

19 May 1994

Proposed Spent Fuel Cask Geometry OECD Phase II-B Benchmark

Fuel Assembly (based on Westinghouse 17x17 design):

Fuel Rod Data:

Fuel diameter	0.8192 cm
Rod ID	0.8357 cm
Rod OD	0.9500 cm
Fuel Length	365.7 cm
Fuel Material	UO ₂ (assumed isotopic composition from Part II-A 4.5 wt %, 30 GWd/MTU fuel, 5 y cooling time)
Clad Material	Zircaloy
Gas Gap	Void
Endplug Material	Zircaloy
Endplug Height	1.75 cm
Full Rod Length	369.2 cm (fuel + 2 endplugs)
Upper Hardware	30.0 cm
Lower Hardware	10.0 cm
Upper Water Region	7.0 cm
Lower Water Region	0.0 cm

Axial Fuel Divisions (9 axial regions):

Region 1 (Fuel top)	5 cm
Region 2	5 cm
Region 3	10 cm
Region 4	20 cm
Region 5	285.7 cm
Region 6	20 cm
Region 7	10 cm
Region 8	5 cm
Region 9 (Fuel Bottom)	5 cm

Assembly Data:

Lattice	17x17, (289 fuel rods, no guide tubes)
Dimensions	21.41728 x 21.41728 x 409.2 cm
Pitch	1.25984 cm
Moderator	Water
Upper and Lower End Hardware	50% Stainless Steel, 50% H ₂ O (by volume)

Note: rather than attempt to model the detail of the assembly end hardware, it has been chosen to mock up the hardware as a region of smeared water and stainless steel. Other hardware (e.g., grid spacers) is ignored.

Cask:

Cask shell:

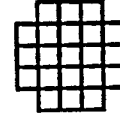
ID	136.0 cm
OD	196.0 cm
Material	Stainless Steel (SS304)
Height (outside)	476.2 cm
Height (inner cavity)	416.2 cm

Assembly basket:

Inner basket compartment dimensions 22 cm x 22 cm x 416.2 cm (per ass'y position)
Material Borated Stainless Steel (1 wt % boron)
Basket wall thickness 1 cm

Configuration:

21 assembly positions in a 5x5 array (no corner positions)
Fuel assemblies are centered within basket region
Cask is completely flooded with water



Material Compositions (densities in atoms/barn-cm)

Zircaloy
Cr 7.589E-05
Fe 1.484E-04
Zr 4.298E-02

Water
H 6.662E-02
O 3.331E-02

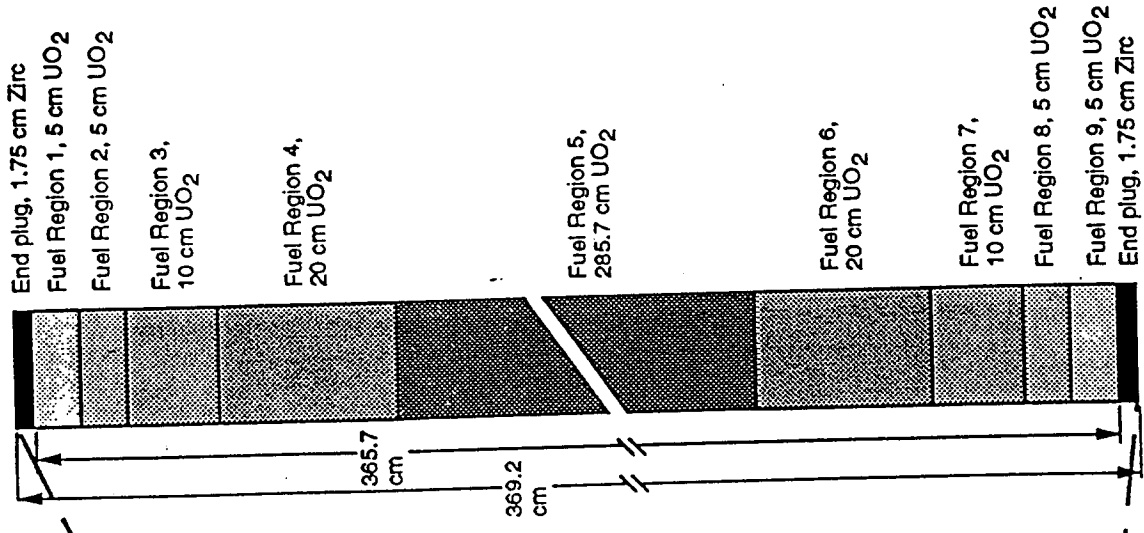
Stainless Steel (SS304)
Cr 1.743E-02
Mn 1.736E-03
Fe 5.936E-02
Ni 7.721E-03

Borated (1 wt %)
Stainless Steel
Cr 1.691E-02
Mn 1.684E-03
Fe 5.758E-02
Ni 7.489E-03
10B 7.836E-04
11B 3.181E-03

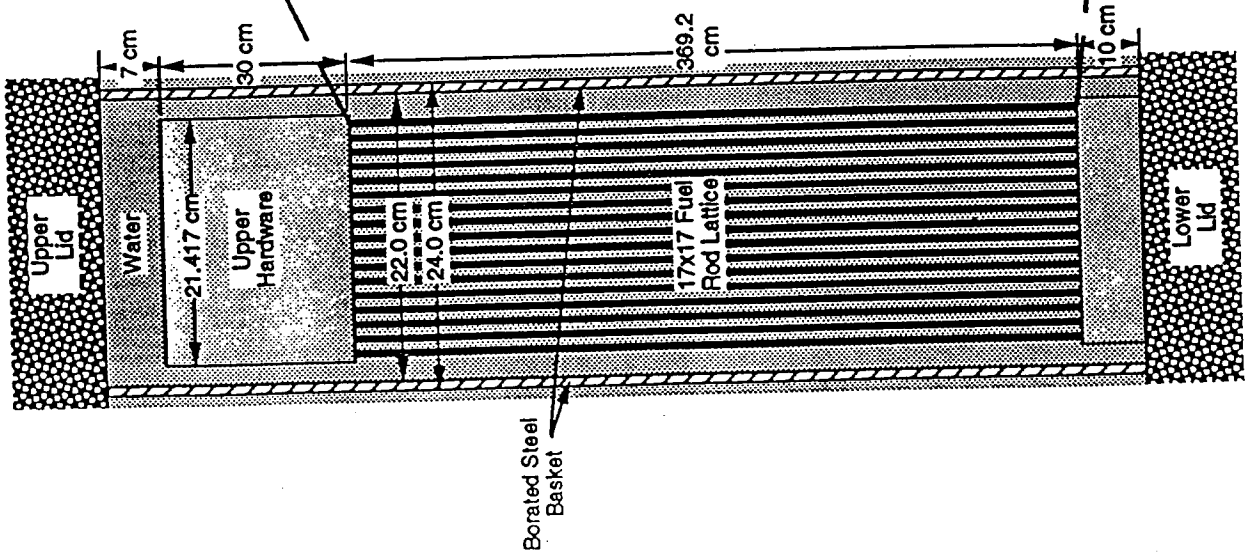
50/50 Stainless
Steel/Water Mixture
H 3.338E-02
O 1.669E-02
Cr 8.714E-03
Mn 8.682E-04
Fe 2.968E-02
Ni 3.860E-03

Drawings on the following pages illustrate some of the key aspects and dimensions of the proposed cask geometry.

SideView (fuel rod)

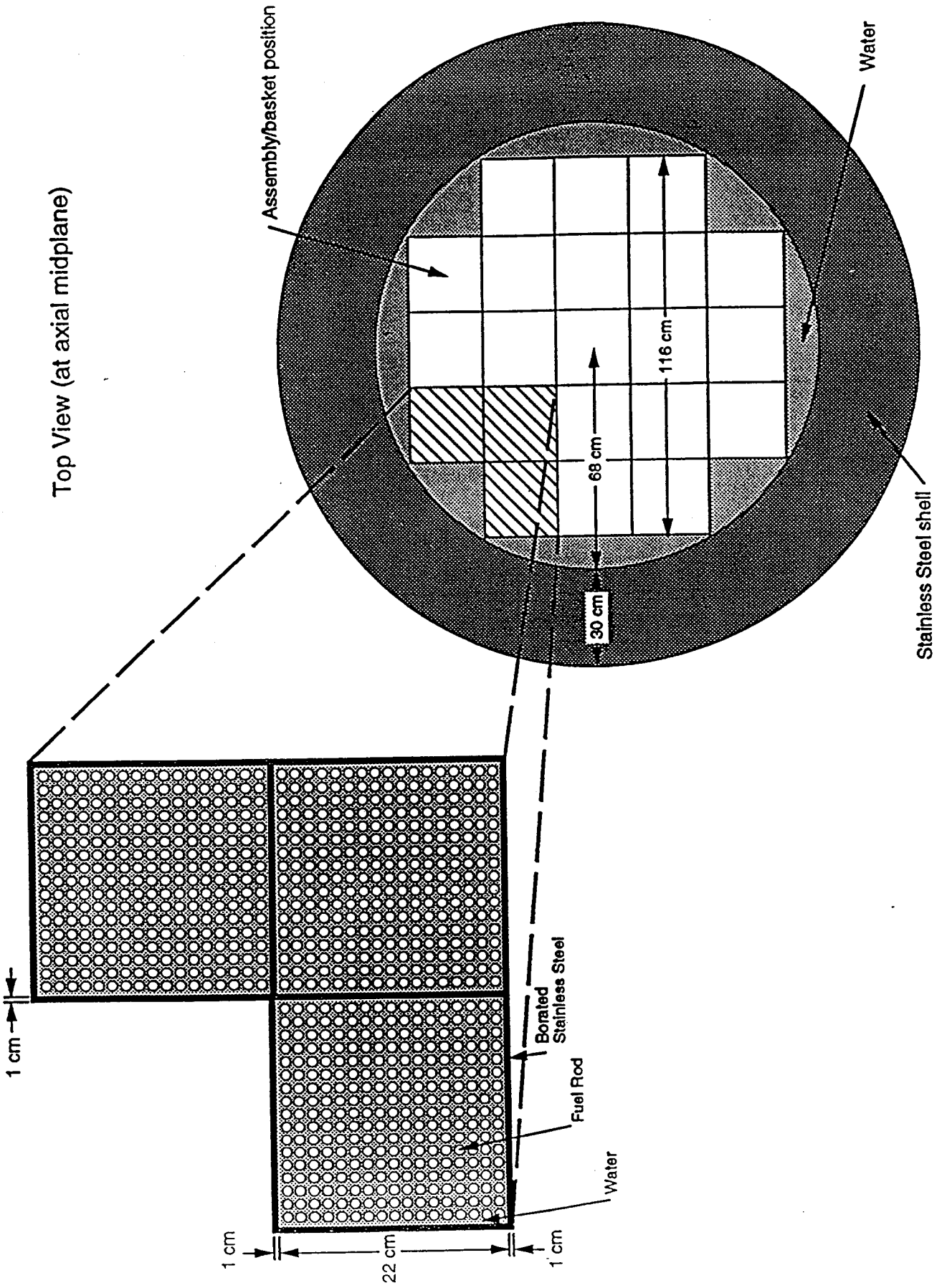


SideView (single basket compartment)

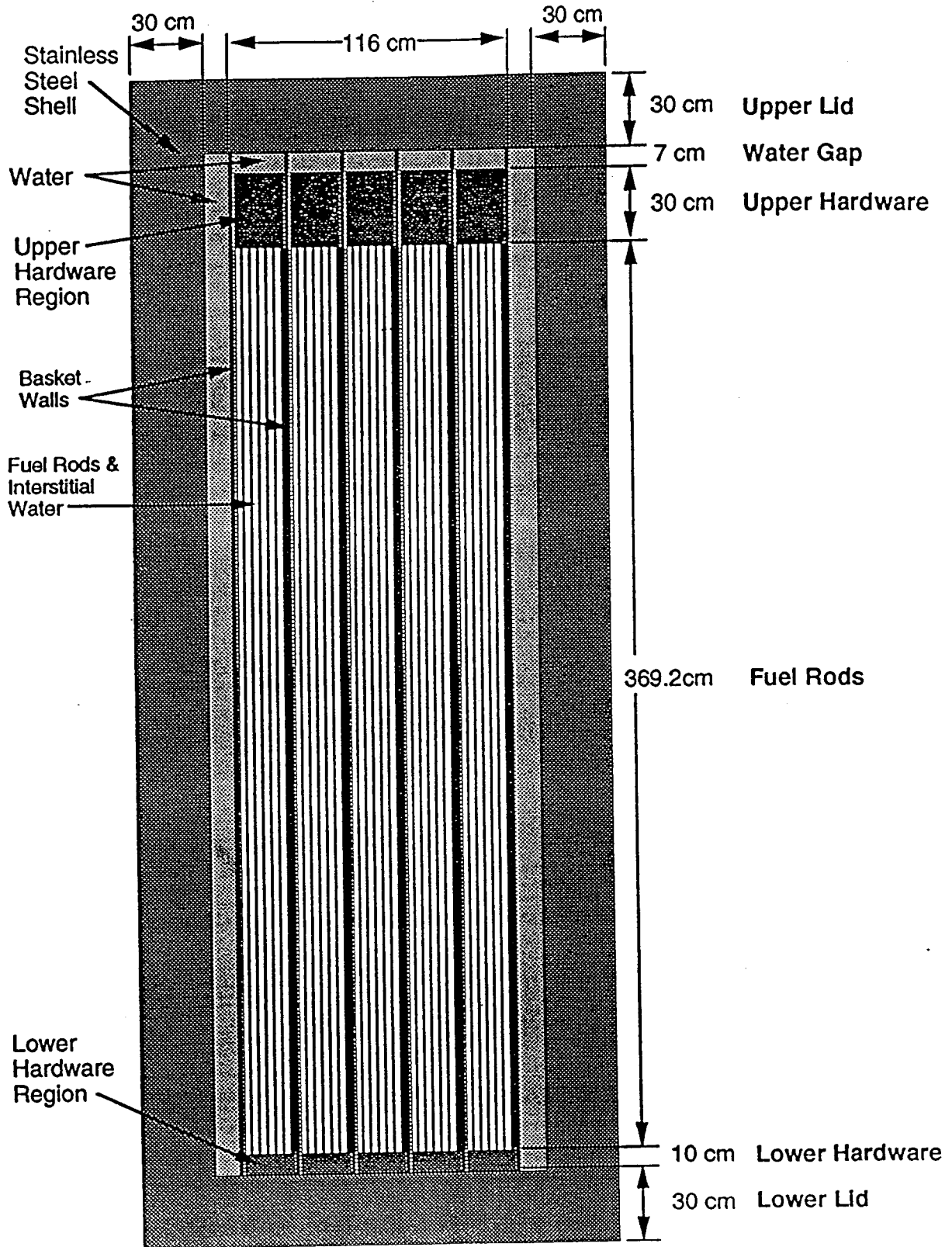


Note: drawings are not to scale

Top View (at axial midplane)



SideView (cask)



Note: drawing is not to scale