6.10.11.3.1 VVER Fuel Assemblies

There are two variations of the VVER fuel assembly to be transported in the Traveller VVER package. These two fuel assemblies are modeled with the same fuel assembly model for criticality safety, as the fuel specifications important to criticality safety (e.g., pellet diameter, fuel rod diameter, pitch, rod positions, etc) remain the same between the fuel assembly variations. The fuel assemblies are described below in Section 6.10.11.4.1.1.1.

6.10.11.4 General Considerations

The models developed for these calculations are not exact representations of the package, but they do explicitly include all of the physical features that are important to criticality safety. Modeling approximations will be shown to be either conservative or neutral with respect to the criticality safety case. This section describes the packaging and the contents models.

6.10.11.4.1 Model Configuration

Geometry input dimensions are taken directly from design drawings and are derived by stacking dimensions from design drawings or calculated using geometric relationships and dimensions shown on design drawings. Longitudinal dimensions in the model are oriented along the z-axis, and latitudinal dimensions are oriented in the x-y plane. The origin of the individual package unit is near the bottom of the package along the z-axis and at the center of the package in the x-y plane. The positive direction is from bottom to top of the package along the z-axis, the positive direction is from left to right along the x-axis when viewed from the top of the package and the positive direction is from lower to upper along the y-axis.

6.10.11.4.1.1 Contents Models

The contents models used in support of this analysis include the VVER Fuel Assembly Model.

6.10.11.4.1.1.1 VVER Fuel Assembly Models

Section 6.10.11.3.1 established that a single VVER fuel assembly will be used in all calculations. The VVER model basically consists of concentric hexagonal prisms to model the top nozzle assembly, skeleton, and fuel regions. The fuel assembly origin is at the bottom left hand corner of the fuel assembly lower nozzle. The fuel assembly is placed inside the fuel confinement with no translation of the origin.
Table 6-45 shows the parameters of the VVER fuel assembly as modeled. It is described in further detail in Section 6.10.11.9. In the following table, units are defined by inches and centimeters in parentheses.

Table 6-45 VVER Fuel Assembly Parameters

Fuel Assembly Type	VVER
Nominal Pellet Diameter	0.3088 (0.7844)
Annular Pellet Inner Diameter	0.1550 (0.3937)
Nominal Clad Thickness	0.0225 (0.0572)
Clad Material	Zirconium alloy
Nominal Clad Outer Diameter	0.3600 (0.9144)
Maximum Stack Length	138.98 (353)
Nominal Assembly Envelope	9.244 (23.480)
Kg's ^{235}U Assembly	26
Nominal Lattice Pitch	0.5020 (1.2751)
GT Outer Diameter	0.4960 (1.2598)
GT Thickness	0.0315 (0.0800)
GT Material	ZIRC
IT Outer Diameter	0.4960 (1.2598)
IT Thickness	0.0315 (0.0800)
IT Material	ZIRC