

1. GENERAL INFORMATION

1.1 Introduction

This application is in support of renewing Certificate of Compliance No. USA/9215/B(U), model NPI-20WC-6 MkII. The package is for shipment of special form sources (either cobalt-60 or cesium-137) and comprises a shielded inner container which fits snugly within an overpack. The overpack is made up of a Wooden Protective Jacket and a Steel Shell which encloses the Wooden Protective Jacket.

The package design is service proven; we estimate that the 9215 package has been used to make more than 3,500 shipments without an adverse incident.

The package is licensed for a maximum activity of 15,000 curies of cobalt-60 and the associated decay heat of 240 watts, or 20,600 Ci of cesium-137, and an associated decay heat of 97 watts.

1.2 Package Description

1.2.1 Packaging

The inner container serves as a transfer cask to exchange sources to and from various devices, irradiators and other casks, as well as providing a shielding and containment function during shipment. As a shipping/transfer cask, it is designated Model S/TC MkII. Each cask is numbered serially as TC-X. The overpack, consisting of both the Wooden Protective Jacket (WPJ) and the surrounding Steel Shell, is designated OP-Y, again numbered serially. Overpacks and inner containers are interchangeable and are used in any combination.

Figure 1.2.1 is a vertical section drawing of the Model NPI-20WC-6 MkII shipping packaging. Figure 1.2.2 is a horizontal section drawing. A vertical section of the S/TC is shown in Figure 1.2.3. The principal components of the packaging are identified in the drawings. Drawings of the S/TC (NPI 240122, Rev. H) and the overpack (NPI 240166, Rev. J) are included as attachments to this application and are referenced in Appendix 1.3.

The S/TC consists of a 3/8 inch thick spherical shell, 24 inches inside diameter, containing a chambered, shielded Drum Assembly held in place by two Cover Assemblies. The Drum Assembly fits into an 8¼ inch inside diameter by 3/16-inch-thick horizontally oriented cylinder, which forms a weldment with the S/TC Shell through a steel flange. The toroidal cavity formed by the horizontal cylinder houses the chambered source positioning Drum Assembly.

The Drum Assembly chambers carry the source holders, which may vary from one model of machine to another. The Drum Assembly is removable and can be

interchanged with another to provide for the different design of source holders. During shipment, the chambers, or section of chambers, that are not filled with source holders, are fitted with full diameter, steel-encased lead or tungsten alloy plugs and spacers, which restrict movement to less than 0.25 inches in any direction. The Drum Assembly, source holders, and plugs are secured in the container by Shielded Cover Assemblies, or End Covers, bolted to the Shell Assembly at both ends of the Drum Assembly containing cylinder. The bolted Cover Assemblies are sealed using silicone rubber gaskets.

The S/TC is enclosed within the overpack, consisting of a Wooden Protective Jacket surrounded by a Steel Shell. The WPJ is a right circular cylinder consisting of ¾" thick exterior grade, Douglas Fir Plywood Discs glued together with a resorcinol resin adhesive and nailed. In addition, the WPJ is reinforced with 16 axial, 5/8-inch diameter, full length steel rods. The WPJ has a plywood sidewall of six-inch minimum thickness and a plywood top and bottom, each of 8¼ inch thickness. The WPJ is surrounded by the 12-gauge Steel Shell. The Steel Shell has a flanged, bolted closure and 12 or more ½ inch vent holes; these are covered with durable, weatherproof tape, or fitted with plugs which relieve under pressure.

Welded to the bottom of the 12-gauge Steel Shell is an additional 8-gauge steel plate to which, in turn, are welded three skids fabricated from five-inch, ten pound I beams. The I beams provide the support for the package which can be lashed down and secured by blocking in a transport vehicle. Normal handling for loading and unloading the package is from beneath; for example, with a forklift truck. There are four tie down brackets attached to the Steel Shell. These are not intended as lifting devices but meet lifting device requirements. The lifting eye used for handling the Steel Shell lid is provided with a cover and seal to prevent its use to lift the package during regular transport.

The structural components of the S/TC Shell Assembly are constructed of ASTM A-516 Gr 70 and ASTM A-333 Gr 60 specification carbon steel made to fine grade practice. The removable drum is fabricated of austenitic stainless steel. The lead shielding employed in all components is pig lead, chemical grade.

The S/TC has a gross weight of approximately 3,400 pounds. The packaging gross weight is limited to 6,000 pounds, although the typical gross shipping weight is expected to be approximately 5,200 pounds. The packaging has no inner protrusions. The only protrusions beyond three inches from the surface of the Steel Shell are the lid lifting eye (six inches) and the skids (5 inches). The overall height of the packaging, including the lifting eye, is 59". The overall diameter, including the tie downs, is 54.5".

The cooling arrangement of the packaging is completely passive; no special hardware for cooling is required. The source heat is dissipated by a combination of conduction, convection, and radiation to the outer surface of the Steel Shell and thence to the surroundings. The maximum internal energy generation is 240 watts deposited almost completely within the S/TC.

The sources are encapsulated in stainless steel containers with welded closures. The encapsulation provides the principal containment. In addition, however, the Drum Assembly chambers of the S/TC are sealed during transport, using silicone rubber gaskets, which provide an additional containment barrier for normal transport and hypothetical accident conditions.

The entire shipping package is free of liquids and no special gases are required.

1.2.2 Contents of Packaging

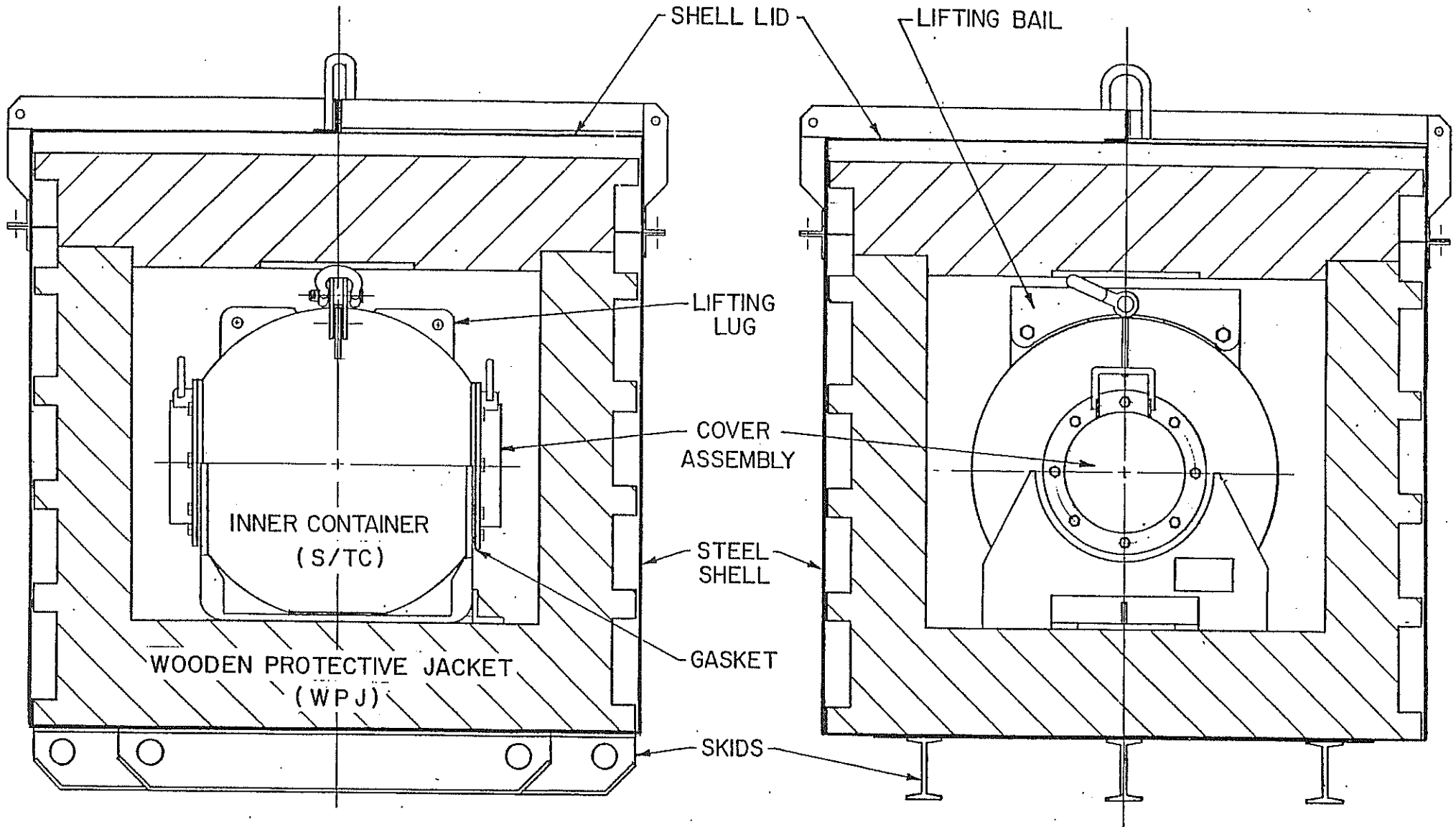
The packaging is for shipment of sealed sources (either cobalt-60 or cesium-137), which meet the requirements of special form as defined in 10 CFR 71. The Maximum package activity shall not exceed 15,000 curies of cobalt-60 or 20,600 Ci of cesium-137. The maximum internal decay heat generation shall not exceed 240 watts. Normal pressure is nominally atmospheric and, in any case, substantially below one atmosphere gauge.

1.2.3 Special Requirements for Plutonium

Not applicable.

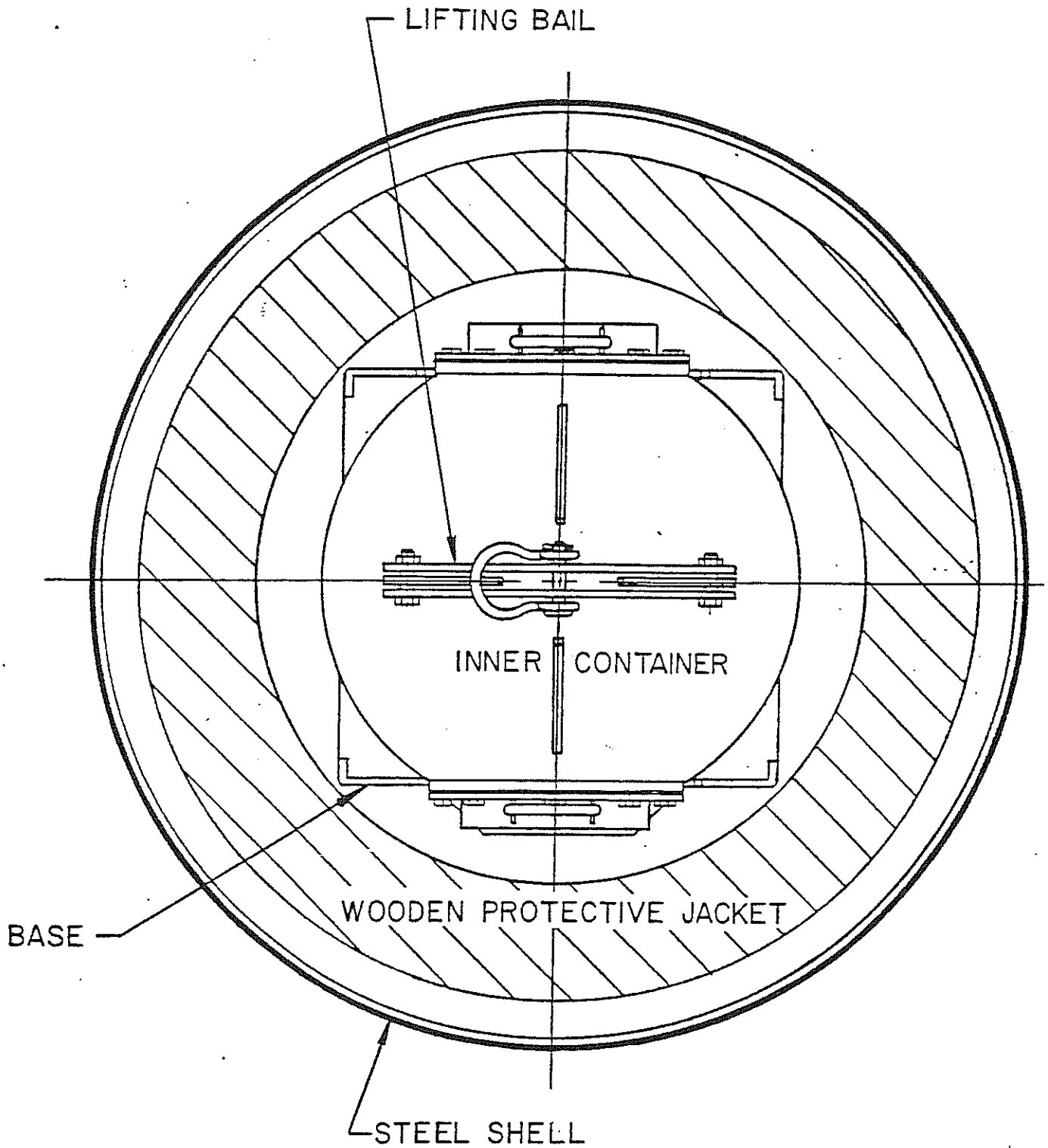
1.2.4 Operational Features

Not applicable.

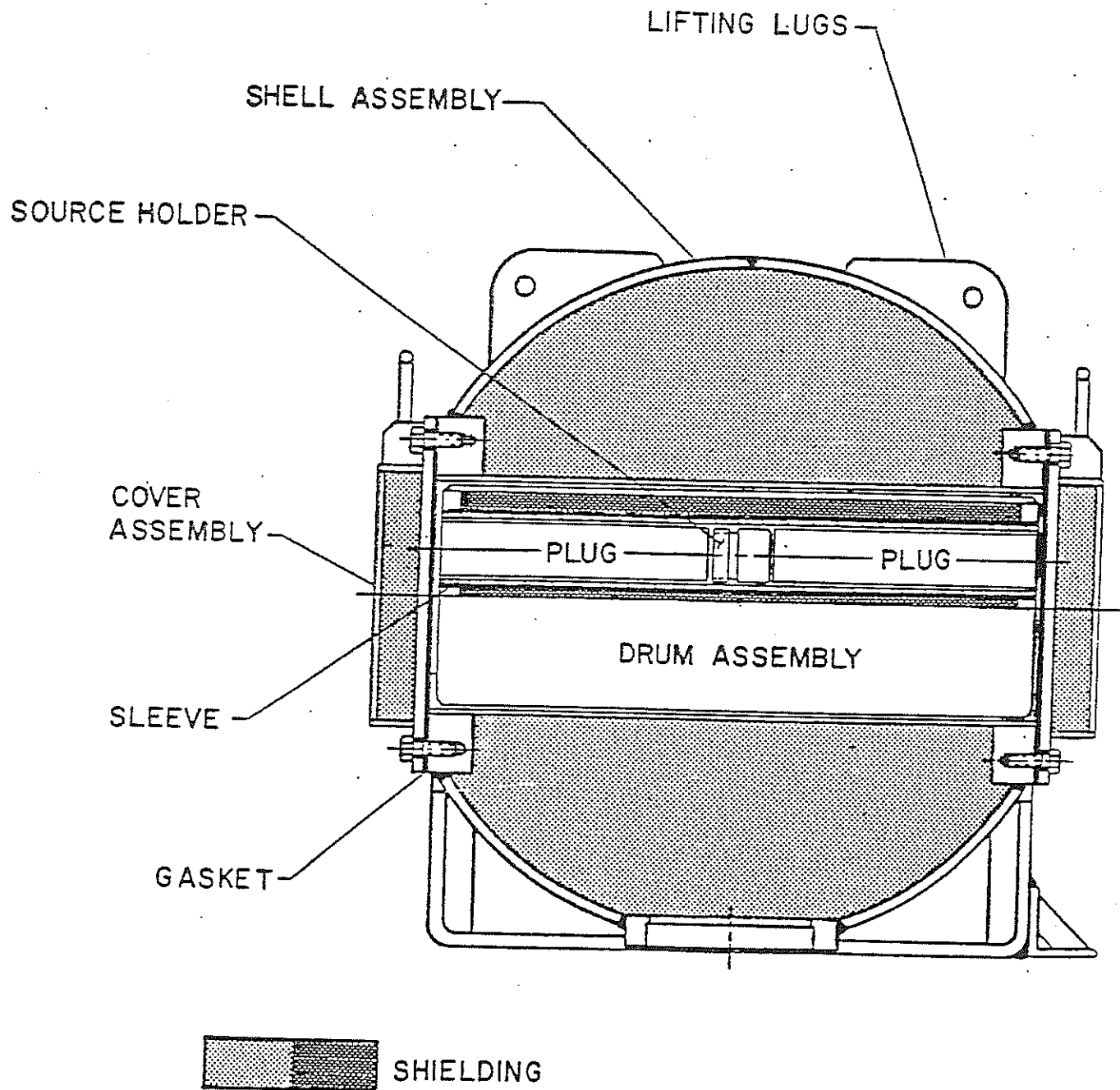


MODEL NPI-20WC-6MK II SHIPPING PACKAGE VERTICAL SECTION

FIGURE 1.2.1



MODEL NPI -20 WC - 6 / MK II SHIPPING PACKAGE
HORIZONTAL SECTION



S/TC INNER CONTAINER - VERTICAL SECTION

FIGURE 1.2.3

1.3 Appendix

1.3.1 Shipping transfer cask, Model S/TC MkII

NPI Drawing Number N-240122, Rev. H (attached)

1.3.2 Overpack

NPI Drawing Number 240116, Rev. J (attached)