

D-6.2.1 SPC 15x15 PWR Fuel Design Description

The Siemens Power Corporation (SPC) 15x15 fuel assembly design is the only PWR fuel from CP&L's Robinson Nuclear Power Plant that is intended to be shipped in the IF-300 cask. This fuel design incorporates GdO<sub>2</sub> integral burnable absorbers and 6 inch top and bottom axial blankets containing natural UO<sub>2</sub> pellets (0.72 wt% <sup>235</sup>U) with a ████% theoretical fuel density. The SPC assembly contains 204 fuel rods, 20 guide tubes, and 1 instrument tube. The geometry of a typical fuel rod cell is shown in Figure D-6.2-1. Figures D-6.2-2a and D-6.2-2b illustrate the SPC PWR fuel assembly models used in the evaluation, and Table D-6.2-2 summarizes the fuel design data.

Although the pin-by-pin <sup>235</sup>U enrichment varies throughout the fuel lattice in the central enriched zone, all fuel pins in this zone were assumed to contain UO<sub>2</sub> pellets enriched to 4.65 wt% <sup>235</sup>U. Although the PWR basket design is capable of holding seven assemblies, this evaluation addresses a cask loading of six assemblies with the center location left empty. This restriction allows the shipment of the higher enrichment (4.65 wt% <sup>235</sup>U) fuel without requiring any cask or basket design modifications.

Consistent with the requirements contained in NUREG/CR- 5661 (NRC 1997), no credit is taken for fuel burnup or integral burnable absorbers such as gadolinium.

D-6.2.2 GE BWR Fuel Design Description

There are 5 different General Electric (GE) BWR fuel designs from CP&L's Brunswick Nuclear Power Plant that are intended to be shipped in the IF-300 BWR Cask. These fuel designs are identified as GE-7, GE-8, GE-9, GE-10, and GE-13. All of these fuel designs have 8x8 lattices of fuel rods except for GE-13, which has a

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9x9 lattice. Table D-6.2-3 summarizes the fuel-related data for each fuel design.

The GE-7 fuel assemblies contain two small water rods offset diagonally in the center of the lattice (Figure D-6.2-3). The GE-8 fuel assemblies contain four small water rods in the center of the lattice (Figure D-6.2-4). Note that two of the four water rods for the GE-8 design are normal water rods, and the other two water rods are empty fuel rods serving as water rods. The GE-9 and GE-10 fuel assemblies have one large water rod located in the center of the lattice (Figure D-6.2-5). The GE-13 fuel assemblies contain two large water rods offset diagonally in the center of the lattice (Figure D-6.2-6). Figure D-6.2-7 is an axial view of a GE-8 assembly, which is representative of all five of the GE fuel designs of interest.

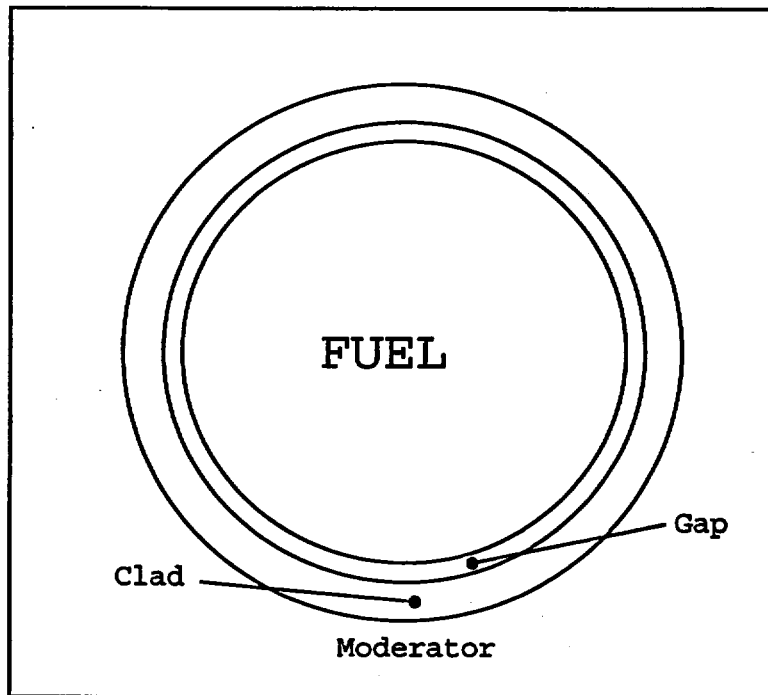
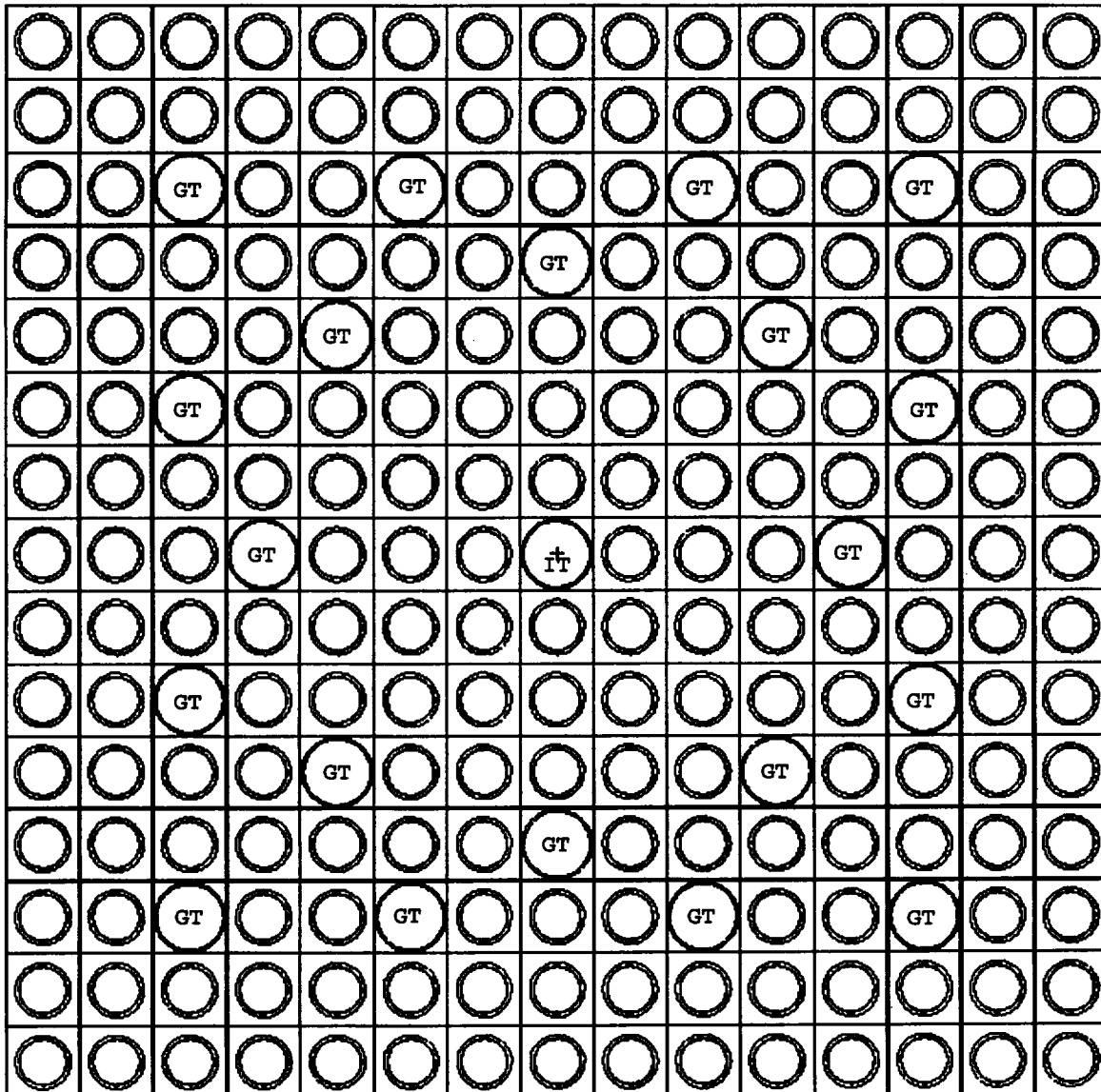


Figure D-6.2-1

Typical Fuel Pin



GT - Control Rod Guide Tube  
IT - Instrument Guide Tube

Figure D-6.2-2a

Depiction of SPC 15x15 Fuel Assembly - Radial View

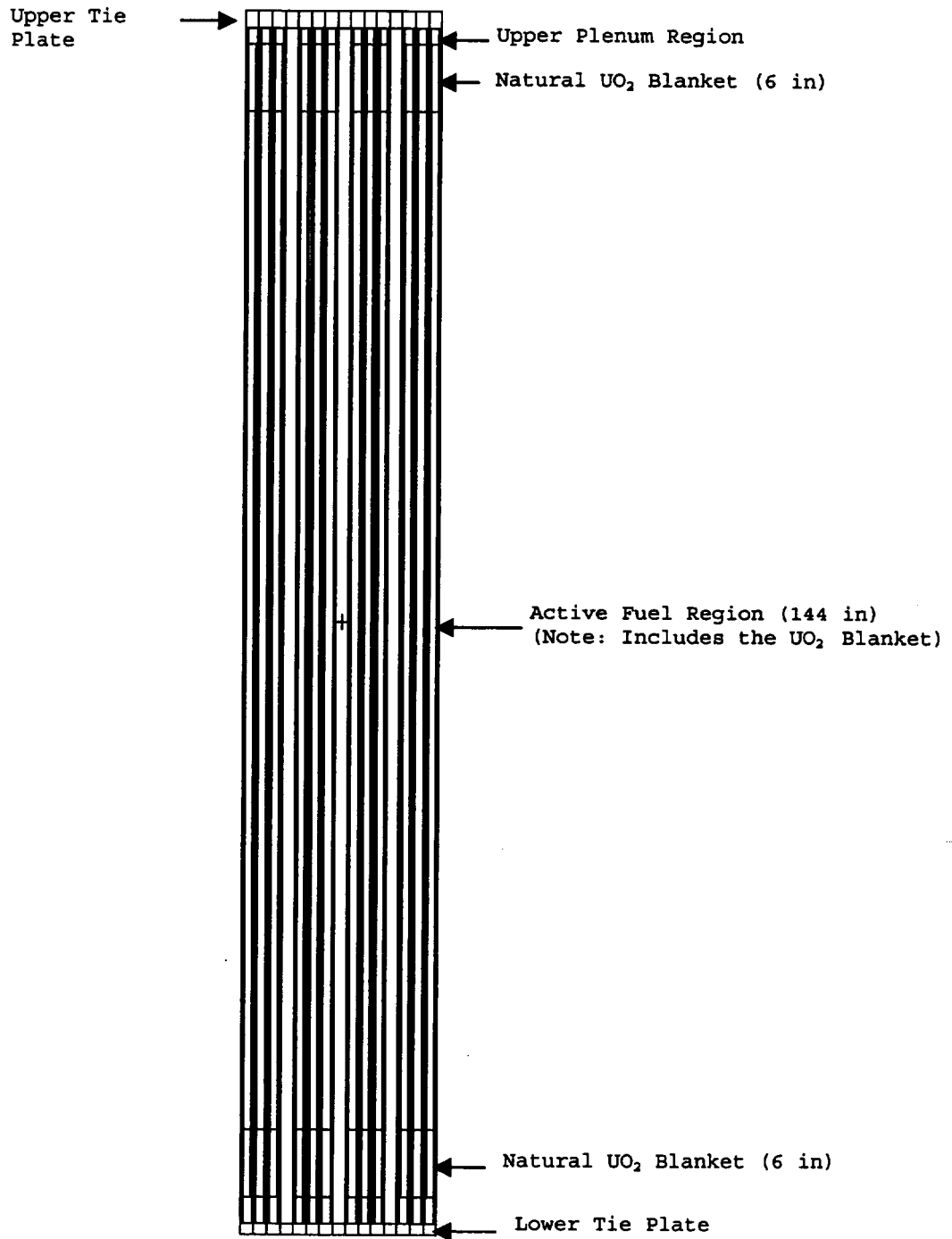


Figure D-6.2-2b

Depiction of SPC 15x15 Fuel Assembly - Axial View

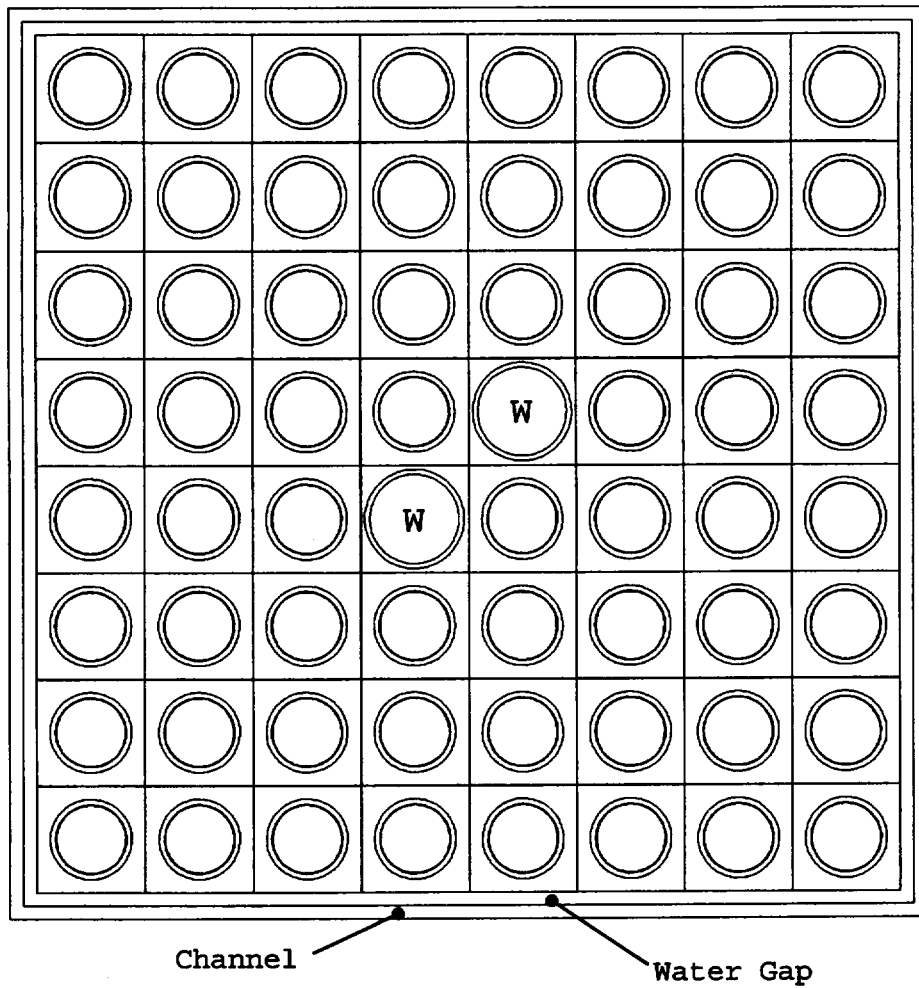


Figure D-6.2-3  
Depiction of GE-7 Fuel Assembly

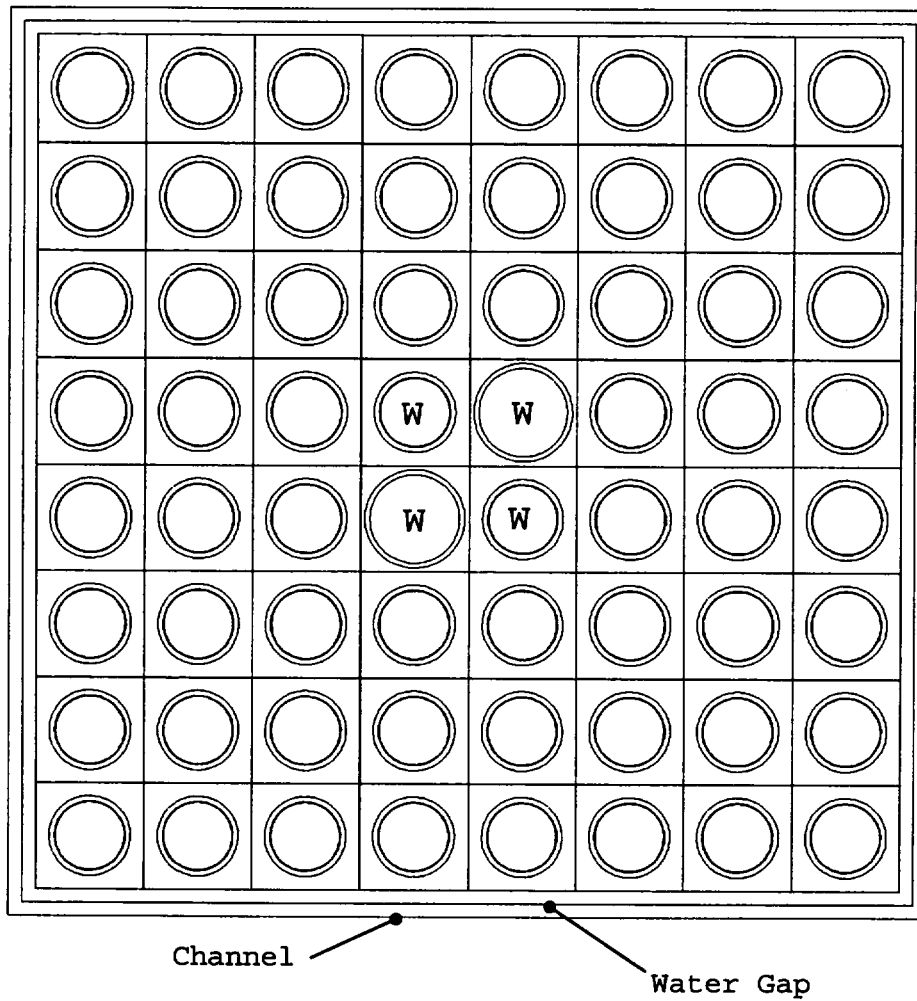


Figure D-6.2-4  
Depiction of GE-8 Fuel Assembly

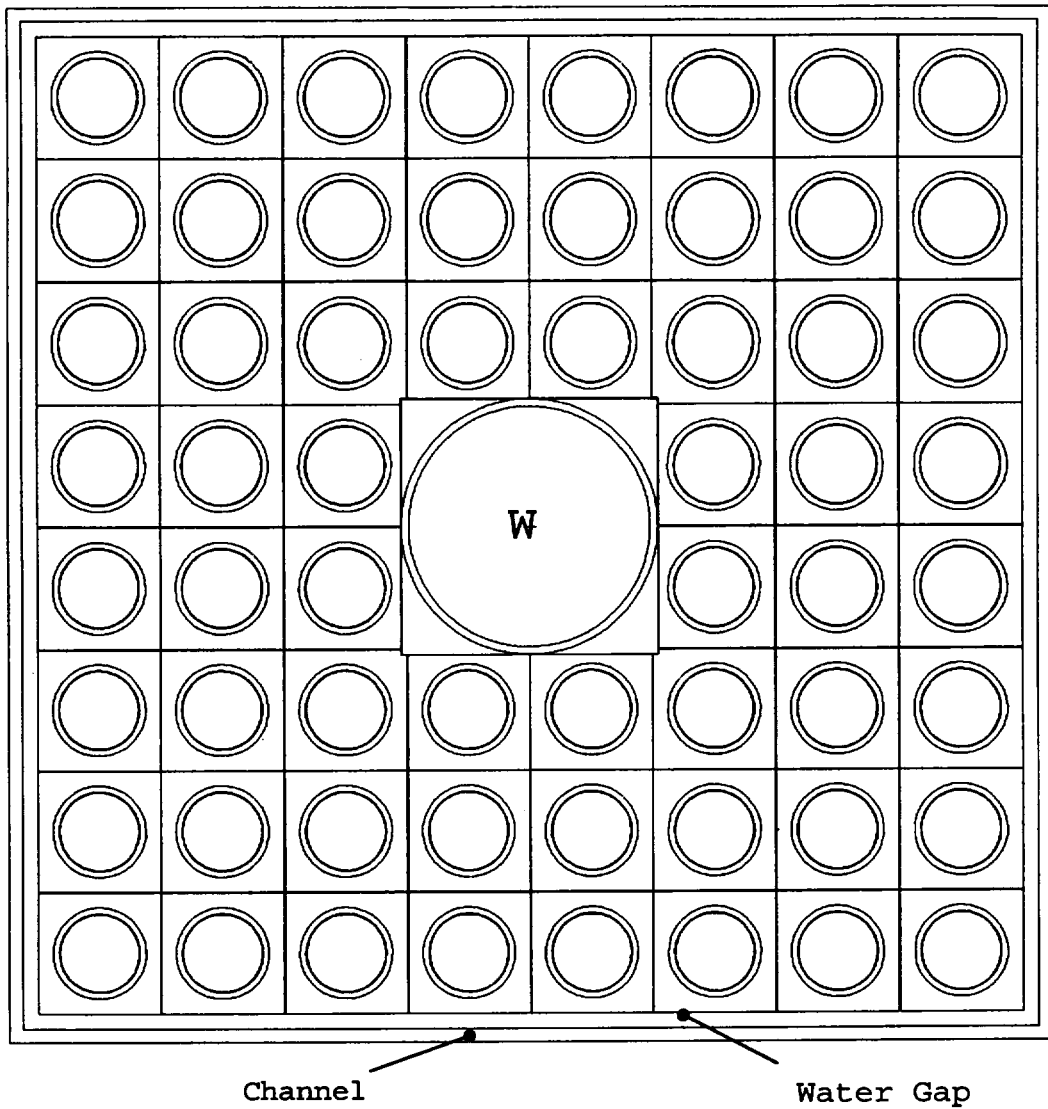


Figure D-6.2-5

Depiction of GE-9 and GE-10 Fuel Assembly

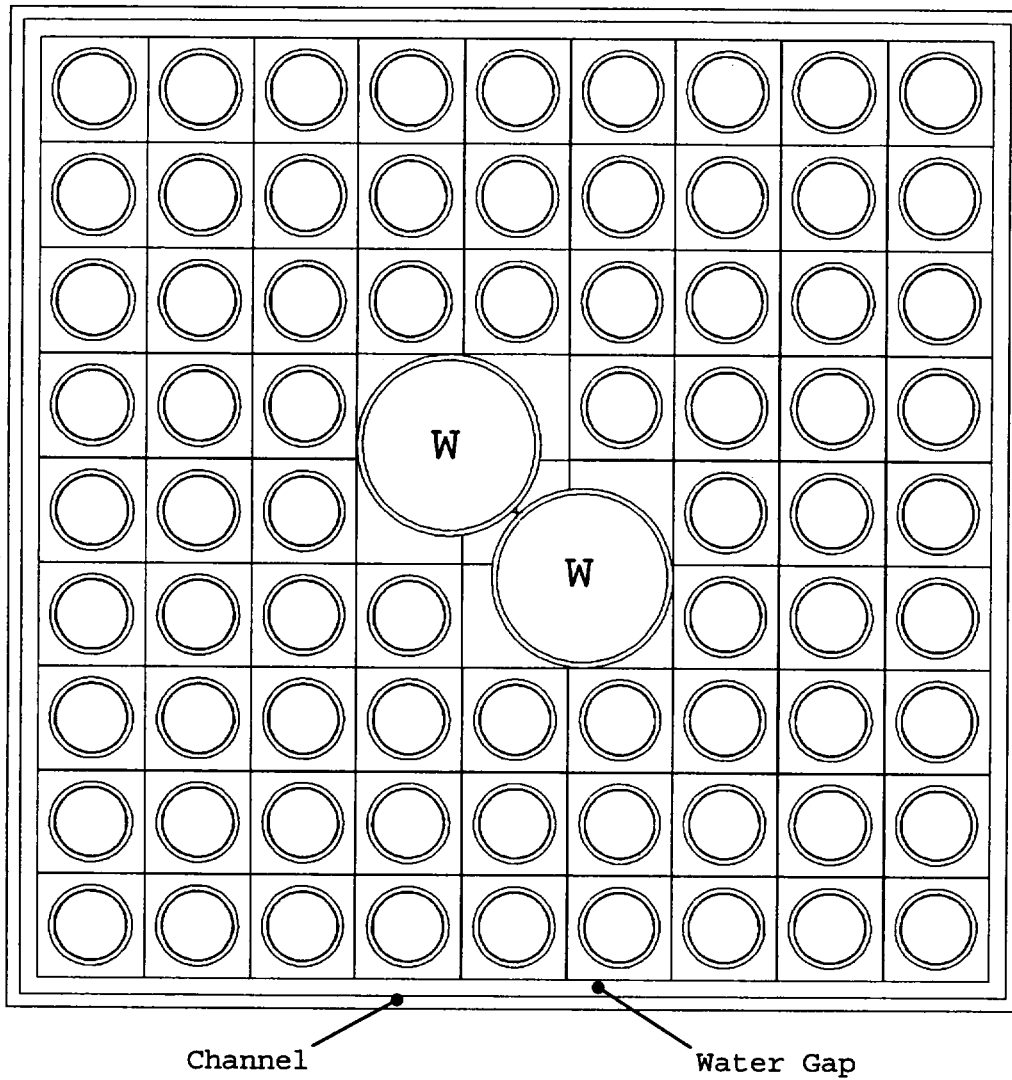


Figure D-6.2-6

Depiction of GE-13 Fuel Assembly



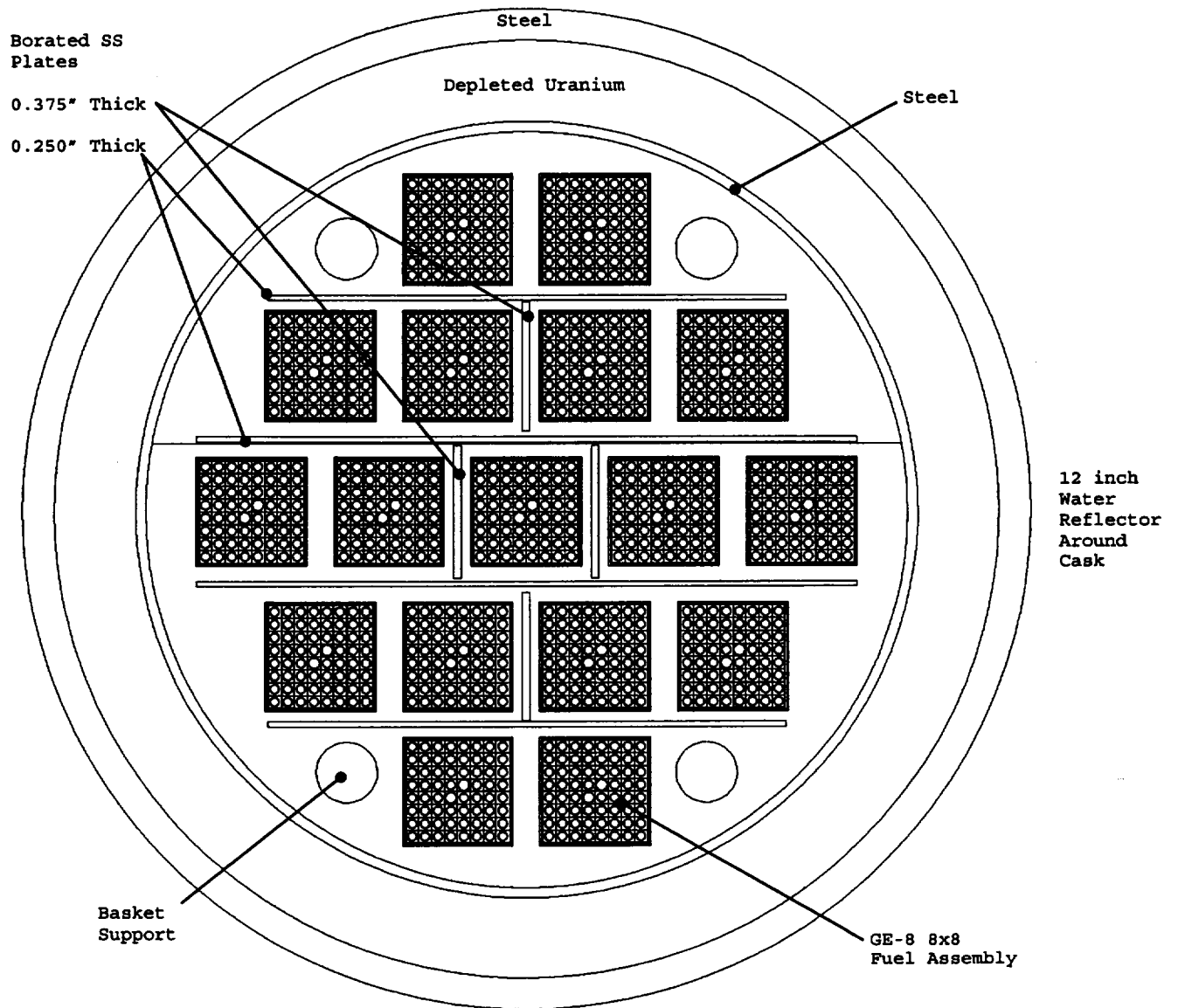


Figure D-6.4-2

BWR Cask Model - Radial View

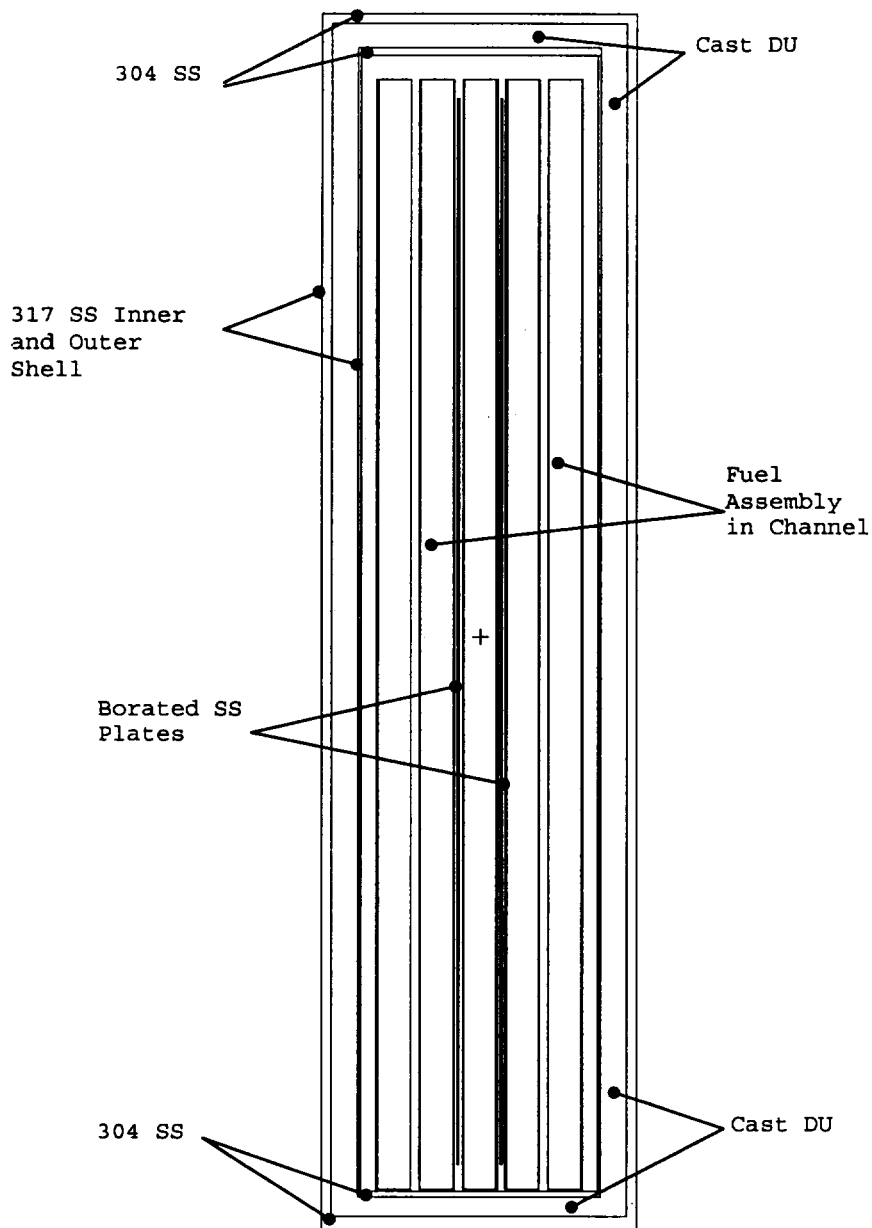


Figure D-6.4-3

BWR Cask Model - Axial View