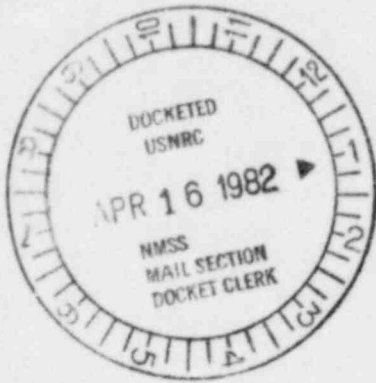


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GULF NUCLEAR, INC.
PACKAGE EVALUATION
MODEL R
TYPE B QUANTITIES

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CONTENTS

	<u>Page</u>
1 General Information	1
1.1 Introduction	1
2 Package Description	1
2.1 Packaging	1
2.2 Contents of Package	1
3 Structural Evaluation	2
3.1 Discussion	2
3.2 Design Criteria	2
3.3 Weight	2
3.4 Mechanical Properties of Materials	2
3.5 Chemical and Galvanic Reactions	2
3.6 Positive Closure	2
3.7 Lifting Devices	2
4 Hypothetical Accident Conditions	3
4.1 Free Drop	3
4.2 Functure	3
4.3 Thermal	3

APPENDIX

1 Drawing of Model R and 20V	4
2 Pictures of Drop Test	5
3 Pictures of Puncture Test	6-7
4 Pictures of Thermal Test	8-9
5 Approval Letter 20V, 40V and U-110, A,B and C	10-13
6 Witness	14

1 GENERAL INFORMATION

The enclosed information concerns a metal container which is an overpack that is used to transport Gulf Nuclear, Inc. Model 20-V, 40-V, 20-VS and 40-VS radiography devices and radiography source exchangers, Models U-110, U-110A, U-110B and U-110C. All of these devices are transported in the container Model R. The devices may contain up to 200 curies of Iridium-192.

1.1 INTRODUCTION

The container, Model R, will be used to transport up to 200 curies of Iridium-192. The radioactive material is contained in stainless steel capsules which meet special form requirements.

2 PACKAGE DESCRIPTION

2.1 Packaging

The outer container is a ten gallon drum, constructed of twenty gauge steel, an open head with bolt locking ring. There is a layer of urethane foam inside the drum that varies in thickness from $\frac{1}{2}$ inch to $2\frac{1}{2}$ inches. The foam serves two purpose; (1) a fireshield and (2) protects the inner container during transit.

2.2 Contents of Package

The inner containers have the following characteristics:

- (1) 20-V: A radiography device which has an outer aluminum case and a depleted uranium shield. The space between the uranium and case is filled with epoxy.
- (2) 40-V: Same construction as the 20-V with a slightly different uranium shield.
- (3) 20-VS: A radiography device which has an outer stainless steel case and a depleted uranium shield. The space between the uranium and case is filled with epoxy.
- (4) 40-VS: Same construction as the 20-VS with a slightly different uranium shield.
- (5) U-110: A device used to transport and exchange radiography sources in the field. An aluminum case similar to the 20-V, a depleted uranium shield. The inside space filled with epoxy.
- (6) U-110A, B and C: Same as the U-110 with slight difference in the locking mechanisms to accomodate radiography sources of different lengths.

3 STRUCTURAL EVALUATION

3.1 Discussion

The Model R package is a metal drum partially filled with urethane foam which adds strength and thermal protection. The inner containers house the radiation shielding material and their function is to protect the depleted uranium and to hold the radioactive source in the proper position within the shield.

3.2 Design Criteria

The outer package primary function is to aid in protecting the inner package. The drum prevents anyone from tampering with the inner devices. The inner devices have multi-use capabilities and serve at least two functions, transporting and source handling. Primary containment of the radioactive materials is provided by the sealed source itself. The radiation shielding is provided by the depleted uranium shield. The outer case of the inner container and the outer container (drum) protects the shield from inadvertent damage.

3.3 Weight

The weight of the package is sixty-five pounds.

3.4 Mechanical Properties of Materials

The drum is constructed of twenty gauge steel. The 20-V, 40-V and the U-110 series are devices with aluminum housing and uranium shields. The 20-VS and the 40-VS are stainless steel devices. The packaging material is poured in place urethane foam.

3.5 Chemical and Galvanic Reactions

There are no chemical or galvanic reactions with the materials of construction.

3.6 Positive Closure

The drum is equipped with a ring and bolt closure. The ring is also fixed with a lead seal.

3.7 Lifting Devices

There are no lifting devices on the package.

4 HYPOTHETICAL ACCIDENT CONDITIONS

4.1 Free Drop

The Gulf Nuclear, Inc. container, Model R, with a 20-V as the inside device was dropped thirty feet onto a $\frac{1}{4}$ inch thick steel plate placed on an eight inch thick concrete pade. The container maintained some physical damage; however, shielding and containment were not compromised (See Appendix 2).

4.2 Puncture

The container was dropped forty inches, striking a six inch diameter bar, eight inches long. Only minor damage occurred (See Appendix 3).

4.3 Thermal

The Model R container was suspended over a six foot diameter tank containing diesel fuel. The fuel was ignited and the fire maintained for thirty minutes. Temperature was monitored to insure that a 1475 degree Fahrenheit point was reached.

Results: The container was deformed and flammable gases were emitted from the container. These gases ceased to burn when the fire was extinguished. The 20-V remained intact with no visible damage (See Appendix 4).

APPENDIX 1

LOCK RING

20 GA.

URATHANE FOAM

20-V
40-V
20-VS
40-VS
UI10-SERIES

3"

10"

3"

REVISIONS			GULF NUCLEAR, INC.		
NO.	DATE	BY	MODEL R OVERPACK		
1					
2					
3			DRAWN BY MPA	SCALE 1/2	MATERIAL
4			CHK'D	DATE 2-5-82	DRAWING NO.
5			TRACED	APP'D	C-2