Evolution of Indian Containment Structure

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• 1.2m thick RCC Wall for shielding purpose

• Prestressed Dome
  – 12φ7 system with 74T capacity
• Two Wall System
  – Reinforced Rubble Masonry Outer Wall above GL

• Prestressed Inner Containment
  – 12 $\phi 8$ system with 92 T capacity
• Evolving Towards Double Containment Concept

• Prestressed Inner Containment with Cellular Containment Slab
  – 12T13 system with 200T capacity
• Introduction of 4 SG Openings in OC Dome
  - Reduced Containment Height
• Double Containment Concept
  – 4 SG Openings in OC & IC Domes

• Prestressed Inner Containment with
  – 19K13 system with 355 T capacity
• No. of SG Opening Reduced from 4 to 2

• Prestressed Inner Containment with
  – 19K13 system with 355 T capacity
### Details of Containment Structures of Indian PHWRs

<table>
<thead>
<tr>
<th>Design Parameter</th>
<th>RAPS-1&amp;2</th>
<th>MAPS-1&amp;2</th>
<th>NAPS-1&amp;2 / KAPS-1&amp;2</th>
<th>KGS-1to4 / RAPS-3to8</th>
<th>TAPS-3&amp;4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Containment Volume (m$^3$)</td>
<td>40286</td>
<td>47784</td>
<td>32200</td>
<td>54000</td>
<td>82267</td>
</tr>
<tr>
<td>Test Pressure [ Kg/cm$^2$ (g) ]</td>
<td>0.55</td>
<td>1.44</td>
<td>1.44</td>
<td>1.73</td>
<td>1.44</td>
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<tr>
<td>Design Pressure [ Kg/cm$^2$ (g) ]</td>
<td>0.42</td>
<td>1.16</td>
<td>1.25</td>
<td>1.73</td>
<td>1.44</td>
</tr>
<tr>
<td>Peak Ground Accln (PGA)</td>
<td>0.05g</td>
<td>0.1g</td>
<td>0.3g / 0.2g</td>
<td>0.2g / 0.1g</td>
<td>0.2g</td>
</tr>
<tr>
<td>Temperature due to Design Basis Accident</td>
<td>71°C</td>
<td>96°C</td>
<td>120°C</td>
<td>153°C</td>
<td>125°C</td>
</tr>
<tr>
<td>Prestressing System &amp; Capacity</td>
<td>12 φ 7 74T</td>
<td>12 φ 8 92T</td>
<td>12 T 13 200T / 220T</td>
<td>19K13 355T</td>
<td>19K13 355T</td>
</tr>
</tbody>
</table>
• Dry Containment
• Containment spray system
• Metallic liner for IC
• Passive Decay Heat Removal System
• Prestressed Inner Containment with 500T capacity cables
• Common raft for entire Nuclear Building
Containment Structure of KKNPP (VVER)

• 1500T Capacity
• 55C15 Prestressing System