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1.0 GENERAL INFORMATION

1.1 INTRODUCTION

The Traveller is a shipping package designed to transport non-irradiated uranium fuel assemblies or rods with enrichments up to 5.0 weight percent. It will carry several types of PWR fuel assemblies, VVER fuel assemblies, as well as either BWR or PWR rods. This is described further in Section 6. The proposed Criticality Safety Index (CSI) for the Traveller is 0.7 when transporting fuel assemblies and 0.0 when transporting loose rods. The following sections describe the package design and testing program in detail. Drawings are presented in Section 1.4.1. A generic sketch of the Traveller representing the package as prepared for transport is provided in Figure 1-7.

1.2 PACKAGE DESCRIPTION

1.2.1 Packaging

The Traveller package is designed to carry one (1) fuel assembly or one (1) pipe for loose rods. It is made up of three basic components: 1) an Outerpack, 2) a Clamshell, and 3) a Fuel Assembly or Rod Pipe. The Outerpack and Clamshell are connected together with a suspension system that reduces the forces applied to the fuel assembly during transport. The Rod Pipe is secured inside the Clamshell during transport of loose rods.

1.2.1.1 Package Types

There are three types of packagings in the Traveller family.

1.2.1.1.1 Traveller Standard (Traveller STD)

- Gross Weight = 4,500 pounds (2041 kg)
- Tare Weight = 2,850 pounds (1293 kg)
- Outer Dimensions = 197.0" length x 27.0" width x 39.3" height
  (5004 mm x 688 mm x 998 mm)

1.2.1.1.2 Traveller XL

- Gross Weight = 5,230 pounds (2,372 kg)
- Tare Weight = 3,255 pounds (1,476 kg)
- Outer Dimensions = 226.0" length x 27.1" width and 39.3" height
  (5740 mm x 688 mm x 998 mm)

1.2.1.1.3 Traveller VVER

- Gross Weight = 5,105 pounds (2316 kg)
- Tare Weight = 3,255 pounds (1476 kg)
- Outer Dimensions = 226.0" length x 27.1"width and 39.3" height
  (5740 mm x 688 mm x 998 mm)

1.2.1.2 Outerpack

The Outerpack is a structural component that serves as the primary impact and thermal protection for the Fuel Assembly. It also provides for lifting, stacking, and tie down during transportation. The Outerpack is a long tubular design consisting of a top and bottom half as shown in Figure 1-1. Each half consists of a stainless steel outer shell, a layer of rigid polyurethane foam, and an inner stainless steel shell. The stainless steel provides structural strength and acts as a protective covering to the foam. A typical cross-section showing key elements of the package is depicted in Figure 1-2.

The outerpack is comprised of independent impact limiters at the top end and lower end. Each end impact limiter is a system containing a pillow sub-assembly adjacent to 20 pcf polyurethane foam. The 20 pcf foam is encased by the package outerpack stainless steel skins. The top pillow sub-assembly consists of 6 pcf foam encased between two stainless steel plates to allow mating with the upper outerpack. A detail of the top pillow assembly is shown on 10004E58, sheet 6. The lower pillow assembly consists of 6 pcf foam encased in a stainless steel circular housing which allows mating with the lower outerpack. A detail of the lower pillow assembly is also shown on 10004E58, sheet 6.

The foam is a rigid, closed cell polyurethane that is an excellent impact absorber and thermal insulator and has well defined characteristics that make it ideal for this application. The steel-foam-steel “sandwich” is the primary fire protection, and is described in more detail in Section 3.

The inside of the Outerpack is lined with blocks of Ultra High Molecular Weight (UHMW) polyethylene. The polyethylene has a dual purpose. It provides a conformal cavity for the Clamshell and fuel assembly to fall into during low-angle drops. The clamshell is fastened to the lower Outerpack using shock absorbing rubber mounts. Polyethylene foam sheeting may be positioned between the clamshell and lower Outerpack to augment the shock absorbing characteristics for routine transport. A weather gasket between the mating surfaces of the upper and lower Outerpack provides a seal to prevent rain and water spray from entering the package.

The Traveller VVER Outerpack is identical to the Traveller XL Outerpack except that the shock mounts on the VVER are slightly smaller and stiffer. The Traveller VVER Outerpack utilizes a bolted bracket for attachment to the Clamshell versus just a bolt for the Traveller XL. This change was needed because the sway space inside the Traveller VVER package is smaller than the Traveller XL package. The shock mount spacing positions are identical for the Traveller VVER and the Traveller XL Outerpacks.

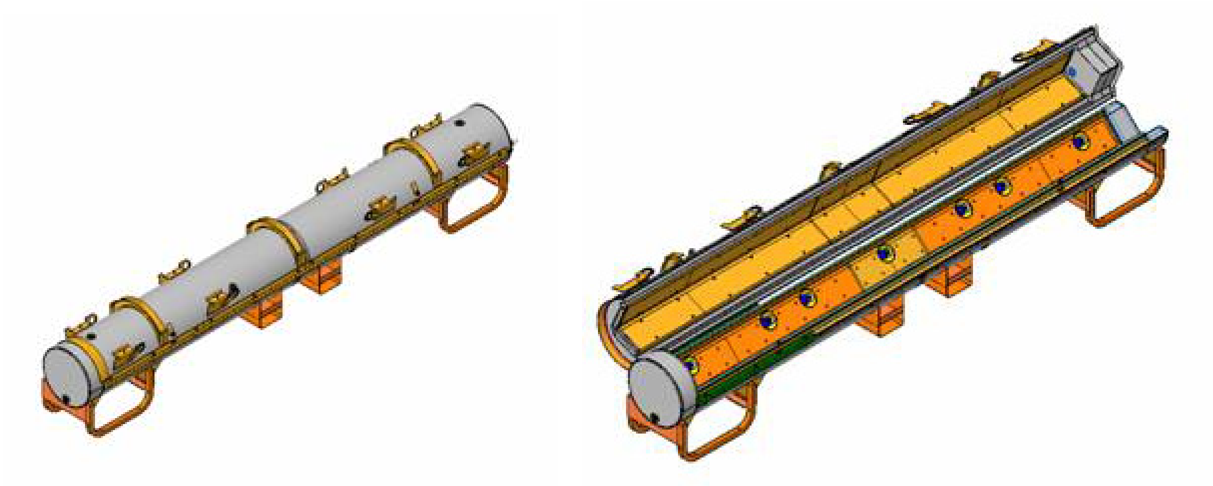


Figure 1-1 Outerpack Closed Position (left) and Opened Position (right)

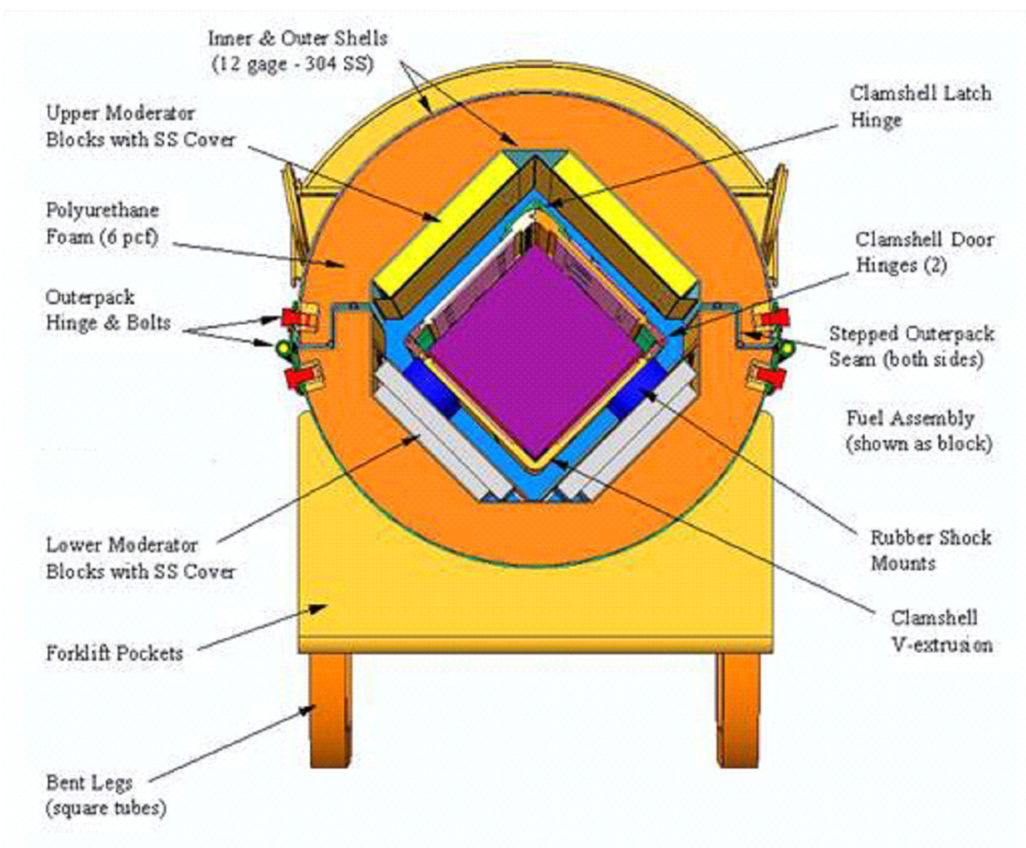


Figure 1-2 Outerpack Cross-Section View (typical) Clamshell

1.2.1.3 Clamshell

The purpose of the Clamshell is to protect the contents during routine handling and limit rearrangement of the contents in the event of a transport accident. During routine handling, the Clamshell doors open to load the contents and are secured with multi-point cammed latches and hinge pins. The Clamshell is a part of the confinement system that protects and restrains the fuel assembly or fuel rod tube contents during all transport conditions. During accident transport conditions the clamshell remains closed and the structure limits rearrangement of the fuel assembly. Neutron absorber plates are installed on the inside surface of the clamshell along the full length of each side.

There are two general types of clamshells used, a typical rectangular Clamshell, and a hexagonal VVER Clamshell. The rectangular Clamshell is used in both the Traveller STD and XL packages, with minor differences between the two which are described below. The VVER Clamshell is used in the Traveller VVER package. Within this document, "Clamshell" will reference the commonly used rectangular Clamshell, while any use of the VVER Clamshell will be specifically referenced as such.

1.2.1.3.1 STD and XL Clamshell

The Clamshell structural components consist of an aluminum "V" strong back, two aluminum panel doors, a small top "V" access door, bottom and top end plates, and a multi-point cammed latch closure mechanism. Piano type hinges (continuous hinges) connect each panel door and the small top "V" access door to the "V" strong back. The neutron absorber plates are secured to the clamshell with threaded fasteners. The absorber plates do not provide any structural strength to the clamshell. The "V" strong back and bottom plate are lined with a cork rubber pad to cushion the contents and prevent damage during normal handling and routine transport conditions.

The top plate of the clamshell has two configurations in order to accommodate different fuel types. Each uses a combination of flat head cap screws and tongue and groove joints to fasten securely to the clamshell. The Fixed Top Plate (FTP), shown in Figure 1-3, is secured directly to the top access door with cap screws.It has a tongue edge that fits into grooved shear bars that are attached directly to both faces of the clamshell base with cap screws. The Removable Top Plate (RTP), shown in Figure 1-4, has grooved edges all around, and mates with shear bars that are fastened to all four faces of the clamshell. The bottom plate is similarly secured to the clamshell base with cap screws. Closure is provided by tongue and groove joining with the clamshell doors.

The panel doors are secured by multi-point cammed latches that are spaced along the length of the clamshell. These mechanical fasteners consist of a cam latch on the right main door that engages a keeper on the left main door. The cam latch is rotated a quarter-turn to engage the keeper as shown in Figure 1-5. A wave spring washer prevents inadvertent movement of the cam latch. There are 9 cam latches on the Traveller STD clamshell and 11 cam latches on the Traveller XL clamshell. The top access door is secured with a short hinge pin inserted into the hinge knuckles when the small top access door is closed.

Clamping mechanisms that interface with the contents provide axial and lateral restraint during all transport conditions. An adjustable, threaded rod clamping device provides axial restraint at the top of the fuel assembly or rod tube. The design of the top axial restraint components, as shown in Figures 1-5A, 1-5B, and 1-5C, depends on the clamshell top plate configuration (FTP or RTP) and the fuel assembly type. An additional restraint may be added to secure core components (reactor core control components or secondary source rods) when shipped within the fuel assembly. Rubber pads are positioned at axial locations along the inside of the clamshell doors to restrain lateral movement. These restraints, referred to as grid pads, are positioned to match the mid-grid locations for each fuel assembly type.

Traveller XL clamshell dimensions accommodate both the longer fuel designs and fuel designs with a larger cross section dimensions. The longer length may be adapted for shorter fuel assembly designs that are normally shipped in the Traveller STD by adding an aluminum spacer component as shown in Figure 1-5D. The spacer is placed on the bottom end plate to elevate the fuel assembly in the longer clamshell so it can be secured with the axial restraints at the top of the clamshell. The larger cross section dimension may be adapted for fuel assemblies with smaller cross sections by adding fuel spacer assemblies in the aluminum "V" strong back as shown in Figure 1-5E.

1.2.1.3.2 VVER Clamshell

The VVER Clamshell is similar in build to the standard Clamshell, however it has been designed for the transport of hexagonal fuel assemblies. A comparison of the two can be seen in Figure 1-5F. The VVER Clamshell consists of an aluminum strong back and two aluminum panel doors, bottom and top end plates, and a similar multi-point cammed latch closure mechanism as is used in the standard Clamshell. The VVER Clamshell also uses piano type hinges to connect each panel door to the strong back, and neutron absorber plates are likewise installed on each side of the VVER Clamshell using threaded fasteners. The strong back and bottom plate are also lined with a cork rubber pad to prevent damage during normal transport conditions.

The VVER Top Plate (VTP) also utilizes a combination of locking mechanisms and tongue and groove joints to fasten itself to the VVER Clamshell. As is shown in Figure 1-5G, the VTP has a grooved tongue edge which slides into a shear lip that is directly fastened to the base of the VVER Clamshell. The top plate is then secured to the shear lip by a pair of quarter-turn locking knobs, see Figure 1-5H. These knobs are simply rotated 90-degrees for either the open or closed positions. A wave spring under each knob prevents them from inadvertently rotating. The bottom plate is secured to the clamshell with cap screws, and closure is provided by a tongue and groove joining with the VVER Clamshell doors.

The main doors of the VVER Clamshell operate in the same manner as the standard Clamshell, and are secured with identical locking mechanisms, see Figure 1-5I. There are 9 cam latches on the VVER Clamshell.

Lateral and axial clamping mechanisms exist to provide restraint for the contents during all transport conditions. A circular clamping plate provides axial restraint at the top of the fuel assembly, shown in Figure 1-5J. This clamping plate is adjustable by using the center clamp plate stud installed on the VTP, which lowers the clamp until it contacts the fuel assembly. This is similar in operation to the axial restraint shown in Figure 1-5B. A jam nut is used to keep the stud from turning during shipment. Rubber pads are positioned at axial locations along the inside of the VVER Clamshell doors to restrain lateral movement. Similar to the standard clamshell, these restraints (grid pads) are positioned to match the mid-grid locations for each assembly type.

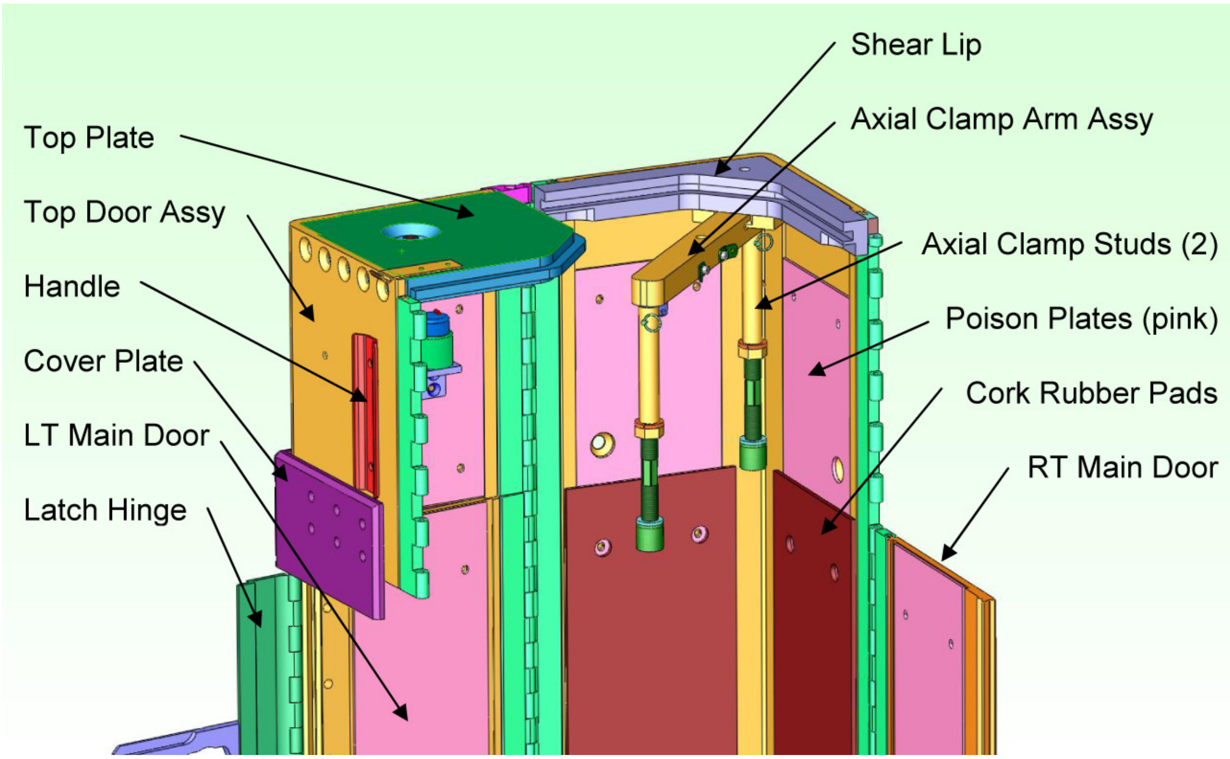
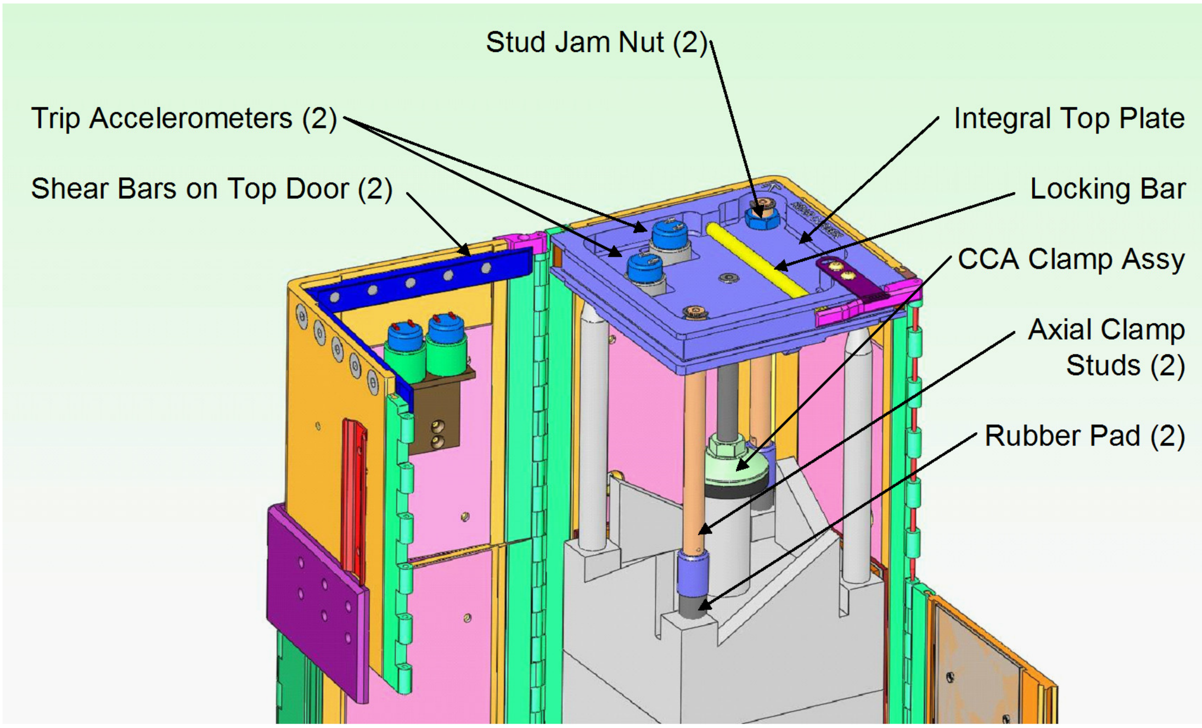


Figure 1-3 Clamshell with Fixed Top Plate (FTP)



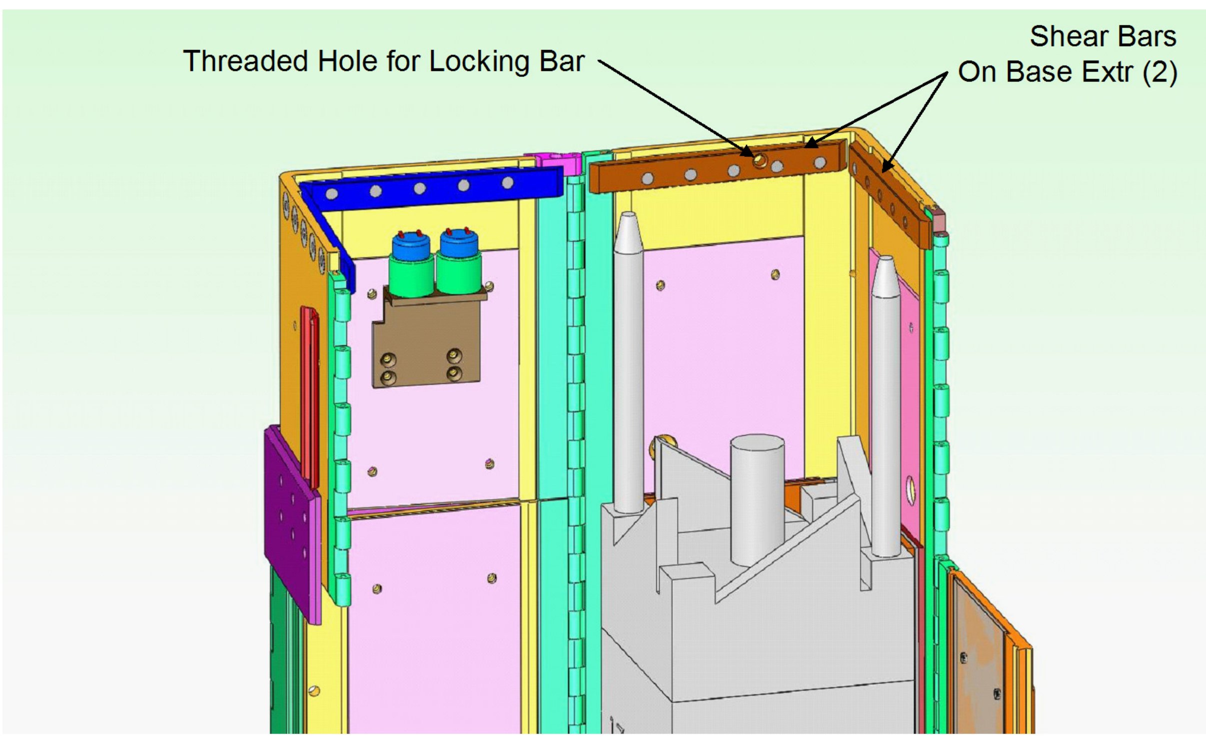


Figure 1-4 Clamshell with Removable Top Plate (RTP)

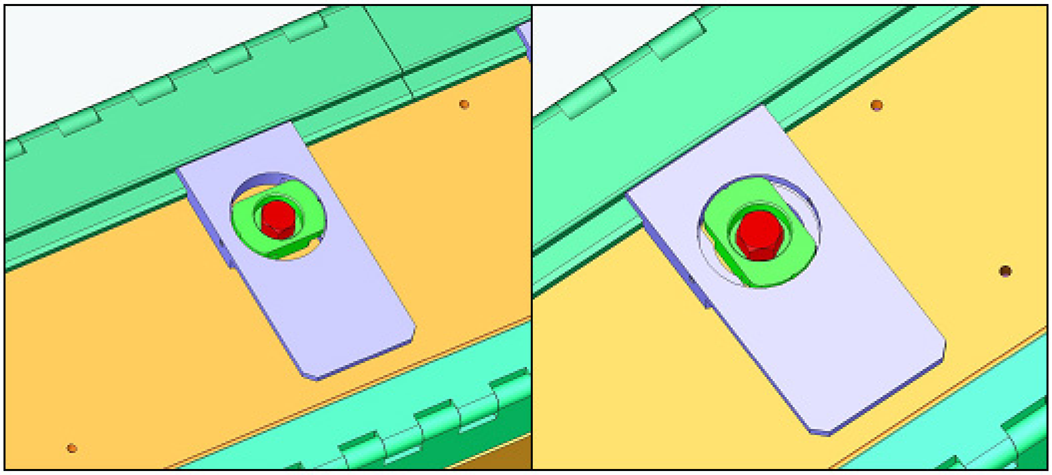
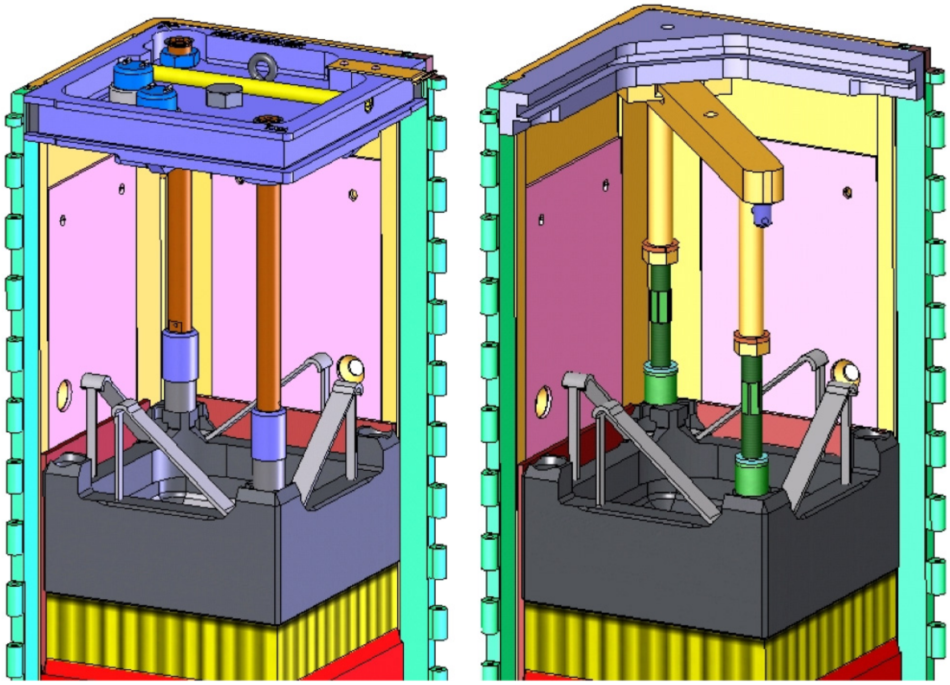
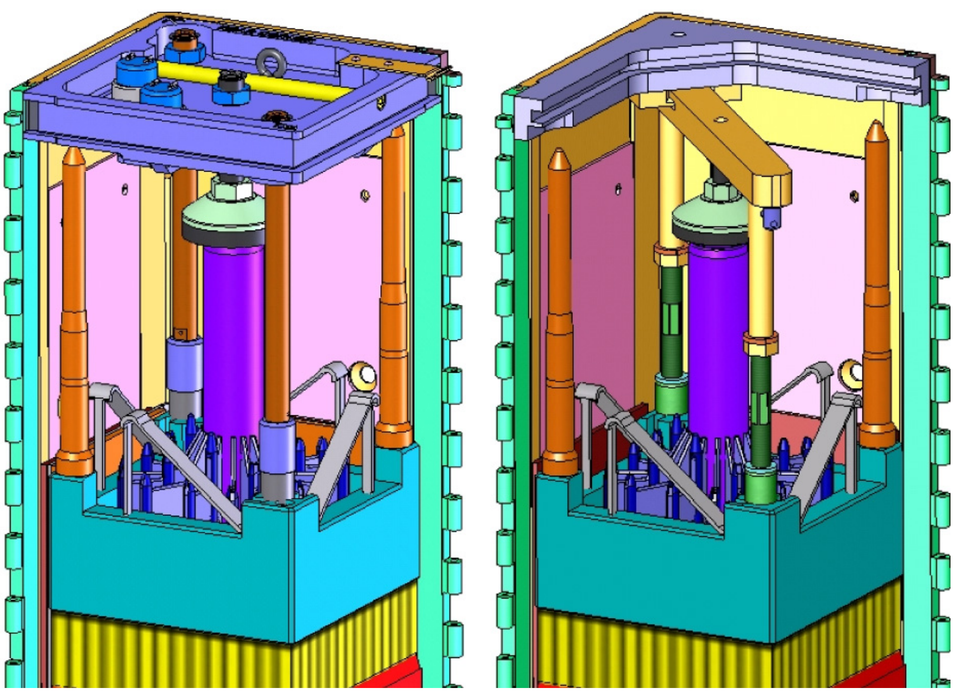


Figure 1-5 Clamshell Latch Locked Position (left) and Open Position (right)



Fuel Assembly



Fuel Assembly with Spider-Body Core Component

Figure 1-5A Corner Post Axial Restraint – Removable Top Plate (left), Fixed Top Plate (right)

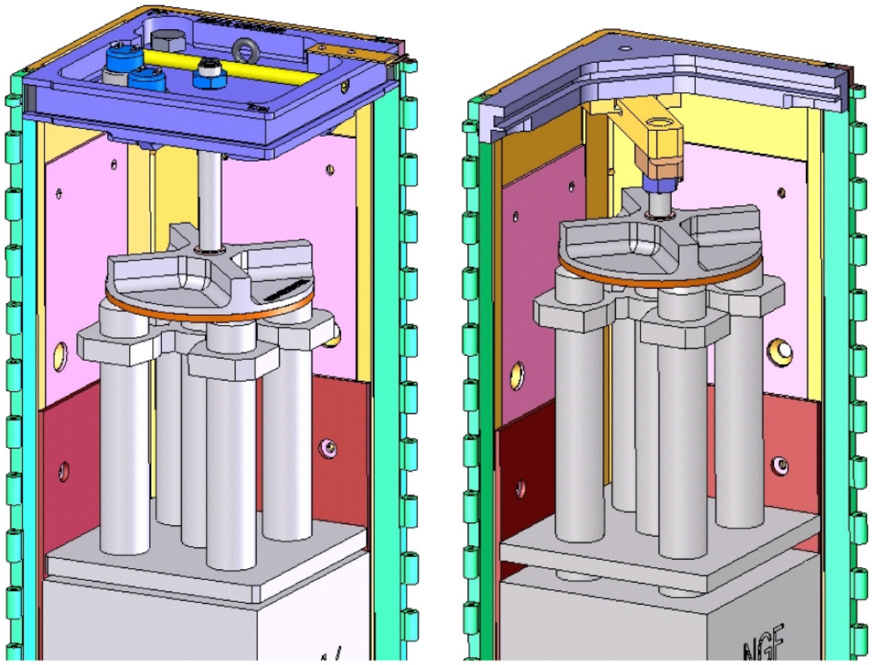


Figure 1-5B Center Plate Axial Restraint – Removable Top Plate (left), Fixed Top Plate (right)

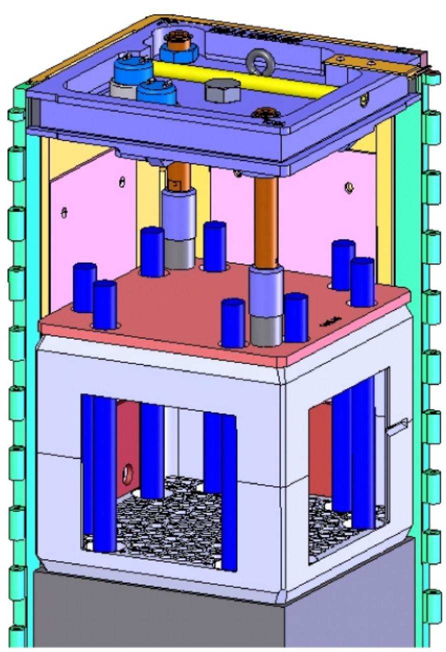


Figure 1-5C ATOM Corner Post Axial Restraint

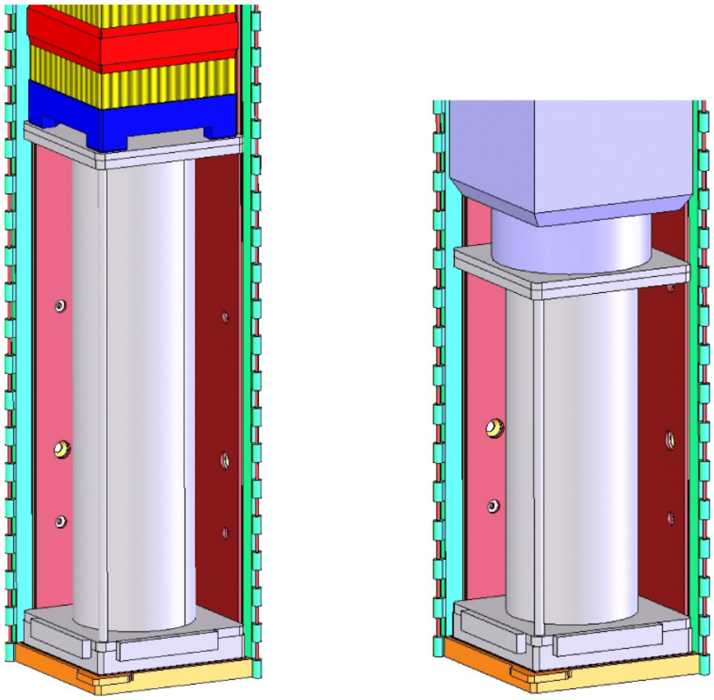


Figure 1-5D Axial Spacer Assembly (length depends on fuel assembly type)

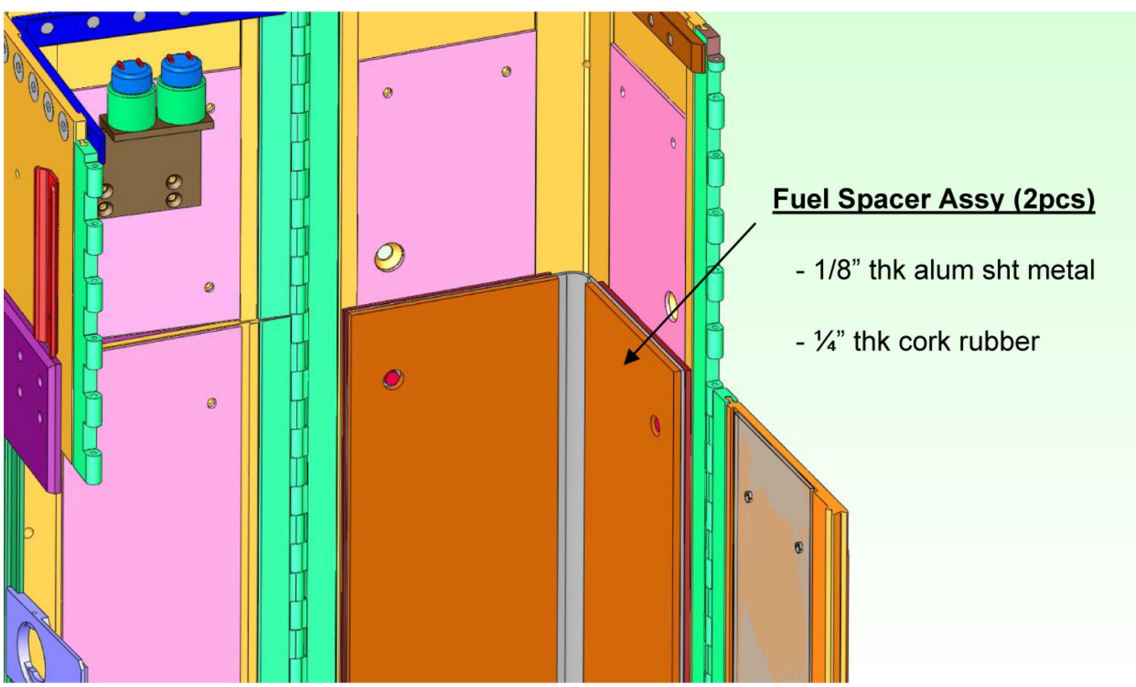


Figure 1-5E XL Clamshell Fuel Spacer Assembly

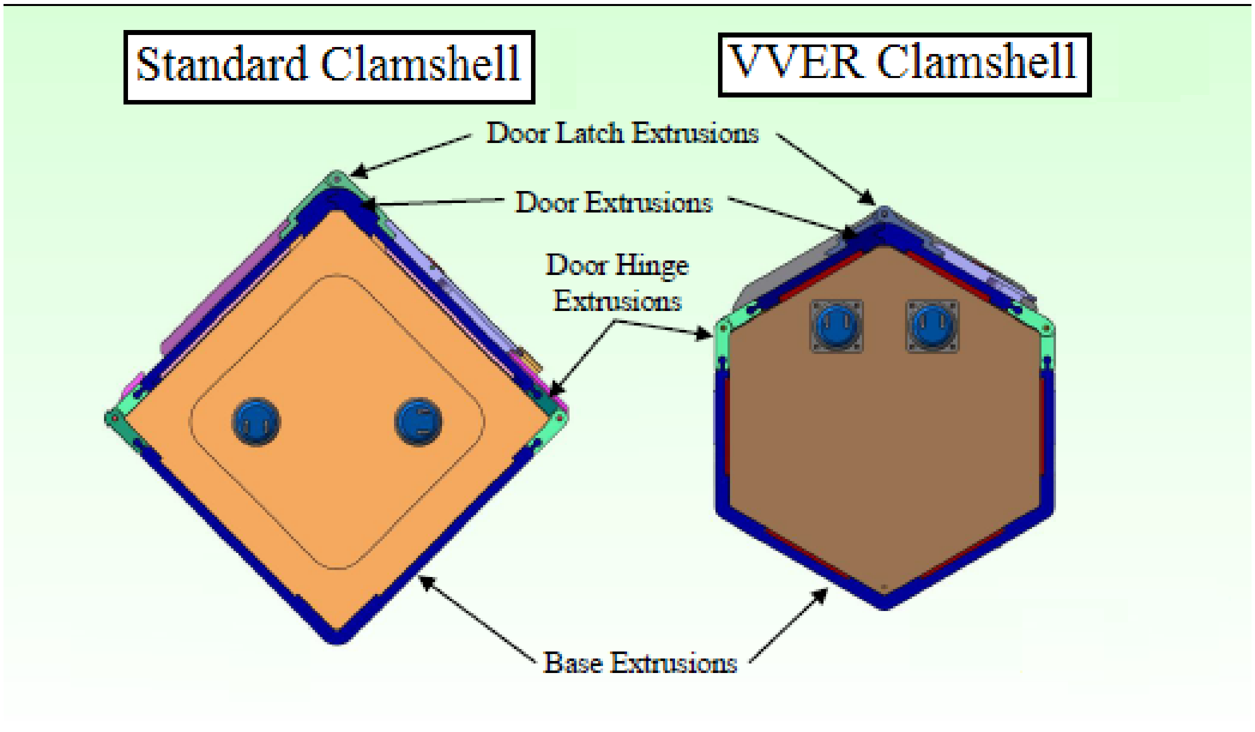


Figure 1-5F Comparison of Standard Clamshell to VVER Clamshell

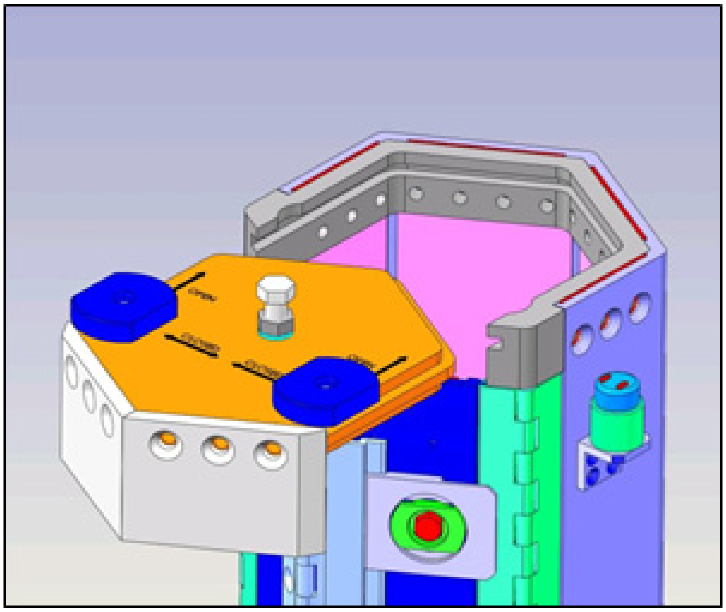


Figure 1-5G VVER Clamshell with VVER Top Plate (VTP)

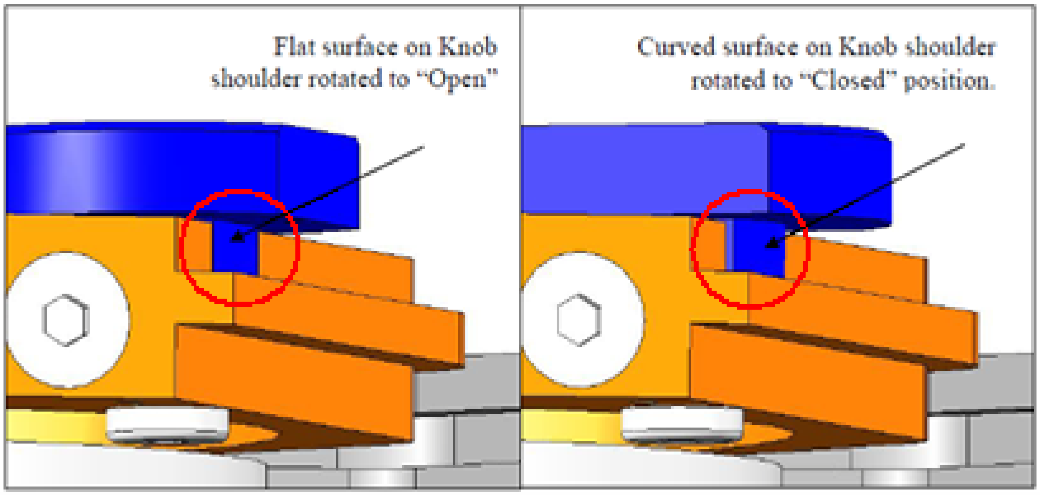


Figure 1-5H VTP Locking Mechanism

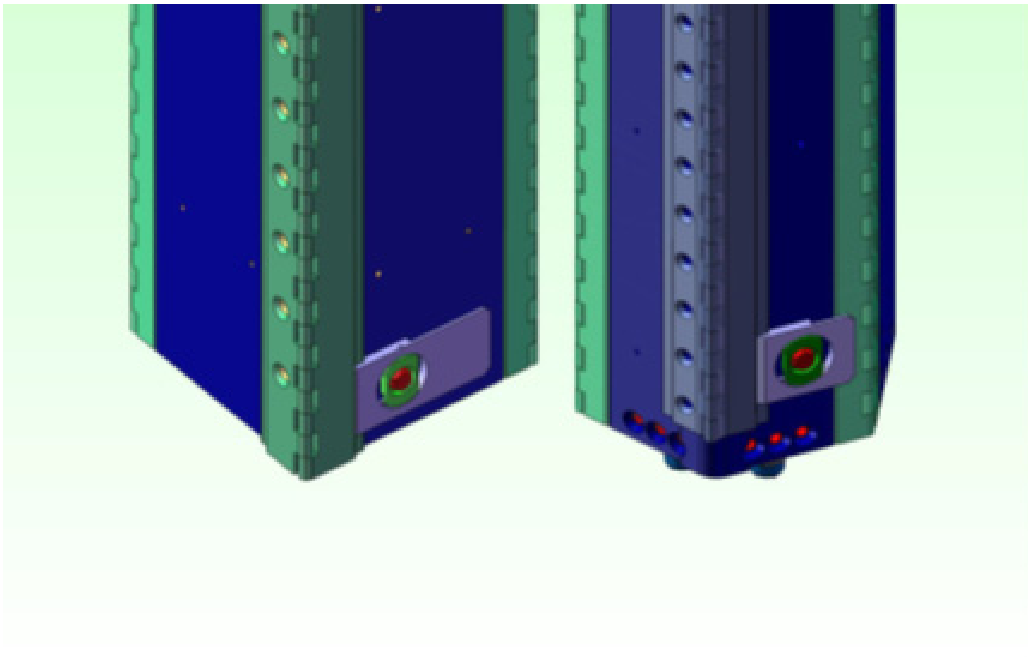


Figure 1-5I Comparison of Clamshell Door Hinges and Latches

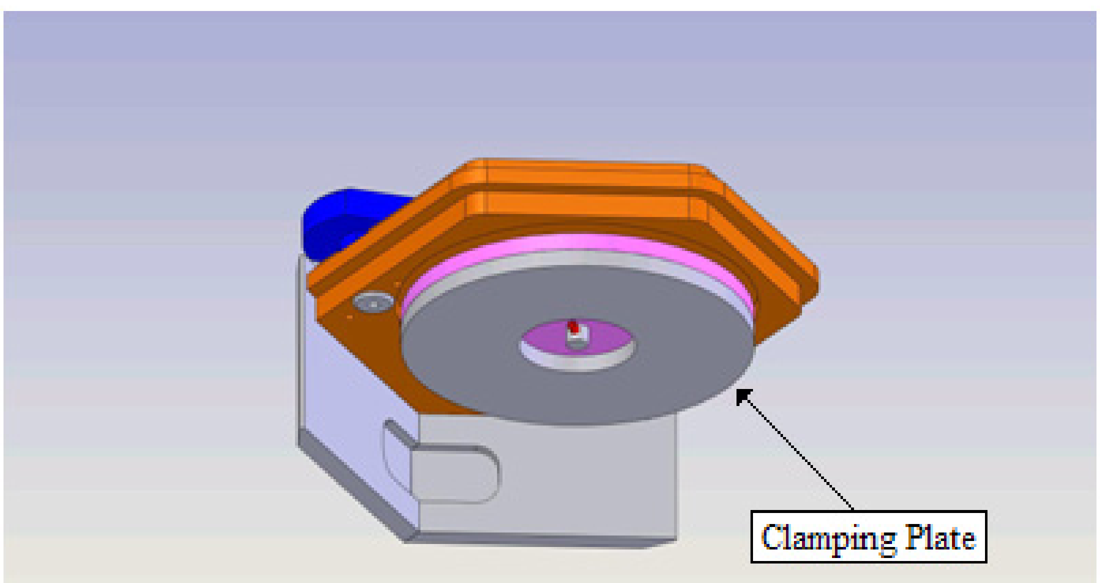


Figure 1-5J Axial Clamp as Installed on VTP

1.2.1.4 Rod Pipe

The Traveller is designed to carry loose rods using the rod pipe shown in Figure 1-6. The rod pipe consists of a 6" (15.2 cm) standard 304 stainless steel, Schedule 40 pipe, and standard 304 stainless steel closures at each end. The closure is a 0.25 inch (6.35 mm) thick cover secured with Type 304 stainless steel hardware to a flange fabricated from 0.25 inch (6.35 mm) thick plate.

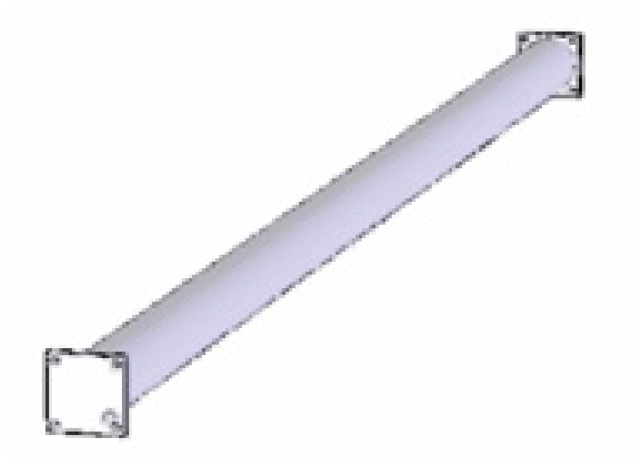


Figure 1-6 Rod Pipe

The rod pipe is held in place by clamshell restraining devices. Axial restraint is provided by the axial clamp assembly shown on Sheet 7 of 9 of drawing 10004E58. The axial clamp arm is bolted into the top shear lip and contact the fuel rod pipe is performed by an adjustable jack screw. Lateral and vertical restraint is accomplished through the use of removal rubber pads located inside the clamshell door lip in conjunction with the latch assemblies on the clamshell doors. The rubber pads are of varying thickness to accommodate the loose rod shipping pipes. The rod pipe design has a maximum loaded weight of 1650lb (748kg).

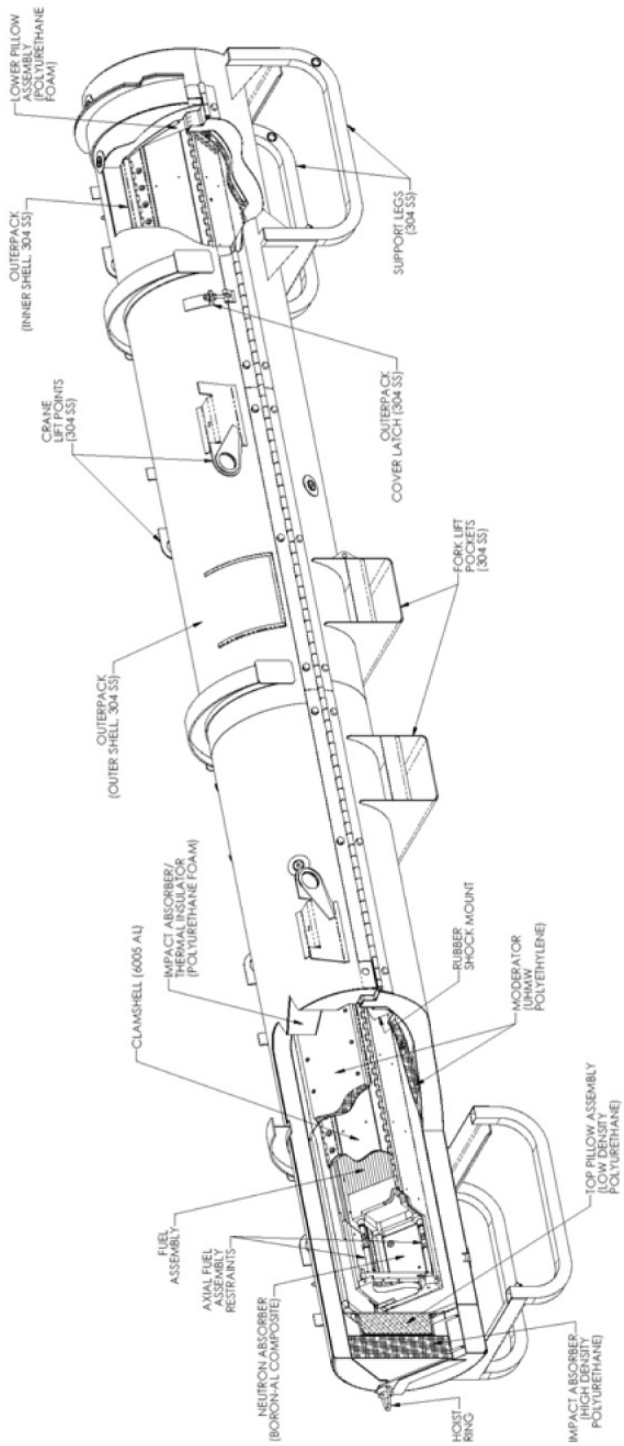


Figure 1-7 Generic Sketch of Traveller Representing the Package as Prepared for Transport

1.2.2 Containment System

The Containment System is described in both IAEA Regulations for the Safe Transport of Radioactive Material, Safety Standard Series No. TS-R-1 (213) and the Code of Federal Regulations, Title 10, Part 71.4 as, “the assembly of components of the packaging intended to retain the radioactive material during transport.” The Containment System for the Traveller is the fuel rod. Containment is described in greater detail in Section 6.

1.2.3 Contents

Westinghouse Electric Company provides fuel assembly designs that are transported in the Traveller for use in pressurized water reactors (PWR). The general configuration and dimensions of the PWR fuel assembly designs are similar, but there are unique features in some of the components of the fuel assembly. A typical PWR fuel assembly is shown in Figure 1-8.

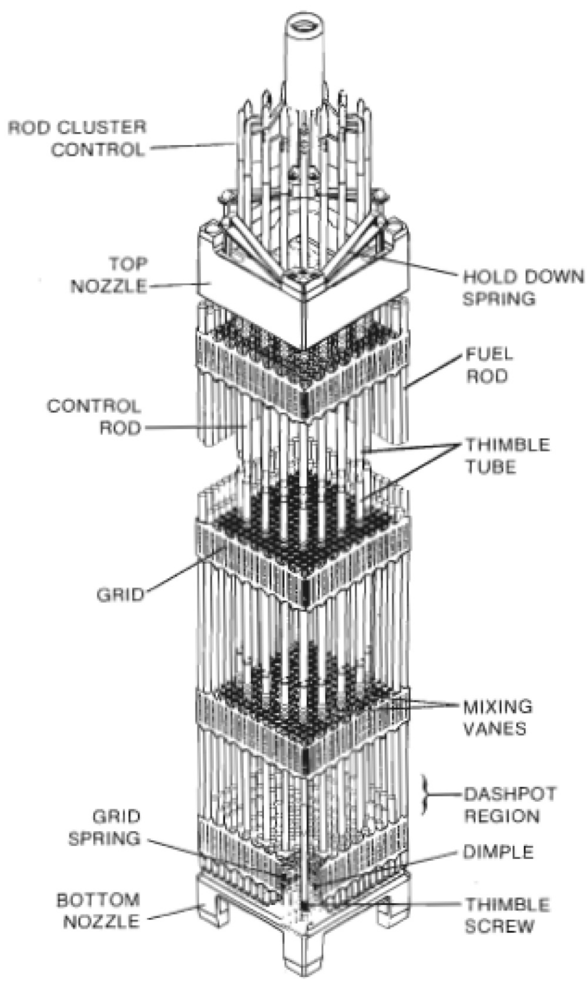


Figure 1-8 Cutaway of 17x17 Optimized Fuel Assembly with RCC

1.2.3.1 Type and Form

The contents is a single PWR fuel assembly and fuel rods. Fuel rods are transported in a fuel rod pipe. Any number of fuel rods may be transported in a fuel rod pipe. Fuel rods include designs for both pressurized water reactors (PWR) and boiling water reactors (BWR). For the range of fuel rod diameters (0.37 – 0.45 inch) the maximum number of fuel rods that fit inside the rod pipe is 250 to 170 fuel rods. The actual number of fuel rods placed in a rod pipe is less than this because some space is required to accommodate the packaging materials and allow for handling fuel rods. The PWR fuel assembly may be transported with reactor core components A single fuel assembly with non-fissile base-plate mounted core components or spider-body core components, or a single fuel rod pipe is transported in a package. The core components include rod cluster control (RCC) assemblies and secondary source rods that are not radioactive material. In addition, any of the fuel rods is a fuel assembly may be replaced by a solid stainless steel rod. The maximum contents weight is 748 kg (1,650 lbs) for a Traveller STD, and 894 kg (1,971 lbs) for a Traveller XL, and 839 kg (1,850 lbs) for a Traveller VVER.

1.2.3.1.1 Fuel Pellets

The fuel pellet is composed of enriched uranium dioxide powder that is compacted by cold pressing and then sintered to attain the required density. The sintered uranium dioxide is chemically inert at reactor temperatures and pressures. Slightly dished ends of each pellet permit axial expansion at the center of the pellets.

1.2.3.1.2 Fuel Rod

Uranium dioxide pellets are inserted into a zirconium alloy tube, and each end of the tube is sealed by welding on an end plug to form a fuel rod. The pellets are prevented form shifting during handling and shipment by a compression spring located between the top of the fuel pellet stack and the top end plug.

The fuel rod is designed as a pressure vessel. Fuel rod pre-pressurization which reduces fuel and cladding mechanical interaction significantly reduces the number and extent of cyclic stresses experienced by the cladding. The result is a marked extension of the fatigue life margin of cladding with enhanced cladding reliability. A representative nominal internal pressure of fuel rods at room temperature conditions is 2.62 MPa (380 psig). There is no pressure relief device that would allow radioactive contents to escape.

The ASME Boiler and Pressure Vessel Code, Section III, is used as a guide in the mechanical design and stress analysis of the fuel rod. The rod is designed to withstand the applied loads, both external and internal. The fuel pellet is sized to provide sufficient volume within the fuel tube to accommodate differential expansion between fuel and cladding. Welds of the fuel rods are verified for integrity by such means as X-ray inspection, ultrasonic testing, or process control.

1.2.3.1.3 Fuel Assembly

A square or hexagonal array of fuel rods that are structurally bound together in a skeleton constitutes a fuel assembly. The skeleton consists of thimble tubes, spring clip grids, a top nozzle, bottom nozzle and other hardware (i.e., springs, nuts, etc.). Control rod thimbles replace fuel rods at selected spaces in the array and are fastened to the top and bottom nozzles of the assembly. Spring clip grid assemblies are fastened to the guide thimbles along the height of the fuel assembly to provide support for the fuel rods. The fuel rods are contained and supported, and the rod-to-rod centerline spacing is maintained within this skeletal framework.

The bottom nozzle of the fuel assembly controls flow distribution in the reactor core and also serves as the bottom structural element. The top nozzle functions as the fuel assembly upper structural element and forms a plenum space where the heated reactor coolant is mixed and directed toward the flow holes in the upper core plate.

The spring clip grids provide support for the fuel rods in two perpendicular directions. Each rod is supported as six points in each cell of the grid. Four support points are fixed: two on onside of the grid strap, and two similarly located on the adjacent side. Two more support points are provided by spring straps located opposite the fixed points. Each spring strap exerts a force on the fuel rod such that lateral fuel rod vibration is restrained. Because the fuel rods are not physically bound to the support points, they are free to expand axially to accommodate thermal and radiation growth.

All fuel assemblies employ the same basic mechanical design. While all assemblies are capable of accepting control rod clusters, these are not used in every fuel assembly. Selected fuel assemblies have neutron sources or burnable absorber rods installed in the control rod guides thimbles. Fuel assemblies not containing either control rod clusters, source assemblies, or burnable absorbers rods, are fitted with plugs in the upper nozzle to restrict the flow through the vacant control rod guide thimbles. Fuel assemblies may be shipped with any of these core components, except for primary neutron source rods which contain Californium-252 that requires a package with radiation shielding features.

The fuel assembly design provides optimum core performance by minimizing neutron absorption in the structural materials and maximizing heat transfer capabilities. Mixing vane grids increase the heat transfer capability of the fuel rods. High fuel utilization is achieved by minimizing the parasitic absorption of neutrons in the core. The only structural materials in the fuel region are the spring clip grids, control rod guide thimbles, and fuel cladding. Zirconium alloys are used because they absorb relatively few neutrons and have good heat transfer properties.

1.2.3.1.4 Rod Cluster Control Assemblies

Rod cluster control (RCC) assemblies are used for reactor startup or shutdown, to follow load changes, and to control small transient changes in reactivity. The control elements of the RCC assembly consists of cylindrical neutron absorber rods (control rods, having approximately the same dimensions as a fuel rod and connected at the top by a spider-like bracket to form rod clusters. The control rods, which are stainless steel tubes encapsulating a neutron absorber material, extend the fuel length of the fuel assembly when fully inserted.

1.2.3.1.5 Burnable Absorber

Aluminum oxide-boron carbide burnable absorber material in placed the fuel assembly to provide additional reactivity control during reactor cycles. This material depletes during the reactor cycle in the same fashion as uranium-235.

1.2.3.1.6 Reactor Startup Neutron Sources

Reactor startup neutron sources must be used because of fuel configuration and the initially low core activity.

Neutron sources are of two types: 1) a primary source, which is active for initial reactor startup and startup early in the life of the first core; and 2) a secondary source, used for later startup of the reactor and which is activated during the operation of the reactor. The primary source normally are a californium isotope. The secondary sources contain a mixture of antimony and beryllium (Sb-Be).

The primary and secondary sources are similar to a control rod in mechanical construction. Both types of source rods are clad in stainless steel. The secondary source rods contain Sb-Be pellets which are not initially active. The primary source rods contain sealed capsules of source material at a specified axial position. Cladding encapsulation is completed by seal-welding the end plugs.

1.2.3.2 Maximum Quantity of Material per Package

The maximum quantity of radioisotopes in the contents of the package is limited to such quantity that is contained in a single fuel assemblies or the maximum number of fuel rods that may be transported in a fuel rod pipe. The fissile material is low enriched uranium less than 5 wt% uranium-235. The maximum quantity of fissile material is contained in approximately 32 kg of uranium-235. The fuel pellets are fabricated from Enriched Commercial Grade uranium as defined in ASTM C 996 (Ref. 1) and summarized in Table 1-1. Individual fuel rods are wrapped in a protective plastic sleeve. When the rod pipe is filled with the correct number of rods, a plastic disc is inserted to protect the ends of the fuel rods. The space between the plastic disc and the rod pipe is filled with "bubble wrap" so that the rods are secured axially. Fuel assemblies are wrapped in a polyethylene sleeve.

Table 1-1. Contents Specification

	Enriched Commercial Grade
U-232	0.0001 μg/gU
U-234	11.0×10^3 μg/g^{235}U
U-236	250 μg/gU
Tc-99	0.01 μg/gU
Alpha Activity Np / Pu	< 0.4 Bq/gU
Total Gamma Activity	< 5000 MeV Bq/kg

Enriched commercial grade uranium contents is unirradiated uranium with an A2 value that is unlimited on the basis of the isotopic mixtures given in ASTM C996. Enriched commercial grade uranium is a Type A quantity of radioactive material irrespective of the quantity of radioactive material.

Packing materials which have a moderating effectiveness greater than water, such as polyetheylene sleeves and dunnage used to protect the fuel assembly or rod contents during transport, are limited as follows:

- Such hydrogen dense packing materials must have a moderating effectiveness which is less than or equal to polyethylene;
- For PWR fuel assemblies, such material is limited to a maximum of 2.17 kg per package;
- For loose rods, such material is limited to a maximum of 8.49 kg per package;
- For VVER fuel assemblies, such material is limited to a maximum of 3.98 kg per package.

1.2.4 Operational Features

Fork lift pockets and tubular legs are attached to the bottom Outerpack. Stacking brackets, which double as lift points, are attached to the top Outerpack and are located in eight (8) locations. The package must be uprighted onto one end for loading and unloading. Two lifting points are attached to the top nozzle end of the top Outerpack.

1.3 GENERAL REQUIREMENTS FOR ALL PACKAGES

1.3.1 Minimum Package Size

The smallest overall dimension of the Traveller packages is outer shell diameter, approximately 25 inches (64 cm). This dimension is greater than the minimum dimension of 4-inches specified in 10 CFR §71.43(a), TS-R-1 (634). Therefore, the requirements of 10 CFR §71.43(a), TS-R-1 (634) are satisfied by the Traveller packages.

1.3.2 Tamper-Indicating Feature

Two (2) tamper indicating seals (wire/lead security seal) are attached between the upper and lower Outerpack halves to provide visual evidence that the closure was not tampered. Thus, the requirements of 10 CFR §71.43(b), TS-R-1 (635) are satisfied.

The Traveller series of packages cannot be opened inadvertently. Positive closure of the Traveller packages is provided by high strength 3/4-inch hex head screws. Thus, the requirements of 10 CFR §71.43(c), TS-R-1(639) are satisfied.

1.4 APPENDICES

1.4.1 References

1. ASTM C 996-04, "Standard Specification for Uranium Hexaflouride Enriched to Less than 5% ^{235}U."

1.4.2 Engineering Drawings for Packaging

10004E58, Rev. 8 (Sheets 1-9)
10006E58, Rev. 5
10037E43, Rev. 2 (Sheets 1-8)

Security-Related Information
Figure Withheld Under 10 CFR 2.390

SEE PRODUCT SPECIFICATION PDINFO00 FOR SUPPLEMENTAL PRODUCT INFORMATION

DIMENSIONS ARE IN INCHES

Westinghouse

SAFETY RELATED ITEMS TRAVELLER XL & STD

E | 10004E58 | 8

SHEET 1 OF 9

Security-Related Information
Figure Withheld Under 10 CFR 2.390

SEE PRODUCT SPECIFICATION PDINFO00 FOR SUPPLEMENTAL PRODUCT INFORMATION

DIMENSIONS ARE IN INCHES

THIRD ANGLE PROJECTION

Westinghouse

SAFETY RELATED ITEMS TRAVELLER XL & STD

E | 10004E58 | 8

SHEET 2 OF 9

Security-Related Information
Figure Withheld Under 10 CFR 2.390

SEE PRODUCT SPECIFICATION PDINFO00 FOR SUPPLEMENTAL PRODUCT INFORMATION

DIMENSIONS ARE IN INCHES

THIRD ANGLE PROJECTION

Westinghouse

SAFETY RELATED ITEMS TRAVELLER XL & STD

E | 10004E58 | 8

SHEET 3 OF 9

Security-Related Information
Figure Withheld Under 10 CFR 2.390

SEE PRODUCT SPECIFICATION PDINFO00 FOR SUPPLEMENTAL PRODUCT INFORMATION

DIMENSIONS ARE IN INCHES

THIRD ANGLE PROJECTION

Westinghouse

SAFETY RELATED ITEMS TRAVELLER XL & STD

E 10004E58 8

SHEET 4 OF 9

Security-Related Information
Figure Withheld Under 10 CFR 2.390

SEE PRODUCT SPECIFICATION PDINFO00 FOR SUPPLEMENTAL PRODUCT INFORMATION

DIMENSIONS ARE IN INCHES

THIRD ANGLE PROJECTION

Westinghouse

SAFETY RELATED ITEMS TRAVELLER XL & STD

E

10004E58

8

SHEET 9 OF 9

Security-Related Information
Figure Withheld Under 10 CFR 2.390

SEE PRODUCT SPECIFICATION PDINFO00 FOR SUPPLEMENTAL PRODUCT INFORMATION

DIMENSIONS ARE IN INCHES

THIRD ANGLE PROJECTION

Westinghouse

SAFETY RELATED ITEMS TRAVELLER XL & STD

E | 10004E58 | 8

Security-Related Information
Figure Withheld Under 10 CFR 2.390

SEE PRODUCT SPECIFICATION PCINFOOO FOR SUPPLEMENTAL PRODUCT INFORMATION

DIMENSIONS ARE IN INCHES

THIRD ANGLE PROJECTION

Westinghouse

SAFETY RELATED ITEMS TRAVELLER XL & STD

E | 10004E58 | 8

SHEET 7 OF 9

Security-Related Information
Figure Withheld Under 10 CFR 2.390

SEE PRODUCT SPECIFICATION PDINFO00 FOR SUPPLEMENTAL PRODUCT INFORMATION

DIMENSIONS ARE IN INCHES

THIRD ANGLE PROJECTION

Westinghouse

SAFETY RELATED ITEMS TRAVELLER XL & STD

E | 10004E58 | 8

Security-Related Information
Figure Withheld Under 10 CFR 2.390

SEE PRODUCT SPECIFICATION PDINFO00 FOR SUPPLEMENTAL PRODUCT INFORMATION

DIMENSIONS ARE IN INCHES

THIRD ANGLE PROJECTION

Westinghouse

SAFETY RELATED ITEMS TRAVELLER XL & STD

E | 10004E58 | 8

SHEET 9 OF 9

BILL OF MATERIAL						
REQUIRED 04	03	02	01	ITEM	PART NAME	(SIZE) REFERENCE INFORMATION
			1	01	6" PIPE	SCHED 40 304 SST

Security-Related Information
Figure Withheld Under 10 CFR 2.390

REV	ECN	DESCRIPTION
1	SO 75235 ECN ECN 61146-0	B. HEMPY 03/29/04
2	SO 75331 ECN ECN 0000084-0	IN ZONE E4: REMOVED NOTE "DIA "A" SCH 40 304 ST.STL. PIPE". IN ZONE B7/B8: REMOVED DIA TABLE. CHANGED MAXIMUM WEIGHT LOAD. IN ZONE D5: ADDED NOTE "GROUP 2". IN BOM: FOR GROUPS 01 & 02 ADDED "SCHED 40 304 SST". G. HILL 10/05/05
3	75258 ECN 0000129-0	SEE SHEET 2 FOR CHANGE. B JONES 10/18/05
4	BUD122045 ECN 0000196-0	IN ZONE G2 ADDED NOTES A & B UNDER BOM. IN ZONE G3 ADDED "OPTIONAL" TO NOTE. IN ZONE D6 CHANGED NOTE FROM BREATHER VALVE LOCATION OPTIONAL. IN ZONE D5 ADDED "(5" PIPE)" TO VIEW LABEL. CHANGED 167 TO 200. IN ZONE D4 ADDED BALLOON 2. G. HILL 3/3/06
5	BUD 122343 ECN 0000330-0	DELETED IT 02 AND GR 02. DELETED SH 2. ADDED NOTE IN ZONE D7. REVISED NOTES IN ZONE D4/D7, E4 AND E7. C. LAWSON 04/12/06

SEE PRODUCT SPECIFICATION PDINF000 FOR SUPPLEMENTAL PRODUCT INFORMATION

PRIMARY DIMENSIONS ARE IN INCHES

THIRD ANGLE PROJECTION

ALL TOLERANCES +/- 1/8" UNLESS OTHERWISE NOTED

M. ALES
B. HEMPY
S. PALMER
J. COLE
W. HERWIG
D. SUMMER

Westinghouse Electric Company LLC Nuclear Fuel, Columbia, SC USA

SHIPPING PACKAGE
LOOSE ROD PIPE

E | - | 10006E58 | 5
1:1 | SEE DWG | SHEET 1 OF 1

Security-Related Information
Figure Withheld Under 10 CFR 2.390

SEE PRODUCT SPECIFICATION PDINFO00 FOR SUPPLEMENTAL PRODUCT INFORMATION

DIMENSIONS ARE IN INCHES

THIRD ANGLE PROJECTION

SO	VVERDEV
ECN	000235-0
1	DESCRIPTION
BUD128779	ECN 000324-0
2	DESCRIPTION: EDITED NOTES
DWN BY	C. GIBBS 2015/02/25

C. GIBBS	2012/08/29
G. HILL	2013/07/04
B. HENPY	2012/04/19
S. PALMER	2012/04/23
B. JOYNER	2012/05/22
D. ROWLAND	2012/05/22
R. MAURER	2012/04/24
J. HALLIGAN	2012/04/24
J. RANDOLPH	2012/04/20

Westinghouse ELECTRIC COMPANY LLC - NUCLEAR FUEL COLUMBIA, SC USA

SAFETY RELATED ITEMS
TRAVELLER VVER

E | 10037E43 | 2

SCALE 1:1 | SHEET 1 OF 8

Security-Related Information
Figure Withheld Under 10 CFR 2.390

SEE PRODUCT SPECIFICATION PDINF000 FOR SUPPLEMENTAL PRODUCT INFORMATION

DIMENSIONS ARE IN INCHES

C. GIBBS	
G. HILL	
B. HEMPY	
B. PALMER	
B. JOYNER	
D. ROWLAND	
R. MAURER	
J. HALLIGAN	
J. RANDOLPH	

Westinghouse

SAFETY RELATED ITEMS TRAVELLER VVER

E 10037E43 2

SHEET 2 OF 8

Security-Related Information
Figure Withheld Under 10 CFR 2.390

SEE PRODUCT SPECIFICATION PDINFO00 FOR SUPPLEMENTAL PRODUCT INFORMATION

DIMENSIONS ARE IN INCHES

THIRD ANGLE PROJECTION

C. GIBBS
D. HILL
B. HEMPY
S. PALMER
B. JOYNER
D. ROWLAND
R. MAURER
J. HALLIGAN
J. RANDOLPH

Westinghouse

SAFETY RELATED ITEMS TRAVELLER VVER

E

10037E43

2

SHEET 3 OF 8

Security-Related Information
Figure Withheld Under 10 CFR 2.390

SEE PRODUCT SPECIFICATION PDINFO00 FOR SUPPLEMENTAL PRODUCT INFORMATION

DIMENSIONS ARE IN INCHES

C. GIBBS	
D. HILL	
B. HEMPY	
S. PALMER	
B. JOYNER	
D. ROWLAND	
R. MAURER	
J. HALLIGAN	
J. RANDOLPH	

Westinghouse

SAFETY RELATED ITEMS
TRAVELLER VVER

E | 10037E43 | 2

SHEET 4 OF 6

Security-Related Information
Figure Withheld Under 10 CFR 2.390

SEE PRODUCT SPECIFICATION POINF000 FOR SUPPLEMENTAL PRODUCT INFORMATION

DIMENSIONS ARE IN INCHES

THIRD ANGLE PROJECTION

C. GIBBS	
G. HILL	
B. HEMPY	
B. PALMER	
B. JOYNER	
D. ROWLAND	
R. MAURER	
J. HALLIGAN	
J. RANDOLPH	

Westinghouse

SAFETY RELATED ITEMS
TRAVELLER VVER

E | 10037E43 | 2

1:10

SHEET 5 OF 8

Security-Related Information
Figure Withheld Under 10 CFR 2.390

SEE PRODUCT SPECIFICATION
PDINFO00 FOR SUPPLEMENTAL
PRODUCT INFORMATION

DIMENSIONS ARE IN INCHES

C. GIBBS	
G. HILL	
B. HEMPY	
S. PALMER	
S. JOYNER	
D. ROWLAND	
R. MAURER	
J. HALLIGAN	
J. RANDOLPH	

Westinghouse

SAFETY RELATED ITEMS
TRAVELLER VVER

E | 10037E43 | 2

1:2

SHEET 6 OF 8

Security-Related Information
Figure Withheld Under 10 CFR 2.390

SEE PRODUCT SPECIFICATION PDINFO00 FOR SUPPLEMENTAL PRODUCT INFORMATION

DIMENSIONS ARE IN INCHES

THIRD ANGLE PROJECTION

C. GIBBS	
O. HILL	
B. HENRY	
S. PALMER	
B. JOYNER	
D. ROWLAND	
R. MAURER	
J. HALLIGAN	
J. RANDOLPH	

Westinghouse

SAFETY RELATED ITEMS
TRAVELLER VVER

10037E43 2

SHEET 7 OF 8

Security-Related Information
Figure Withheld Under 10 CFR 2.390

SEE PRODUCT SPECIFICATION PDINFO00 FOR SUPPLEMENTAL PRODUCT INFORMATION

DIMENSIONS ARE IN INCHES

C. GIBBS		
G. HILL		
B. HEMPY		
S. PALMER		
B. JOYNER		
D. ROWLAND		
R. MAURER		
J. HALLIGAN		
J. RANDOLPH		

Westinghouse

SAFETY RELATED ITEMS TRAVELLER VVER

E 10037E43 2

SHEET 8 OF 8