
removable head	1B2	
Metal drum other than steel or aluminum -----		506
non-removable head	1N1	
removable head	1N2	
Plywood drum -----	1D	507
Fiber drum -----	1G	508
Plastic drum -----		509
non-removable head	1H1	
removable head	1H2	
Plastic jerry can -----		509
non-removable head	3H1	
removable head	3H2	
Wooden barrel -----		510
bung type	2C1	
slack type	2C2	
Steel jerrycan -----		511
non-removable head	3A1	
removable head	3A2	
Steel box -----		512

PACKAGING REQUISITION CHECK LIST

Date: March 12, 1992

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unlined uncoated	4A1	
inner lining or coating	4A2	
Aluminum box -----		512
unlined uncoated	4B1	
inner lining or coating	4B2	
Natural wood box -----		513
ordinary	4C1	
sift-proof	4C2	
Plywood box -----	4D	514
Reconstituted wood box -----	4F	515
Fiberboard box -----	4G	516
Plastic box -----		517
expanded	4H1	
solid	4H2	
Woven plastic bag -----		518
unlined or non-coated	5H1	
sift-proof	5H2	
water-resistant	5H3	
Plastic film bag -----	5H4	519
Textile bag -----		520
unlined or non-coated	5L1	
sift-proof	5L2	
water-resistant	5L3	
Paper bag -----		521
multi-wall	5L2	
multi-wall water-resistant	5L3	
Composite packagings with inner plastic receptacles -----		522
within steel drum	6HA1	
within steel crate or box	6HA2	
within aluminum drum	6HB1	
within aluminum crate or box	6HB2	
within wooden box	6HC	
within plywood drum	6HD1	
within plywood box	6HD2	
within fiber drum	6HG1	
within fiberboard box	6HG2	
within plastic drum	6HH	
Composite packaging with inner glass, porcelain, or stoneware receptacles -----		523
within steel drum	6PA1	
within steel crate or box	6PA2	
within aluminum drum	6PB1	
within aluminum crate or box	6PB2	
within wooden box	6PC	
within plywood drum	6PD1	
within wickerwork hamper	6PD2	
within fiber drum	6PG1	
within fiberboard box	6PG2	

PACKAGING REQUISITION CHECK LIST

Date: March 12, 1992

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within expanded plastic packaging 6PH1
 within solid plastic packaging 6PH2

D. Requisition Requirements

1. The packaging being requisitioned is _____
 _____ package type, _____
 _____ size. It shall meet the applicable
 regulations in 49 CFR 170 through 180.
2. Packaging shall be tested for a specific gravity of _____ and a
 hydrostatic test pressure of _____ kPa, if for liquids, or for
 maximum content weight of _____ kg, if for solids or combination
 package, using testing requirements for Packing Group _____.
3. The manufacturer shall mark the packaging in compliance with
 49 CFR 178.503.
4. The manufacturer shall furnish a description of the material
 comprising each packaging component contacting the package
 contents, in sufficient detail to permit a preliminary
 determination of chemical compatibility by the shipper.
5. The manufacturer shall include the following certifications:
 - (1) that the packagings furnished meet the design and
 fabrication standards contained in 49 CFR 178._____.
 - (2) that the packagings furnished are capable of successfully
 passing the performance test requirements contained in
 49 CFR 178.600 through 49 CFR 178.609, consistent with the
 packaging markings.
 - (3) that the manufacturer is familiar with 49 CFR 178.2 and is
 providing adequate information to enable the purchaser to
 properly fill and close the package and is providing
 adequate information on proper assembly of any combination
 packagings furnished.
 - (4) that the manufacturer is familiar with, and the packaging
 complies with, the following paragraphs in 49 CFR 173.24:
 (a), (b)(1), (b)(2), (d), and (f)(1).
 - (5) that the manufacturer is familiar with, and the packaging
 complies with, the following paragraphs in 49 CFR 173.24a:
 (a)(2), and (a)(5).

PACKAGING REQUISITION CHECK LIST

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- (6) that the manufacturer is familiar with, and any combination packagings furnished comply with, paragraphs 49 CFR 173.24a(a)(1) and 49 CFR 173.24a(a)(3).
- (7) that the manufacturer is familiar with, and any packagings (e.g., wooden or cardboard box) furnished comply with, 49 CFR 173.24a(a)(4).

6. List below any additional, site specific, packaging requirements.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

RECEIVING INSPECTION AND STORAGE CHECK LIST

Date: March 23, 1992

Page 1 of 3

Revision No: 0

SOP No: W-RECINS

A. Receiving Inspection and Storage Check List Identification

Date _____ Check List ID Number _____

Cognizant Person _____ **Phone** _____

Cognizant Organization _____

B. Package Description

Packaging type _____ ID Code _____

If this is a combination packaging what is the outer packaging? _____
 _____ Inner packaging? _____

What marking is on this package to designate the packing group test requirements and capacity limits (178.503)?

C. Functional Requirements of Packaging Components

List the functional requirement, important to containment, for each packaging component.

<u>Pkg. Component</u>	<u>Functional Requirement of Component</u>
-----------------------	--

[illegible]

RECEIVING INSPECTION AND STORAGE CHECK LIST

Date: March 23, 1992

Page 2 of 3

Revision No: 0

SOP No: W-RECINS

D. Receiving Inspection Requirements

The receiving inspection shall require the following:

1. Assure the packaging manufacturer furnished a certification of compliance with the applicable paragraphs from the DOT design and fabrication standards contained within 49 CFR 178.504 through 178.523.

For this packaging the applicable section is 178.____.

2. Assure the packaging manufacturer furnished a certificate of performance compliance with the applicable sections of 49 CFR 178.600 through 178.609.
3. Assure the packaging marking and the level of the DOT performance testing passed by the packaging are consistent.
4. Assure instructions were furnished by the manufacturer for:
 - a. filling and closing the packaging, and
 - b. assembling a combination packaging (if applicable).
5. Assure the packaging manufacturer certified that they are familiar with, and that the packagings furnished are in compliance with:
 - a. 49 CFR 173.24 paragraphs (a), (b)(1), (b)(2), (d), and (f)(1),
 - b. 49 CFR 173.24(a) paragraphs (a)(2) and (a)(5),
 - c. 49 CFR 173.24(a) paragraphs (a)(1) and (a)(3) for any combination packagings furnished, and
 - d. 49 CFR 173.24(a) paragraph (a)(4) for any wooden packagings furnished.
6. Assure the manufacturer furnished a description of each material comprising those packaging components which may come into contact with the package contents.

RECEIVING INSPECTION AND STORAGE CHECK LIST

Date: March 23, 1992

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7. List below receiving inspection requirements:

- a. developed from functional requirements in Section C of this check list, and
- b. developed from packaging requirements in Section D, paragraph 6 of the Packaging Procurement Check List.

8. What document assures these packaging requirements, important to containment, are met during the receiving inspection? _____

E. Storage and Handling Requirements

1. To ensure the packaging components perform as intended it is required that no packaging components be distorted or damaged during storage and handling.
2. List any additional requirements, important to containment, to be met during storage and handling of this packaging.

What document assures the requirements important to containment are met during storage and handling? _____

ROUTINE DETERMINATION CHECK LIST

Date: March 23, 1992

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Revision No: 0

SOP No: W-ROUDET

A. Routine Determination Check List Identification

Date _____ Check List ID No. _____

Cognizant Person _____ Phone _____

Cognizant Organization _____

B. Package Information

Package Contents _____

Physical Form (check one) Solid ____ Liquid ____ Gas ____ Other ____

Hazard Class and Division _____, Packing Group _____,

Proper Shipping Name _____

Package Type _____ Marking (178.503(a)) _____

Shipment Date: _____ Shipment ID No. _____

Consignee _____

Identity of Persons Completing this Checklist

<u>Initials</u>	<u>Name</u> (Print)	<u>Organization</u> (Print)
-----------------	---------------------	-----------------------------

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Other Comments

ROUTINE DETERMINATION CHECK LIST

Date: March 23, 1992

Page 2 of 6

Revision No: 0

SOP No: W-ROUDET

C. Supporting Documentation

Identify the latest applicable completed check list or report.

	<u>Date</u>	<u>ID Number</u>
Materials Characterization	_____	_____
Package Selection	_____	_____
Package Requisition	_____	_____
Receiving Inspection	_____	_____
Receiving Insp. Report	_____	_____

D. Material Amount

1. What amount of material is being shipped in this package? _____
2. What package marking shows authorized contents amount? _____
3. For liquid packages, is the specific gravity equal or less than the package authorization (173.24a(b)(1))? _____
4. If solid material is shipped in a packaging marked for liquid is the net weight less than authorized (173.24a(b)(3))? _____
5. Is the vapor pressure of liquid contents within the authorized range based upon the packaging pressure test(173.24a(b)(4))? _____
6. Is the amount shipped less than the amount authorized? _____

E. Material Compatibility

1. List below the materials in the packaging components which may contact the material being shipped and their compatibility.

<u>Pkg. Component</u>	<u>Material</u>	<u>Compatible?</u>	<u>Basis for Answer</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

ROUTINE DETERMINATION CHECK LIST

Date: March 23, 1992

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SOP No: W-ROUDET

2. List below the materials identified as incompatible with the material described in the Material Description Check List.

_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

3. Noting that compatibility includes corrosivity, permeability, softening, premature ageing, and embrittlement (173.24(e)(1)) are the packaging components compatible with the contents? _____
4. Are a mixture of gases or vapors in the package which could cause abnormal heat or pressure precluded (173.24(b)(3))? _____
Basis for this assessment _____.
5. Do packaging materials and contents preclude significant chemical or galvanic reaction (173.24(e)(2))? _____
Basis for this assessment _____.
6. Are all plastic packaging components (don't forget bottle caps) compatible with the contents (49 CFR 173.24(e)(3)(i))? _____
Basis for this assessment _____.
7. Are plastics, used in packagings for liquids, capable of passing the Compatibility and Permeation tests specified by DOT (173.24(e)(3)(ii))? _____ Basis for this assessment _____.
8. Will any venting of the package preclude identifiable release of hazard material and or toxic, flammable or asphyxiant gas (173.24(g))? _____ Basis for this assessment _____.
9. Is this package in compliance with 49 CFR 173.24(e)(4) which prohibits packing or mixing hazardous materials together in the same outer packagings if they might react dangerously? _____
Basis for this assessment _____?
10. Is the packaging capable of containing any solids being shipped which may become liquid during transport? (173.24(e)(5)) _____
Basis for this assessment _____.

ROUTINE DETERMINATION CHECK LIST

Date: March 23, 1992

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Revision No: 0

SOP No: W-ROUDET

F. Filling and Closing

1. List the instructions below, from the packaging manufacturer or supplier, which are important to containment (171.2(c) and 178.2(c)).

<u>Activity</u>	<u>Initials, Completed</u>
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

2. List below any additional Routine Determination requirements for this packaging.

<u>Activity</u>	<u>Initials, Completed</u>
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

3. When filling liquid packagings what written procedures ensure leaving sufficient ullage (173.24(h) and 173.24a(d))? _____
4. When installing liquid receptacles into combination packaging what written procedure ensures the receptacles are installed upright (173.24a(a)(1))? _____

ROUTINE DETERMINATION CHECK LIST

Date: March 23, 1992

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5. When installing cushioning material into a combination packaging what procedures ensure the cushioning material is properly installed (173.24a(a)(3))? _____
6. What is the identification number of the procedures used to require package inspection after filling and closing to ensure that no hazardous material is on the outside of the package (137.24a(b)(5)) _____
7. What is the identification number of the procedures used for filling and closing this package. _____
8. Are all filling and closing requirements, important to containment, met? ____ Print name of individual answering this question. _____

G. Package Marking and Labeling

Compliance with the following regulations is indicated by initials of a shipper representative.

<u>Requirement</u>	<u>Regulation 49 CFR</u>	<u>Compliance Initials</u>
The package is marked with:		
Proper Shipping Name	172.301	_____
UN Number	172.301	_____
Package type & Manufacturer name	178.3	_____

If required, the package is marked with:

Technical Name	172.301	_____
"USA"	178.3	_____
Gross Weight	178.310	_____
Type A or Type B	178.310	_____
Consignor & Consignee	172.301	_____
Markings for liquids used	172.312	_____
Inhalation Hazard & Poison	172.313	_____
ORM	172.316	_____
Explosive	172.320	_____
Additional markings	172.324	_____

The marking meets the following requirements:

Marking is durable	172.304	_____
Marking is in English	172.304	_____

ROUTINE DETERMINATION CHECK LIST

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Background is contrasting color	172.304	_____
Marking unobscured by labels, etc.	172.304	_____
Marking is away from other markings	172.304	_____
Marking is in correct format	178.3	_____
Abbreviations used are authorized	172.308	_____

Other Marking Requirements Implemented because of Unique Nature of Contents

_____	_____	_____
_____	_____	_____

Labeling requirements Implemented:

<u>Requirement</u>	<u>49 CFR 172</u>	<u>Initials</u>
Labels in Col. 6 of HMT are applied	400	_____
Label for other hazards (if required)	402	_____
Mixed Packaging labels applied(if reqd)	404	_____
Consolidated Packaging labels (if reqd)	404	_____
Label modification are authorized	405	_____
Labels are properly placed	406	_____
Labels meet specifications	407	_____

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APPENDIX B
SHIPPING LOGISTICS CHECK LIST

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SHIPPING LOGISTICS CHECK LIST

Date: March 12, 1992

Page 1 of 2

Revision No: 0

SOP No: W-SHPLOG

A. Shipping Papers

1. Compliance with the following regulations is indicated by initials of a shipper representative.

<u>Requirement</u>	<u>Regulation 49 CFR 172</u>	<u>Compliance Initials</u>
Shipping paper includes:		
Proper Shipping Name	202	_____
Hazard Class or Division	202	_____
ID Number	202	_____
Packing Group (Col. 5)	202	_____
Total weight	202	_____
Shippers Certification	204	_____
Emerg. Response Telephone Number	604	_____

Shipping Papers include, when applicable

Exemption	203	_____
Limited Quantity	203	_____
Description of EPA Haz. Substance	203	_____
RQ	203	_____
Residue	203	_____
Skin Corrosive Only	203	_____
Dangerous When Wet	203	_____
Technical Names (for nos)	203	_____
Poison	203	_____
Poison Inhalation Hazard	203	_____

2. Are entries on shipping papers in correct format (172.201)? _____

B. Emergency Response Information

1. Compliance with the following regulations is indicated by initials of a representative of the shipper.

<u>Requirement</u>	<u>Regulation 49 CFR 172</u>	<u>Compliance Initials</u>
Shipping paper, or other document, includes:		
Proper Shipping Name	602	_____
Hazard Class or Division	602	_____
ID number	602	_____

SHIPPING LOGISTICS CHECK LIST

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2. Shipping papers, or another document, include the following information for emergency responders?

<u>Information Required</u>	<u>49 CFR 172 Ref</u>	<u>Compliance Initials</u>
Immediate hazards to health	602	_____
Risks of fire or explosion	602	_____
Immediate precautions to take	602	_____
Immediate methods for handling fires	602	_____
Immediate methods for handling spills	602	_____
Preliminary first aid measures	602	_____

C. Placarding

1. What set of placards were offered to the carrier by the shipper?
(1) _____ (2) _____ (3) _____
2. Did these placards meet the specifications of 49 CFR 172.556 and Part 172 Appendix A? _____
3. What documentation supports this conclusion? _____

APPENDIX C
SAMPLE PACKAGING REQUISITION CHECK LISTS

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PACKAGING REQUISITION CHECK LIST

Date: March 23, 1992

Page 1 of 4

Revision No: 0

SOP No: W-REQISN

A. Packaging Requisition Check List IdentificationDate 3/23/92 Check List ID Number SAMPLE-4G-I-1 LiterCognizant Person Robert J. Jackson Phone (509) 946-7884Cognizant Organization WHC-Packaging ProgramsB. Package DescriptionPackaging type Fiberboard Box ID Code 4GIf this is a combination packaging, what is the outer packaging? Fiberboard box
Inner packaging 1 liter glass receptacleWhat marking on this package designates the packing group test requirements and capacity limits (178.503)? 4G/X30/SC. DOT Design and Fabrication Standards

<u>Packaging Type</u>	<u>Packaging Identification Code</u>	<u>49 CFR 178.XXX</u>
-----------------------	--------------------------------------	-----------------------

Steel drum -----		504
non-removable head	1A1	
removable head	1A2	
Aluminum drum -----		505
non-removable head	1B1	
removable head	1B2	
Metal drum other than steel or aluminum -----		506
non-removable head	1N1	
removable head	1N2	
Plywood drum -----	1D	507
Fiber drum -----	1G	508
Plastic drum -----		509
non-removable head	1H1	
removable head	1H2	
Plastic jerry can -----		509
non-removable head	3H1	
removable head	3H2	
Wooden barrel -----		510
bung type	2C1	
slack type	2C2	
Steel jerrycan -----		511
non-removable head	3A1	
removable head	3A2	
Steel box -----		512

PACKAGING REQUISITION CHECK LIST

Date: March 23, 1992

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unlined uncoated	4A1	
inner lining or coating	4A2	
Aluminum box -----		512
unlined uncoated	4B1	
inner lining or coating	4B2	
Natural wood box -----		513
ordinary	4C1	
sift-proof	4C2	
Plywood box -----	4D	514
Reconstituted wood box -----	4F	515
Fiberboard box -----	4G	516
Plastic box -----		517
expanded	4H1	
solid	4H2	
Woven plastic bag -----		518
unlined or non-coated	5H1	
sift-proof	5H2	
water-resistant	5H3	
Plastic film bag -----	5H4	519
Textile bag -----		520
unlined or non-coated	5L1	
sift-proof	5L2	
water-resistant	5L3	
Paper bag -----		521
multi-wall	5L2	
multi-wall water-resistant	5L3	
Composite packagings with inner plastic receptacles -----		522
within steel drum	6HA1	
within steel crate or box	6HA2	
within aluminum drum	6HB1	
within aluminum crate or box	6HB2	
within wooden box	6HC	
within plywood drum	6HD1	
within plywood box	6HD2	
within fiber drum	6HG1	
within fiberboard box	6HG2	
within plastic drum	6HH	
Composite packaging with inner glass, porcelain, or stoneware receptacles -----		523
within steel drum	6PA1	
within steel crate or box	6PA2	
within aluminum drum	6PB1	
within aluminum crate or box	6PB2	
within wooden box	6PC	
within plywood drum	6PD1	
within wickerwork hamper	6PD2	
within fiber drum	6PG1	

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within fiberboard box	6PG2
within expanded plastic packaging	6PH1
within solid plastic packaging	6PH2

D. Requisition Requirements

1. The packaging being requisitioned is Combination packaging with fiberboard outer packaging and glass receptacle inner packaging package type, 1 Liter size. It shall meet the applicable regulations in 49 CFR 170 through 180.
2. Packaging shall be tested for a specific gravity of 1.2 and a hydrostatic test pressure of N/A kPa, if for liquids, or for a maximum content weight of 30 kg, for solids or combination package, using testing requirements for Packing Group I.
3. The manufacturer shall mark the packaging in compliance with 49 CFR 178.503.
4. The manufacturer shall furnish a description of the material comprising each packaging component contacting the package contents, in sufficient detail to permit a preliminary determination of chemical compatibility by the shipper.
5. The manufacturer shall include the following certifications
 - (1) that the packagings furnished meet the design and fabrication standards contained in 49 CFR 178.516.
 - (2) that the packagings furnished are capable of successfully passing the performance test requirements contained in 49 CFR 178.600 through 49 CFR 178.609, consistent with the packaging markings.
 - (3) that the manufacturer is familiar with 49 CFR 178.2 and is providing adequate information to enable the purchaser to properly fill and close the package and is providing adequate information on proper assembly of any combination packagings furnished.
 - (4) that the manufacturer is familiar with, and the packaging complies with, the following paragraphs in 49 CFR 173.24: (a), (b)(1), (b)(2), (d), and (f)(1).
 - (5) that the manufacturer is familiar with, and the packaging complies with, the following paragraphs in 49 CFR 173.24a: (a)(2), and (a)(5).

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A. Packaging Requisition Check List IdentificationDate 3/23/92 Check List ID Number SAMPLE-4A1-I-9X13X19Cognizant Person Robert J. Jackson Phone (509) 946-7884Cognizant Organization WHC-Packaging ProgramsB. Package DescriptionPackaging type Steel Box ID Code 4A1If this is a combination packaging, what is the outer packaging _____
N/A Inner packaging? N/AWhat marking on this package designates the packing group test requirements and capacity limits (178.503)? 4A1/X400/SC. DOT Design and Fabrication Standards

<u>Packaging Type</u>	<u>Packaging Identification Code</u>	<u>49 CFR 178.XXX</u>
-----------------------	--------------------------------------	-----------------------

Steel drum -----		504
non-removable head	1A1	
removable head	1A2	
Aluminum drum -----		505
non-removable head	1B1	
removable head	1B2	
Metal drum other than steel or aluminum -----		506
non-removable head	1N1	
removable head	1N2	
Plywood drum -----	1D	507
Fiber drum -----	1G	508
Plastic drum -----		509
non-removable head	1H1	
removable head	1H2	
Plastic jerry can -----		509
non-removable head	3H1	
removable head	3H2	
Wooden barrel -----		510
bung type	2C1	
slack type	2C2	
Steel jerrycan -----		511
non-removable head	3A1	
removable head	3A2	
Steel box -----		512

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unlined uncoated	4A1	
inner lining or coating	4A2	
Aluminum box -----		512
unlined uncoated	4B1	
inner lining or coating	4B2	
Natural wood box -----		513
ordinary	4C1	
sift-proof	4C2	
Plywood box -----	4D	514
Reconstituted wood box -----	4F	515
Fiberboard box -----	4G	516
Plastic box -----		517
expanded	4H1	
solid	4H2	
Woven plastic bag -----		518
unlined or non-coated	5H1	
sift-proof	5H2	
water-resistant	5H3	
Plastic film bag -----	5H4	519
Textile bag -----		520
unlined or non-coated	5L1	
sift-proof	5L2	
water-resistant	5L3	
Paper bag -----		521
multi-wall	5L2	
multi-wall water-resistant	5L3	
Composite packagings with inner plastic receptacles -----		522
within steel drum	6HA1	
within steel crate or box	6HA2	
within aluminum drum	6HB1	
within aluminum crate or box	6HB2	
within wooden box	6HC	
within plywood drum	6HD1	
within plywood box	6HD2	
within fiber drum	6HG1	
within fiberboard box	6HG2	
within plastic drum	6HH	
Composite packaging with inner glass, porcelain, or stoneware receptacles -----		523
within steel drum	6PA1	
within steel crate or box	6PA2	
within aluminum drum	6PB1	
within aluminum crate or box	6PB2	
within wooden box	6PC	
within plywood drum	6PD1	
within wickerwork hamper	6PD2	
within fiber drum	6PG1	
within fiberboard box	6PG2	

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6PH2

1. The packaging being requisitioned is Steel box
 package type, 9 inch high x 13 inch long x 19 inch wide inside size. It shall meet the applicable regulations in 49 CFR 170 through 180.
2. Packaging shall be tested for a specific gravity of N/A and a hydrostatic test pressure of N/A kPa, if for liquids, or for a maximum content weight of 400 kg, if for solids or a combination package using testing requirements for Packing Group I.
3. The manufacturer shall mark the packaging in compliance with 49 CFR 178.503.
4. The manufacturer shall furnish a description of the material comprising each packaging component contacting the package contents, in sufficient detail to permit a preliminary determination of chemical compatibility by the shipper.
5. The manufacturer shall include the following certifications
 - (1) that the packagings furnished meet the design and fabrication standards contained in 49 CFR 178.512.
 - (2) that the packagings furnished are capable of successfully passing the performance test requirements contained in 49 CFR 178.600 through 49 CFR 178.609, consistent with the packaging markings.
 - (3) that the manufacturer is familiar with 49 CFR 178.2 and is providing adequate information to enable the purchaser to properly fill and close the package and is providing adequate information on proper assembly of any combination packagings furnished.
 - (4) that the manufacturer is familiar with, and the packaging complies with, the following paragraphs in 49 CFR 173.24:
(a), (b)(1), (b)(2), (d), and (f)(1).
 - (5) that the manufacturer is familiar with, and the packaging complies with, the following paragraphs in 49 CFR 173.24a:
(a)(2), and (a)(5).
 - (6) that the manufacturer is familiar with, and any combination

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packagings furnished comply with, paragraphs
49 CFR 173.24a(a)(1) and 49 CFR 173.24a(a)(3),

- (7) that the manufacturer is familiar with, and any packagings
(e.g., wooden or cardboard box) furnished comply with,
49 CFR 173.24a(a)(4).

6. List below any additional, site specific, packaging requirements.

1. Paint outside of box with 2 coats of black paint.
2. Deliver 500 boxes per month.

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SOP No: W-REQ18N

A. Packaging Requisition Check List IdentificationDate 3/23/92 Check List ID Number SAMPLE-1A1-I-55Cognizant Person Robert J. Jackson Phone (509) 946-7884Cognizant Organization WHC-Packaging ProgramsB. Package DescriptionPackaging type Steel Drum ID Code 1A1If this is a combination packaging, what is the outer packaging?
N/A Inner packaging? N/AWhat marking on this package designates the packing group test requirements and capacity limits (178.503) 1A1/X1.2/150C. DOT Design and Fabrication Standards

<u>Packaging Type</u>	<u>Packaging Identification Code</u>	<u>49 CFR 178.XXX</u>
-----------------------	--------------------------------------	-----------------------

Steel drum -----		504
non-removable head	1A1	
removable head	1A2	
Aluminum drum -----		505
non-removable head	1B1	
removable head	1B2	
Metal drum other than steel or aluminum -----		506
non-removable head	1N1	
removable head	1N2	
Plywood drum -----	1D	507
Fiber drum -----	1G	508
Plastic drum -----		509
non-removable head	1H1	
removable head	1H2	
Plastic jerry can -----		509
non-removable head	3H1	
removable head	3H2	
Wooden barrel -----		510
bung type	2C1	
slack type	2C2	
Steel jerrycan -----		511
non-removable head	3A1	
removable head	3A2	
Steel box -----		512

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unlined uncoated	4A1	
inner lining or coating	4A2	
Aluminum box -----		512
unlined uncoated	4B1	
inner lining or coating	4B2	
Natural wood box -----		513
ordinary	4C1	
sift-proof	4C2	
Plywood box -----	4D	514
Reconstituted wood box -----	4F	515
Fiberboard box -----	4G	516
Plastic box -----		517
expanded	4H1	
solid	4H2	
Woven plastic bag -----		518
unlined or non-coated	5H1	
sift-proof	5H2	
water-resistant	5H3	
Plastic film bag -----	5H4	519
Textile bag -----		520
unlined or non-coated	5L1	
sift-proof	5L2	
water-resistant	5L3	
Paper bag -----		521
multi-wall	5L2	
multi-wall water-resistant	5L3	
Composite packagings with inner plastic receptacles -----		522
within steel drum	6HA1	
within steel crate or box	6HA2	
within aluminum drum	6HB1	
within aluminum crate or box	6HB2	
within wooden box	6HC	
within plywood drum	6HD1	
within plywood box	6HD2	
within fiber drum	6HG1	
within fiberboard box	6HG2	
within plastic drum	6HH	
Composite packaging with inner glass, porcelain, or stoneware receptacles -----		523
within steel drum	6PA1	
within steel crate or box	6PA2	
within aluminum drum	6PB1	
within aluminum crate or box	6PB2	
within wooden box	6PC	
within plywood drum	6PD1	
within wickerwork hamper	6PD2	
within fiber drum	6PG1	
within fiberboard box	6PG2	

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within expanded plastic packaging 6PH1
within solid plastic packaging 6PH2

D. Requisition Requirements

1. The packaging being requisitioned is Steel Drum
_____ package type,
55 gallon size. It shall meet the applicable regulations in 49 CFR 170 through 180.
2. Packaging shall be tested for a specific gravity of 1.2 and a hydrostatic test pressure of 150 kPa, if for liquids, or for a maximum content weight of N/A kg, if for solids or combination package, using testing requirements for Packing Group I.
3. The manufacturer shall mark the packaging in compliance with 49 CFR 178.503
4. The manufacturer shall furnish a description of the material comprising each packaging component contacting the package contents, in sufficient detail to permit a preliminary determination of chemical compatibility by the shipper.
5. The manufacturer shall include the following certifications:
 - (1) that the packagings furnished meet the design and fabrication standards contained in 49 CFR 178.504.
 - (2) that the packagings furnished are capable of successfully passing the performance test requirements contained in 49 CFR 178.600 through 49 CFR 178.609, consistent with the packaging markings.
 - (3) that the manufacturer is familiar with 49 CFR 178.2 and is providing adequate information to enable the purchaser to properly fill and close the package and is providing adequate information on proper assembly of any combination packagings furnished.
 - (4) that the manufacturer is familiar with, and the packaging complies with, the following paragraphs in 49 CFR 173.24: (a), (b)(1), (b)(2), (d), and (f)(1).
 - (5) that the manufacturer is familiar with, and the packaging complies with, the following paragraphs in 49 CFR 173.24a: (a)(2), and (a)(5).

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- (6) that the manufacturer is familiar with, and any combination packagings furnished comply with, paragraphs 49 CFR 173.24a(a)(1) and 49 CFR 173.24a(a)(3),
- (7) that the manufacturer is familiar with, and any packagings (e.g., wooden or cardboard box) furnished comply with, 49 CFR 173.24a(a)(4).

6. List below any additional, site specific, packaging requirements.

1. Paint outside and inside of drum with bright yellow paint before marking drum.

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SOP No: W-REQ1SN

A. Packaging Requisition Check List IdentificationDate 3/23/92 Check List ID Number SAMPLE-1A1-II-55Cognizant Person Robert J. Jackson Phone (509) 946-7884Cognizant Organization WHC-Packaging Programs**B. Package Description**Packaging type Steel Drum ID Code 1A1If this is a combination packaging, what is the outer packaging?
N/A Inner packaging? N/AWhat marking on this package designates the packing group test requirements and capacity limits (178.503)? 1A1/Y1.2/150**C. DOT Design and Fabrication Standards**

<u>Packaging Type</u>	<u>Packaging Identification Code</u>	<u>49 CFR 178.XXX</u>
Steel drum -----		504
non-removable head	1A1	
removable head	1A2	
Aluminum drum -----		505
non-removable head	1B1	
removable head	1B2	
Metal drum other than steel or aluminum -----		506
non-removable head	1N1	
removable head	1N2	
Plywood drum -----	1D	507
Fiber drum -----	1G	508
Plastic drum -----		509
non-removable head	1H1	
removable head	1H2	
Plastic jerry can -----		509
non-removable head	3H1	
removable head	3H2	
Wooden barrel -----		510
bung type	2C1	
slack type	2C2	
Steel jerrycan -----		511
non-removable head	3A1	
removable head	3A2	
Steel box -----		512
unlined uncoated	4A1	

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inner lining or coating	4A2	
Aluminum box -----		512
unlined uncoated	4B1	
inner lining or coating	4B2	
Natural wood box -----		513
ordinary	4C1	
sift-proof	4C2	
Plywood box -----	4D	514
Reconstituted wood box -----	4F	515
Fiberboard box -----	4G	516
Plastic box -----		517
expanded	4H1	
solid	4H2	
Woven plastic bag -----		518
unlined or non-coated	5H1	
sift-proof	5H2	
water-resistant	5H3	
Plastic film bag -----	5H4	519
Textile bag -----		520
unlined or non-coated	5L1	
sift-proof	5L2	
water-resistant	5L3	
Paper bag -----		521
multi-wall	5L2	
multi-wall water-resistant	5L3	
Composite packagings with inner plastic receptacles -----		522
within steel drum	6HA1	
within steel crate or box	6HA2	
within aluminum drum	6HB1	
within aluminum crate or box	6HB2	
within wooden box	6HC	
within plywood drum	6HD1	
within plywood box	6HD2	
within fiber drum	6HG1	
within fiberboard box	6HG2	
within plastic drum	6HH	
Composite packaging with inner glass, porcelain, or stoneware receptacles -----		523
within steel drum	6PA1	
within steel crate or box	6PA2	
within aluminum drum	6PB1	
within aluminum crate or box	6PB2	
within wooden box	6PC	
within plywood drum	6PD1	
within wickerwork hamper	6PD2	
within fiber drum	6PG1	
within fiberboard box	6PG2	
within expanded plastic packaging	6PH1	

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within solid plastic packaging 6PH2

D. Requisition Requirements

1. The packaging being requisitioned is Steel Drum
_____ package type, 55 gallon size. It shall meet the applicable regulations in 49 CFR 170 through 180.
2. Packaging shall be tested for a specific gravity of 1.2 and a hydrostatic test pressure of 150 kPa, if for liquids, or for a maximum content weight of N/A kg, if for solids or combination package, using testing requirements for Packing Group II.
3. The manufacturer shall mark the packaging in compliance with 49 CFR 178.503.
4. The manufacturer shall furnish a description of the material comprising each packaging component contacting the package contents, in sufficient detail to permit a preliminary determination of chemical compatibility by the shipper.
5. The manufacturer shall include the following certifications
 - (1) that the packagings furnished meet the design and fabrication standards contained in 49 CFR 178.504.
 - (2) that the packagings furnished are capable of successfully passing the performance test requirements contained in 49 CFR 178.600 through 49 CFR 178.609, consistent with the packaging markings.
 - (3) that the manufacturer is familiar with 49 CFR 178.2 and is providing adequate information to enable the purchaser to properly fill and close the package and is providing adequate information on proper assembly of any combination packagings furnished.
 - (4) that the manufacturer is familiar with, and the packaging complies with, the following paragraphs in 49 CFR 173.24: (a), (b)(1), (b)(2), (d), and (f)(1).
 - (5) that the manufacturer is familiar with, and the packaging complies with, the following paragraphs in 49 CFR 173.24a: (a)(2), and (a)(5).

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6. List below any additional, site specific, packaging requirements.

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A. Packaging Requisition Check List IdentificationDate 3/23/92 Check List ID Number SAMPLE-1A1-III-55Cognizant Person Robert J. Jackson Phone (509) 946-7884Cognizant Organization WHC-Packaging ProgramsB. Package DescriptionPackaging type Steel Drum ID Code 1A1If this is a combination packaging, what is the outer packaging?
N/A Inner packaging? N/AWhat marking on this package designates the packing group test requirements and capacity limits (178.503)? 1A1/Z1.2/150C. DOT Design and Fabrication Standards

<u>Packaging Type</u>	<u>Packaging Identification Code</u>	<u>49 CFR 178.XXX</u>
Steel drum -----		504
non-removable head	1A1	
removable head	1A2	
Aluminum drum -----		505
non-removable head	1B1	
removable head	1B2	
Metal drum other than steel or aluminum -----		506
non-removable head	1N1	
removable head	1N2	
Plywood drum -----	1D	507
Fiber drum -----	1G	508
Plastic drum -----		509
non-removable head	1H1	
removable head	1H2	
Plastic jerry can -----		509
non-removable head	3H1	
removable head	3H2	
Wooden barrel -----		510
bung type	2C1	
slack type	2C2	
Steel jerry can -----		511
non-removable head	3A1	
removable head	3A2	
Steel box -----		512
unlined uncoated	4A1	

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inner lining or coating	4A2	
Aluminum box -----		512
unlined uncoated	4B1	
inner lining or coating	4B2	
Natural wood box -----		513
ordinary	4C1	
sift-proof	4C2	
Plywood box -----	4D	514
Reconstituted wood box -----	4F	515
Fiberboard box -----	4G	516
Plastic box -----		517
expanded	4H1	
solid	4H2	
Woven plastic bag -----		518
unlined or non-coated	5H1	
sift-proof	5H2	
water-resistant	5H3	
Plastic film bag -----	5H4	519
Textile bag -----		520
unlined or non-coated	5L1	
sift-proof	5L2	
water-resistant	5L3	
Paper bag -----		521
multi-wall	5L2	
multi-wall water-resistant	5L3	
Composite packagings with inner plastic receptacles -----		522
within steel drum	6HA1	
within steel crate or box	6HA2	
within aluminum drum	6HB1	
within aluminum crate or box	6HB2	
within wooden box	6HC	
within plywood drum	6HD1	
within plywood box	6HD2	
within fiber drum	6HG1	
within fiberboard box	6HG2	
within plastic drum	6HH	
Composite packaging with inner glass, porcelain, or stoneware receptacles -----		523
within steel drum	6PA1	
within steel crate or box	6PA2	
within aluminum drum	6PB1	
within aluminum crate or box	6PB2	
within wooden box	6PC	
within plywood drum	6PD1	
within wickerwork hamper	6PD2	
within fiber drum	6PG1	
within fiberboard box	6PG2	
within expanded plastic packaging	6PH1	
within solid plastic packaging	6PH2	

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D. Requisition Requirements

1. The packaging being requisitioned is Steel Drum
55 gallon package type, 55 gallon size. It shall meet the applicable regulations in 49 CFR 170 through 180.
2. Packaging shall be tested for a specific gravity of 1.2 and a hydrostatic test pressure of 150 kPa, if for liquids, or for a maximum content weight of N/A kg, if for solids or combination package, using testing requirements for Packing Group III.
3. The manufacturer shall mark the packaging in compliance with 49 CFR 178.503.
4. The manufacturer shall furnish a description of the material comprising each packaging component contacting the package contents, in sufficient detail to permit a preliminary determination of chemical compatibility by the shipper.
5. The manufacturer shall include the following certifications
 - (1) that the packagings furnished meet the design and fabrication standards contained in 49 CFR 178.504.
 - (2) that the packagings furnished are capable of successfully passing the performance test requirements contained in 49 CFR 178.600 through 49 CFR 178.609, consistent with the packaging markings.
 - (3) that the manufacturer is familiar with 49 CFR 178.2 and is providing adequate information to enable the purchaser to properly fill and close the package and is providing adequate information on proper assembly of any combination packagings furnished.
 - (4) that the manufacturer is familiar with, and the packaging complies with, the following paragraphs in 49 CFR 173.24: (a), (b)(1), (b)(2), (d), and (f)(1).
 - (5) that the manufacturer is familiar with, and the packaging complies with, the following paragraphs in 49 CFR 173.24a: (a)(2), and (a)(5).
 - (6) that the manufacturer is familiar with, and any combination packagings furnished comply with, paragraphs 49 CFR 173.24a(a)(1) and 49 CFR 173.24a(a)(3),

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A. Packaging Requisition Check List IdentificationDate 3/23/92 Check List ID Number SAMPLE-1A2-I-55Cognizant Person Robert J. Jackson Phone (509) 946-7884Cognizant Organization WHC-Packaging ProgramsB. Package DescriptionPackaging type Steel Drum ID Code 1A2If this is a combination packaging, what is the outer packaging?
N/A Inner packaging N/AWhat marking on this package designates the packing group test requirements and capacity limits (178.503)? 1A2/X400/SC. DOT Design and Fabrication Standards

<u>Packaging Type</u>	<u>Packaging Identification Code</u>	<u>49 CFR 178.XXX</u>
-----------------------	--------------------------------------	-----------------------

Steel drum -----		504
non-removable head	1A1	
removable head	1A2	
Aluminum drum -----		505
non-removable head	1B1	
removable head	1B2	
Metal drum other than steel or aluminum -----		506
non-removable head	1N1	
removable head	1N2	
Plywood drum -----	1D	507
Fiber drum -----	1G	508
Plastic drum -----		509
non-removable head	1H1	
removable head	1H2	
Plastic jerry can -----		509
non-removable head	3H1	
removable head	3H2	
Wooden barrel -----		510
bung type	2C1	
slack type	2C2	
Steel jerrycan -----		511
non-removable head	3A1	
removable head	3A2	
Steel box -----		512
unlined uncoated	4A1	
inner lining or coating	4A2	

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Aluminum box -----		512
unlined uncoated	4B1	
inner lining or coating	4B2	
Natural wood box -----		513
ordinary	4C1	
sift-proof	4C2	
Plywood box -----	4D	514
Reconstituted wood box -----	4F	515
Fiberboard box -----	4G	516
Plastic box -----		517
expanded	4H1	
solid	4H2	
Woven plastic bag -----		518
unlined or non-coated	5H1	
sift-proof	5H2	
water-resistant	5H3	
Plastic film bag -----	5H4	519
Textile bag -----		520
unlined or non-coated	5L1	
sift-proof	5L2	
water-resistant	5L3	
Paper bag -----		521
multi-wall	5L2	
multi-wall water-resistant	5L3	
Composite packagings with inner plastic receptacles -----		522
within steel drum	6HA1	
within steel crate or box	6HA2	
within aluminum drum	6HB1	
within aluminum crate or box	6HB2	
within wooden box	6HC	
within plywood drum	6HD1	
within plywood box	6HD2	
within fiber drum	6HG1	
within fiberboard box	6HG2	
within plastic drum	6HH	
Composite packaging with inner glass, porcelain, or stoneware receptacles -----		523
within steel drum	6PA1	
within steel crate or box	6PA2	
within aluminum drum	6PB1	
within aluminum crate or box	6PB2	
within wooden box	6PC	
within plywood drum	6PD1	
within wickerwork hamper	6PD2	
within fiber drum	6PG1	
within fiberboard box	6PG2	
within expanded plastic packaging	6PH1	
within solid plastic packaging	6PH2	

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D. Requisition Requirements

1. The packaging being requisitioned is Steel Drum

55 gallon package type, _____
size. It shall meet the
applicable regulations in 49 CFR 170 through 180.
2. Packaging shall be tested for a specific gravity of N/A and a
hydrostatic test pressure of N/A kPa, if for liquids, or for a
maximum content weight of 400 kg, if for solids or
combination package, using testing requirements for Packing
Group I.
3. The manufacturer shall mark the packaging in compliance with
49 CFR 178.503.
4. The manufacturer shall furnish a description of the material
comprising each packaging component contacting the package
contents, in sufficient detail to permit a preliminary
determination of chemical compatibility by the shipper.
5. The manufacturer shall include the following certifications
 - (1) that the packagings furnished meet the design and
fabrication standards contained in 49 CFR 178.504_____.
 - (2) that the packagings furnished are capable of successfully
passing the performance test requirements contained in
49 CFR 178.600 through 49 CFR 178.609, consistent with the
packaging markings.
 - (3) that the manufacturer is familiar with 49 CFR 178.2 and is
providing adequate information to enable the purchaser to
properly fill and close the package and is providing
adequate information on proper assembly of any combination
packagings furnished.
 - (4) that the manufacturer is familiar with, and the packaging
complies with, the following paragraphs in 49 CFR 173.24:
(a), (b)(1), (b)(2), (d), and (f)(1).
 - (5) that the manufacturer is familiar with, and the packaging
complies with, the following paragraphs in 49 CFR 173.24a:
(a)(2), and (a)(5).
 - (6) that the manufacturer is familiar with, and any combination
packagings furnished comply with, paragraphs
49 CFR 173.24a(a)(1) and 49 CFR 173.24a(a)(3),

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- (7) that the manufacturer is familiar with, and any packagings (e.g., wooden or cardboard box) furnished comply with, 49 CFR 173.24a(a)(4).

6. List below any additional, site specific, packaging requirements.

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SOP No: W-REQISN

A. Packaging Requisition Check List IdentificationDate 3/23/92 Check List ID Number SAMPLE-1A2-II-55Cognizant Person Robert J. Jackson Phone (509) 946-7884Cognizant Organization WHC-Packaging ProgramsB. Package DescriptionPackaging type Steel Drum ID Code 1A2If this is a combination packaging, what is the outer packaging _____
N/A Inner packaging N/AWhat marking on this package designates the packing group test requirements and capacity limits (178.503) 1A2/Y400/SC. DOT Design and Fabrication Standards

<u>Packaging Type</u>	<u>Packaging Identification Code</u>	<u>49 CFR 178.XXX</u>
-----------------------	--------------------------------------	-----------------------

Steel drum -----		504
non-removable head	1A1	
removable head	1A2	
Aluminum drum -----		505
non-removable head	1B1	
removable head	1B2	
Metal drum other than steel or aluminum -----		506
non-removable head	1N1	
removable head	1N2	
Plywood drum -----	1D	507
Fiber drum -----	1G	508
Plastic drum -----		509
non-removable head	1H1	
removable head	1H2	
Plastic jerry can -----		509
non-removable head	3H1	
removable head	3H2	
Wooden barrel -----		510
bung type	2C1	
slack type	2C2	
Steel jerry can -----		511
non-removable head	3A1	
removable head	3A2	
Steel box -----		512
unlined uncoated	4A1	

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inner lining or coating	4A2	
Aluminum box -----		512
unlined uncoated	4B1	
inner lining or coating	4B2	
Natural wood box -----		513
ordinary	4C1	
sift-proof	4C2	
Plywood box -----	4D	514
Reconstituted wood box -----	4F	515
Fiberboard box -----	4G	516
Plastic box -----		517
expanded	4H1	
solid	4H2	
Woven plastic bag -----		518
unlined or non-coated	5H1	
sift-proof	5H2	
water-resistant	5H3	
Plastic film bag -----	5H4	519
Textile bag -----		520
unlined or non-coated	5L1	
sift-proof	5L2	
water-resistant	5L3	
Paper bag -----		521
multi-wall	5L2	
multi-wall water-resistant	5L3	
Composite packagings with inner plastic receptacles -----		522
within steel drum	6HA1	
within steel crate or box	6HA2	
within aluminum drum	6HB1	
within aluminum crate or box	6HB2	
within wooden box	6HC	
within plywood drum	6HD1	
within plywood box	6HD2	
within fiber drum	6HG1	
within fiberboard box	6HG2	
within plastic drum	6HH	
Composite packaging with inner glass, porcelain, or stoneware receptacles -----		523
within steel drum	6PA1	
within steel crate or box	6PA2	
within aluminum drum	6PB1	
within aluminum crate or box	6PB2	
within wooden box	6PC	
within plywood drum	6PD1	
within wickerwork hamper	6PD2	
within fiber drum	6PG1	
within fiberboard box	6PG2	
within expanded plastic packaging	6PH1	

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within solid plastic packaging 6PH2

D. Requisition Requirements

1. The packaging being requisitioned is Steel Drum
_____ package type,
55 gallon size. It shall meet the
applicable regulations in 49 CFR 170 through 180.
2. Packaging shall be tested for a specific gravity of N/A and a hydrostatic test pressure of N/A kPa, if for liquids, or for a maximum content weight of 400 kg, if for solids or a combination package, using testing requirements for Packing Group II.
3. The manufacturer shall mark the packaging in compliance with 49 CFR 178.503.
4. The manufacturer shall furnish a description of the material comprising each packaging component contacting the package contents, in sufficient detail to permit a preliminary determination of chemical compatibility by the shipper.
5. The manufacturer shall include the following certifications
 - (1) that the packagings furnished meet the design and fabrication standards contained in 49 CFR 178.504.
 - (2) that the packagings furnished are capable of successfully passing the performance test requirements contained in 49 CFR 178.600 through 49 CFR 178.609, consistent with the packaging markings.
 - (3) that the manufacturer is familiar with 49 CFR 178.2 and is providing adequate information to enable the purchaser to properly fill and close the package and is providing adequate information on proper assembly of any combination packagings furnished.
 - (4) that the manufacturer is familiar with, and the packaging complies with, the following paragraphs in 49 CFR 173.24: (a), (b)(1), (b)(2), (d), and (f)(1).
 - (5) that the manufacturer is familiar with, and the packaging complies with, the following paragraphs in 49 CFR 173.24a: (a)(2), and (a)(5).
 - (6) that the manufacturer is familiar with, and any combination

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packagings furnished comply with, paragraphs
49 CFR 173.24a(a)(1) and 49 CFR 173.24a(a)(3),

- (7) that the manufacturer is familiar with, and any packagings (e.g., wooden or cardboard box) furnished comply with, 49 CFR 173.24a(a)(4).

6. List below any additional, site specific, packaging requirements.

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A. Packaging Requisition Check List IdentificationDate 3/23/92 Check List ID Number SAMPLE-1A2-III-55Cognizant Person Robert J. Jackson Phone (509) 946-7884Cognizant Organization WHC-Packaging ProgramsB. Package DescriptionPackaging type Steel Drum ID Code 1A2If this is a combination packaging, what is the outer packaging?
N/A Inner packaging N/AWhat marking on this package designates the packing group test requirements and capacity limits (178.503)? 1A2/Z400/SC. DOT Design and Fabrication Standards

<u>Packaging Type</u>	<u>Packaging Identification Code</u>	<u>49 CFR 178.XXX</u>
-----------------------	--------------------------------------	-----------------------

Steel drum -----		504
non-removable head	1A1	
removable head	1A2	
Aluminum drum -----		505
non-removable head	1B1	
removable head	1B2	
Metal drum other than steel or aluminum -----		506
non-removable head	1N1	
removable head	1N2	
Plywood drum -----	1D -----	507
Fiber drum -----	1G -----	508
Plastic drum -----		509
non-removable head	1H1	
removable head	1H2	
Plastic jerry can -----		509
non-removable head	3H1	
removable head	3H2	
Wooden barrel -----		510
bung type	2C1	
slack type	2C2	
Steel jerry can -----		511
non-removable head	3A1	
removable head	3A2	
Steel box -----		512

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unlined uncoated	4A1	
inner lining or coating	4A2	
Aluminum box -----		512
unlined uncoated	4B1	
inner lining or coating	4B2	
Natural wood box -----		513
ordinary	4C1	
sift-proof	4C2	
Plywood box -----	4D	514
Reconstituted wood box -----	4F	515
Fiberboard box -----	4G	516
Plastic box -----		517
expanded	4H1	
solid	4H2	
Woven plastic bag -----		518
unlined or non-coated	5H1	
sift-proof	5H2	
water-resistant	5H3	
Plastic film bag -----	5H4	519
Textile bag -----		520
unlined or non-coated	5L1	
sift-proof	5L2	
water-resistant	5L3	
Paper bag -----		521
multi-wall	5L2	
multi-wall water-resistant	5L3	
Composite packagings with inner plastic receptacles -----		522
within steel drum	6HA1	
within steel crate or box	6HA2	
within aluminum drum	6HB1	
within aluminum crate or box	6HB2	
within wooden box	6HC	
within plywood drum	6HD1	
within plywood box	6HD2	
within fiber drum	6HG1	
within fiberboard box	6HG2	
within plastic drum	6HH	
Composite packaging with inner glass, porcelain, or stoneware receptacles -----		523
within steel drum	6PA1	
within steel crate or box	6PA2	
within aluminum drum	6PB1	
within aluminum crate or box	6PB2	
within wooden box	6PC	
within plywood drum	6PD1	
within wickerwork hamper	6PD2	
within fiber drum	6PG1	
within fiberboard box	6PG2	

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within expanded plastic packaging 6PH1
within solid plastic packaging 6PH2

D. Requisition Requirements

1. The packaging being requisitioned is Steel Drum
_____ package type,
55 gallon size. It shall meet the
applicable regulations in 49 CFR 170 through 180.
2. Packaging shall be tested for a specific gravity of N/A and a
hydrostatic test pressure of N/A kPa, if for liquids, or for
a maximum content weight of 400 kg, if for solids or a
combination package, using testing requirements for Packing
Group III.
3. The manufacturer shall mark the packaging in compliance with
49 CFR 178.503.
4. The manufacturer shall furnish a description of the material
comprising each packaging component contacting the package
contents, in sufficient detail to permit a preliminary
determination of chemical compatibility by the shipper.
5. The manufacturer shall include the following certifications
 - (1) that the packagings furnished meet the design and
fabrication standards contained in 49 CFR 178.504.
 - (2) that the packagings furnished are capable of successfully
passing the performance test requirements contained in
49 CFR 178.600 through 49 CFR 178.609, consistent with the
packaging markings.
 - (3) that the manufacturer is familiar with 49 CFR 178.2 and is
providing adequate information to enable the purchaser to
properly fill and close the package and is providing
adequate information on proper assembly of any combination
packagings furnished.
 - (4) that the manufacturer is familiar with, and the packaging
complies with, the following paragraphs in 49 CFR 173.24:
(a), (b)(1), (b)(2), (d), and (f)(1).
 - (5) that the manufacturer is familiar with, and the packaging
complies with, the following paragraphs in 49 CFR 173.24a:
(a)(2), and (a)(5).

APPENDIX D
SAMPLE RECEIVING INSPECTION
AND STORAGE CHECK LISTS

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RECEIVING INSPECTION AND STORAGE CHECK LIST

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D. Receiving Inspection Requirements

The receiving inspection shall require the following:

1. Assure the packaging manufacturer furnished a certification of compliance with the applicable paragraphs from the DOT design and fabrication standards contained within 49 CFR 178.504 through 178.523.

For this packaging the applicable section is 178.504.
2. Assure the packaging manufacturer furnished a certificate of performance compliance with the applicable sections of 49 CFR 178.600 through 178.609.
3. Assure the packaging marking and the level of the DOT performance testing passed by the packaging are consistent.
4. Assure instructions were furnished by the manufacturer for:
 - a. filling and closing the packaging, and
 - b. assembling a combination packaging (if applicable).
5. Assure the packaging manufacturer certified that they are familiar with, and that the packagings furnished are in compliance with:
 - a. 49 CFR 173.24 paragraphs (a), (b)(1), (b)(2), (d), and (f)(1),
 - b. 49 CFR 173.24(a) paragraphs (a)(2) and (a)(5),
 - c. 49 CFR 173.24(a) paragraphs (a)(1) and (a)(3) for any combination packagings furnished, and
 - d. 49 CFR 173.24(a) paragraph (a)(4) for any wooden packagings furnished.
6. Assure the manufacturer furnished a description of each material comprising those packaging components which may come into contact with the package contents.
7. List below receiving inspection requirements:
 - a. developed from functional requirements in Section C of this check list, and

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- b. developed from packaging requirements in Section D, paragraph 6 of the Packaging Procurement Check List

All components Visual inspection for damage or flaws

Closure ring lug Visual inspection on representative sample
for good workmanship on joint between the
ring and the lug

Closure bolt Visual inspection representative sample
for damage and flaws

Lid gasket Visual inspection on representative sample
sealing surface for nicks or rough spots

Drum sealing Visual inspection on representative sample
surface for nicks or rough spots

8. What document assures these packaging requirements, important to containment, are met during the receiving inspection? _____

WHC-WHAN-21-3 Rev 0, 8/14/91

E. Storage and Handling Requirements

1. To ensure the packaging components perform as intended it is required that no packaging components be distorted or damaged during storage and handling.
2. List any additional requirements, important to containment, to be met during storage and handling of this packaging.

Store drums in a location to preclude rusting of iron and
steel components

Store drums with lids installed and lightly secured to the
drum

What document assures the requirements important to containment are met during storage and handling? WHC-WHAN-21-3, Rev 0,
8/14/91

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A. Check List IdentificationDate 3/12/92 Check List ID Number SAMPLE-4G-I-1 LiterCognizant Person ROBERT J. JACKSON Phone 509-946-7884Cognizant Organization WHC - Packaging ProgramsB. Package DescriptionPackaging type Fiberboard box ID Code 4GIf this is a combination packaging what is the outer packaging, Fiberboard box
Inner packaging? 1 liter glass receptacleWhat marking is on this package to designate the packing group test requirements and capacity limits (178.503)? 4G/X30/SC. Functional Requirements of Packaging Components

List the functional requirement, important to containment, for each packaging component:

<u>Pkg. Component</u>	<u>Functional Requirement of Component</u>
<u>Glass bottle</u>	<u>Provide containment boundary</u>
<u>Lid</u>	<u>Provide containment boundary</u>
<u>Lid gasket</u>	<u>Provide containment boundary</u>
<u>Lid gasket</u>	<u>Withstand sealing loads</u>
<u>Box</u>	<u>Withstand transport loads</u>
<u>Box</u>	<u>Retain packaging components after accident</u>
<u>Box</u>	<u>Retain cushioning in position after accident</u>
<u>Cushioning</u>	<u>Assist box to withstand transport loads</u>
<u>Cushioning</u>	<u>Reduce impacts on containment boundary</u>
<u>Lugs on ring</u>	<u>Transmit forces to retain lid</u>
<u>Absorbent Mtl.</u>	<u>Retain liquid in box after bottle leakage</u>
<u>Absorbent Mtl.</u>	<u>Retain liquid in box after bottle breakage</u>

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D. Receiving Inspection Requirements

The receiving inspection shall require the following:

1. Assure the packaging manufacturer furnished a certification of compliance with the applicable paragraphs from the DOT design and fabrication standards contained within 49 CFR 178.504 through 178.523.

For this packaging the applicable section is 178.516.

2. Assure the packaging manufacturer furnished a certificate of performance compliance with the applicable sections of 49 CFR 178.600 through 178.609.
3. Assure the packaging marking and the level of the DOT performance testing passed by the packaging are consistent.
4. Assure instructions were furnished by the manufacturer for:
 - a. filling and closing the packaging, and
 - b. assembling a combination packaging (if applicable).
5. Assure the packaging manufacturer certified that they are familiar with, and that the packagings furnished are in compliance with:
 - a. 49 CFR 173.24 paragraphs (a), (b)(1), (b)(2), (d), and (f)(1),
 - b. 49 CFR 173.24(a) paragraphs (a)(2) and (a)(5),
 - c. 49 CFR 173.24(a) paragraphs (a)(1) and (a)(3) for any combination packagings furnished, and
 - d. 49 CFR 173.24(a) paragraph (a)(4) for any wooden packagings furnished.
6. Assure the manufacturer furnished a description of each material comprising those packaging components which may come into contact with the package contents.

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7. List below receiving inspection requirements developed from:
- functional requirements in Section C of this check list,
 - packaging requirements in Section D, paragraph 6 of the Packaging Requisition Check List

Glass bottle	Visual inspection for damage or flaws
Glass bottle lip	Visual inspection for nicks or rough spots
Plastic cap	Visual inspection on representative sample for obvious flaws
Rubber gasket	Visual inspection for damage or flaws
Rubber gasket	Visual inspection for nicks or rough spots
Cushioning	Visual inspection representative sample for damage and obvious flaws
Absorbent Mtl.	Visual inspection on representative sample for damage or obvious flaws
Absorbent Mtl.	Visual inspection on representative sample to assure specified amount is present

8. What document assures these packaging requirements, important to containment, are met during the receiving inspection? _____
 WHC-WHAN-21-3 Rev 0, 8/14/91

E. Storage and Handling Requirements

The storage and handling instructions shall require the following:

- To ensure the packaging components perform as intended it is required that no packaging components be distorted or damaged during storage and handling.
- List any additional requirements, important to containment, to be met during storage and handling of this packaging:

Keep fiberboard box, cushioning, and absorbent material dry

Keep bottles and lids clean

What document assures the requirements important to containment are met during storage and handling? WHC-WHAN-21-3, Rev 0, 8/14/91

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