DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	Packaging Engineering	Date 01/31/95
Project Title/Work Order		EDT No. 608462
Documentation and Analysis for Packaging Limited Quantity Ice Chests (WHC-SD-TP-DAP-006)		ECN No. NA

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
S. B. Dutta	L6-35	X			
D. L. Edwards	S3-90	X			
J. G. Field	G2-02	X			
L. M. Hay	G2-02	X			
J. G. Hogan	S3-90	X			
D. W. McNally	G2-03	X			
P. M. Nguyen	G2-02	X			
WHC-SD-TP-DAP-006	G2-02	X			
Central Files	L8-04	X			
OSTI (2)	L8-07	X			

FEB 16 1995

OSTI

MASTER

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, make any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

2. To: (Receiving Organization) Packaging Engineering	3. From: (Originating Organization) Packaging Engineering	4. Related EDT No.: NA
5. Proj./Prog./Dept./Div.: 84100	6. Cog. Engr.: P. M. Nguyen	7. Purchase Order No.: NA
8. Originator Remarks: This document is transmitted for approval.		9. Equip./Component No.: NA
11. Receiver Remarks:		10. System/Bldg./Facility: NA
		12. Major Assm. Dwg. No.: NA
		13. Permit/Permit Application No.: NA
		14. Required Response Date: 01/30/95

15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approval Designator	Reason for Transmittal	Originator Disposition	Receiver Disposition
1	WHC-SD-TP-DAP-006		0	Documentation and Analysis for Packaging Limited Quantity Ice Chests	SQ	1	1	

16. KEY					
Approval Designator (F)		Reason for Transmittal (G)		Disposition (H) & (I)	
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)		1. Approval	4. Review	1. Approved	4. Reviewed no/comment
		2. Release	5. Post-Review	2. Approved w/comment	5. Reviewed w/comment
		3. Information	6. Dist. (Receipt Acknow. Required)	3. Disapproved w/comment	6. Receipt acknowledged

(G)	(H)	17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)				(G)	(H)
Reason	Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	Reason	Disp.
4,1	4,1	Cog.Eng.: PM Nguyen		1/25/95	G2-02	LM Hay	4,1
4,1	4,1	Cog. Mgr.: JG Field		1/25/95	G2-02	LL Cole	4,1
4,1	4,1	QA: SB Dutta		1/31/95	L6-35		
4,1	4,1	Safety: DW McNelly		1-30-95	G2-03		
4,1	4,1	EF Votaw		1/31/95	G2-02		
4,1		DL Edwards			S3-90		
4,1	4,1	SS Shiraga		1/25/95	G2-02		

18. P. M. Nguyen <i>P. M. Nguyen</i> Signature of EDT Originator	19. Authorized Representative for Receiving Organization	20. <i>J. G. Field</i> Cognizant Manager	21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments
--	--	---	--

MASTER

ENGINEERING DATA TRANSMITTAL

Page 2 of 2

1. EDT 608462

2. To: (Receiving Organization) Packaging Engineering	3. From: (Originating Organization) Packaging Engineering	4. Related EDT No.: NA
5. Proj./Prog./Dept./Div.: 84100	6. Cog. Engr.: P. M. Nguyen	7. Purchase Order No.: NA
8. Originator Remarks: This document is transmitted for approval.		9. Equip./Component No.: NA
		10. System/Bldg./Facility: NA
11. Receiver Remarks:		12. Major Assm. Dwg. No.: NA
		13. Permit/Permit Application No.: NA
		14. Required Response Date: 01/30/95

15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approval Designator	Reason for Trans- mittal	Orig- inator Dispo- sition	Receiv- er Dispo- sition
1	WHC-SD-TP-DAP-006		0	Documentation and Analysis for Packaging Limited Quantity Ice Chests	SQ	1	1	

16. KEY											
Approval Designator (F)		Reason for Transmittal (G)				Disposition (H) & (I)					
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)		1. Approval 2. Release 3. Information		4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)		1. Approved 2. Approved w/comment 3. Disapproved w/comment		4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged			
(G)	(H)	17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)						(G)	(H)		
Reason	Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	Reason	Disp.
4,1	4,1	Cog.Eng.: PH Nguyen		1/25/95	G2-02	LH Key		1/25/95	G2-02	4,1	4,1
4,1	4,1	Cog. Mgr.: JG Field			G2-02						
4,1		QA: SB Dutta			L6-35						
4,1		Safety: DW McNally			G2-03						
4,1		EF Votaw			G2-02						
4,1	4,1	DL Edwards			S3-90						
4,1	4,1	SS Shiraga		1/25/95	G2-02						
18.		19.				20.		21. DOE APPROVAL (if required) Ctrl. No.			
P. M. Nguyen Signature of EDT Originator		Date 1/25/95				J. G. Field Cognizant Manager		Date 1/25/95			
		Authorized Representative Date for Receiving Organization						☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments			

RELEASE AUTHORIZATION

Document Number: WHC-SD-TP-DAP-006, Rev. 0

Document Title: Documentation and Analysis for Packaging Limited
Quantity Ice Chests

Release Date: 2/01/95

**This document was reviewed following the
procedures described in WHC-CM-3-4 and is:**

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

V. L. Birkland
V.L. Birkland

2/1/95

TRADEMARK DISCLAIMER. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

This report has been reproduced from the best available copy. Available in paper copy and microfiche. Printed in the United States of America. Available to the U.S. Department of Energy and its contractors from:

U.S. Department of Energy
Office of Scientific and Technical Information (OSTI)
P.O. Box 62
Oak Ridge, TN 37831
Telephone: (615) 576-8401

Available to the public from: U.S. Department of Commerce
National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161
Telephone: (703) 487-4650

SUPPORTING DOCUMENT		1. Total Pages 8
2. Title Documentation and Analysis for Packaging Limited Quantity Ice Chests	3. Number WHC-SD-TP-DAP-006	4. Rev No. 0
5. Key Words Limited Quantity, Ice Chests, International Air Transport Association (IATA), U.S. Department of Transportation (DOT)	6. Author Name: P. M. Nguyen <i>PMNguyen</i> Signature Organization/Charge Code 84100/E22975	
7. Abstract The purpose of this Documentation and Analysis for Packaging (DAP) is to document that ice chests meet the intent of the International Air Transport Association (IATA) and the U.S. Department of Transportation (DOT) <i>Code of Federal Regulations</i> as strong, tight containers for the packaging of limited quantities for transport.		
8. RELEASE STAMP <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> OFFICIAL RELEASE BY WHC DATE FEB 02 1995 <i>Sta. 21</i> </div>		

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	PACKAGE DESCRIPTION	1
2.1	PACKAGING	1
2.2	CONTENTS	1
3.0	DESIGN REQUIREMENT	2
4.0	TRANSPORTATION	3
4.1	MODE OF TRANSPORT, POINT OF ORIGIN, AND DESTINATION	3
4.2	REQUIREMENTS	3
5.0	EVALUATION	3
5.1	TESTING	3
5.1.1	Drop Test	3
5.1.2	Stacking Test	4
6.0	RECOMMENDATIONS	4
7.0	REFERENCES	5

LIST OF TABLES

1.	Drop Test Parameters	2
2.	Stacking Test Parameters	4

TERMS

CFR	<i>Code of Federal Regulations</i>
DAP	Documentation and Analysis for Packaging
DOT	U.S. Department of Transportation
IATA	International Air Transport Association
LTD QTY	limited quantities

DOCUMENTATION AND ANALYSIS FOR PACKAGING LIMITED QUANTITY ICE CHESTS

1.0 INTRODUCTION

This Documentation and Analysis for Packaging (DAP) substantiates that the ice chests meet the intent of the International Air Transport Association (IATA) and the U.S. Department of Transportation (DOT) *Code of Federal Regulations* (CFR) as strong, tight containers for packaging limited quantities (LTD QTY) for transport. This DAP also outlines the packaging method used to protect the sample bottles from breakage. Because the ice chests meet the DOT requirements, they can be used to ship LTD QTY on the Hanford Site in accordance with the *Hazardous Material Packaging and Shipping* manual, WHC-CM-2-14, or off the Hanford Site in accordance with DOT and IATA regulations.

2.0 PACKAGE DESCRIPTION

2.1 PACKAGING

The ice chests are commercial, off-the-shelf items. The ice chests have gross weight capacities of 25 kg (55 lb) and 29 kg (65 lb). The primary openings are covered by hinged lids and secured by latches.

Once the sample bottles are loaded and the lids closed, the entire perimeter of the lid-to-container interface is taped securely with duct tape to provide additional sealing of the ice chests.

2.2 CONTENTS

The contents of the ice chests must meet the definition of LTD QTY as provided by the regulations. Contents inside the ice chests are liquid samples contained in glass bottles. The sample bottle sizes range in size from 40 mL (1.35 oz) to 2,360 mL (79.80 oz).

Before shipping, each sample bottle shall be double wrapped in air bubble plastic wrap, the individually wrapped bottles placed in a plastic bag, and the plastic bag arranged in the ice chest. The ice chests will be kept cool with ice or an ice substitute.

3.0 DESIGN REQUIREMENT

The ice chests shall fulfill the design requirements specified in 49 CFR (see Section 4.2 of this DAP) and the requirements of the *IATA Dangerous Goods Regulations* (IATA 1993).

The performance standards applied in the *IATA Dangerous Goods Regulations* take into account conditions of transport characterized by the following severity levels:

- Conditions likely to be encountered in routine transport (incident-free conditions)
- Normal conditions of transport (minor mishaps)
- Accident conditions of transport

The performance standards include design requirements and tests (IATA 1993).

For the free drop test, the ice chests must be dropped in the orientation as to cause the maximum damage with respect to the safety features being tested. The height of the fall is measured from the lowest point of the ice chest to the ground and must not be less than the distance specified for the package mass as shown in Table 1:

Table 1. Drop Test Parameters.

Package Mass kg (lb)	Free Drop Distance m (ft)
5,000 (11,023)	1.2 (4)
≥ 5,000 to 10,000 (≥ 11,023 to 22,046)	0.9 (3)
≥ 10,000 to 15,000 (≥ 22,046 to 33,069)	0.6 (2)
≥ 15,000 (≥ 33,069)	0.3 (1)

Extracted from IATA Dangerous Goods Regulations (IATA 1993) except for English conversion.

For the stacking test, the ice chests must be subjected to a compressive load for 24 hours. The load must equal the following:

- For the 25-kg (55-lb) package, 124.74 kg (275 lb)
- For the 29-kg (65-lb) package, 147.42 kg (325 lb).

4.0 TRANSPORTATION

4.1 MODE OF TRANSPORT, POINT OF ORIGIN, AND DESTINATION

The ice chests with contents may be shipped by air or surface transportation. The authorized shipment is from the Hanford Site to a designated laboratory within the continental United States for analysis.

4.2 REQUIREMENTS

Transportation regulations and requirements applying to the general design and shipment of all packages containing hazardous materials are not provided here. It is the shipper's responsibility to ensure that shipments comply with all applicable regulations.

5.0 EVALUATION

This section evaluates the package after the demonstrational testing (see Section 3.0). The testing to be performed is specified in the *IATA Dangerous Goods Regulations* and 49 CFR. Also see Section 3.0 of this DAP. Documentation and pictures for the drop tests and stacking tests are on file with Packaging Engineering.

5.1 TESTING

5.1.1 Drop Test

Two ice chests, one weighing 25 kg (55 lb) and the other 29 kg (65 lb), were dropped from a height of 1.2 m (4 ft). They were dropped onto a unyielding horizontal surface in the orientation most likely to cause the greatest damage.

During the first drop, each ice chest contained:

- 4 1-L (0.26-gal) glass bottles
- 2 500-mL (16.90-oz) glass bottles
- 4 250-mL (8.45-oz) glass bottles

Each bottle, filled with ordinary tap water, was single wrapped in air bubble plastic. The bottles were then single bagged inside the ice chests. The bottom of each ice chest contained 2.54 cm (1 in.) of absorbent sand and the remaining space was filled with vermiculite.

However, when dropped, one bottle from each ice chest broke. Therefore, a second drop test was performed. The test procedure was the same except that the bottles were double wrapped in air bubble plastic. During this test, the ice chests and contents were not damaged.

5.1.2 Stacking Test

The 25-kg (55-lb) and 29-kg (65-lb) ice chests were subjected to a 24-hour stacking test. The equivalent of five times the mass of the actual package was stacked on top of the ice chest. The weights used in this test are shown in Table 2.

Table 2. Stacking Test Parameters.

Ice Chest Weight	Weight for Stacking Per IATA	Actual Weight Placed on Ice Chest
25 kg (55 lb)	124.74 kg (275 lb)	129.18 kg (284.80 lb)
29 kg (65 lb)	147.42 kg (325 lb)	153.29 kg (337.95 lb)

Extracted from IATA Dangerous Goods Regulations (IATA 1993) except for English conversion.

For the stacking test, the ice chests remained filled as for the second drop tests. Next, two ice chests containing lead "bricks," one 124.74 kg (275 lb) and the other 147.42 kg (325 lb), were stacked on top of the 25-kg (55-lb) and 29-kg (65-lb) ice chests, respectively. After the test, each ice chest was inspected. Neither sustained any damage.

6.0 RECOMMENDATIONS

It is recommended that the sample bottles be packaged in separate compartments using a method similar to that used by the soft drink industry for glass bottles, and foam or equivalent material line the insides of the ice chests. This would prevent the bottles from contacting each other and provide additional shock absorbency for the package.

7.0 REFERENCES

49 CFR 173, 1991, "Transportation," *Code of Federal Regulations*, as amended.

IATA, 1993, *International Air Transport Association Dangerous Goods Regulations*, 34th Edition, Effective January 1, 1993 through December 31, 1993.

IATA, 1994, *International Air Transport Association Dangerous Goods Regulations*, 35th Edition, Effective January 1, 1994 through December 31, 1994.

WHC-CM-2-14, *Hazardous Materials Packaging and Shipping*, Westinghouse Hanford Company, Richland, Washington.