



Level 2 PRA

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Level 2 PRA

- **Based on consequence analyses by Ontario Power Generation (OPG), KAERI and AECL on severe core damage; CANDU design is inherently robust by having lots of water inventory in the moderator and calandria vault (shield tank), allowing time for severe accident management before containment fails**
- **Consequence analyses will be performed with the MAAP4-CANDU code**
- **Containment performance is modeled via containment event tree**
- **Accident sequence quantification will be performed to determine the “large release” frequency**



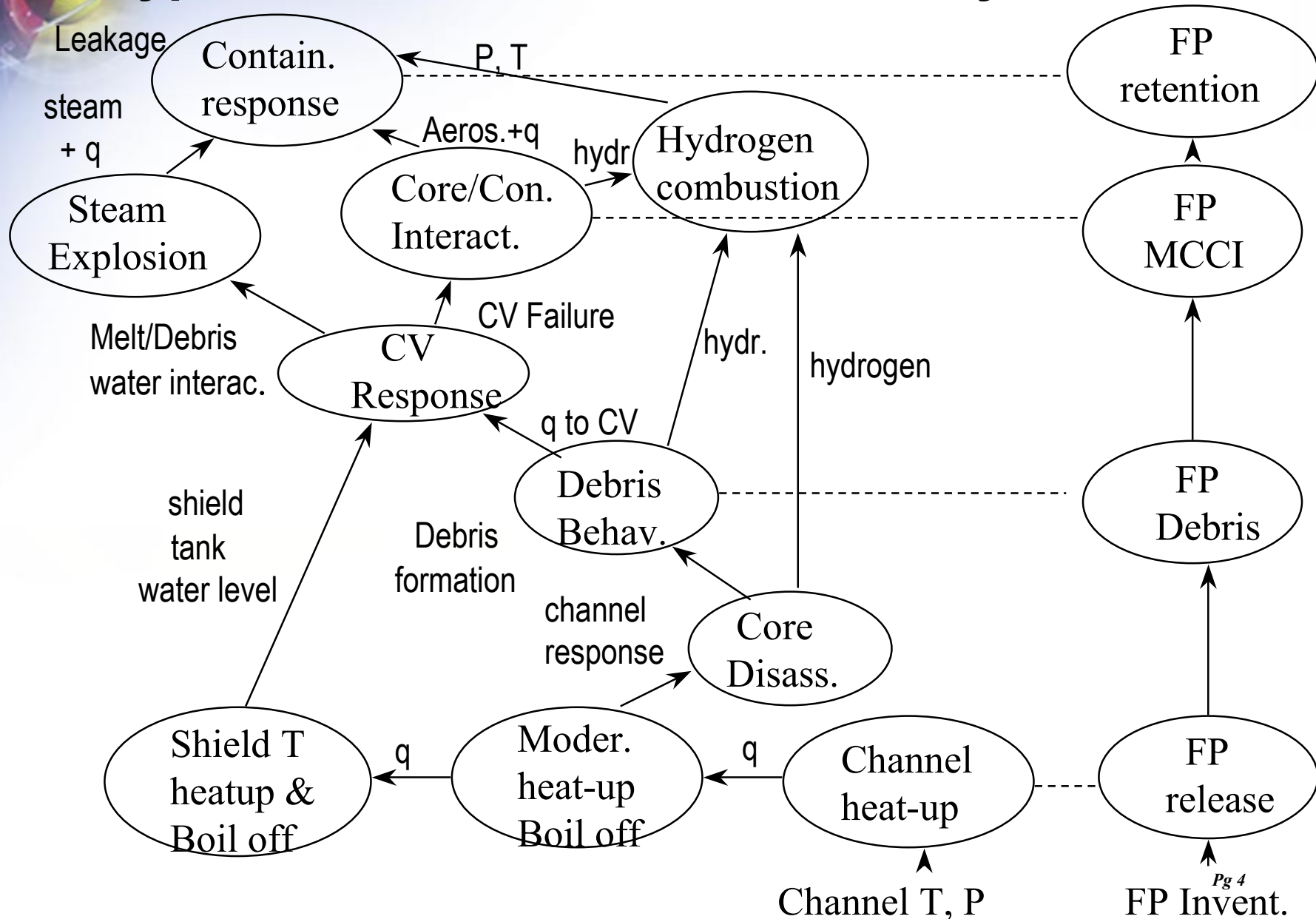
Summary of Significant Events (Generic CANDU 6 SBO)

Time (h)	Comments

0	Loss of AC and all backup power
2.5	SG Secondary side dry
3.5	Fuel Bundles uncovered within Fuel channels
4.3	One fuel channel is dry inside
4.4	Pressure Tube and Calandria Tube ruptured
4.4	Moderator reaches saturation temperature in the Calandria Vault (CV)
4.8	Beginning of Core Disassembly
8.3	Core Collapse onto CV Bottom
8.9	CV Water depleted
14.5	RV begins to boil off
27.1	Containment failed
42.4	CV failed due to creep



Typical CANDU Level 2 PSA Analysis Items





MAAP4 Highlights

- **MAAP4 CANDU code is part of Industry Standard Toolset (IST) Project**
 - **Validation and Verification activities together with utilities**
 - **Line-by-Line verification underway**
 - **Validation activities to begin this year**
- **(MAAP4 Design Review performed by Fauske and Associates (FAI), AECL and Ontario Power Generation in December 1999)**



Containment Reliability

- The following containment functions (dormant and mission) are modeled:
 - Airlocks
 - Containment isolation
 - Hydrogen control
 - Reactor building cooling
- Mission time ~ 72 hours
- Credit for main steam isolation valve (MSIV) to cater for steam generator tube rupture



Credit of Reserve Water Tank on Level 2 PRA

- **The ACR-700 reserve water tank (RWT) inventory will be credited in the level 2 PRA by providing inventory makeup to the moderator and shield tank**
- **The passive RWT makeup will delay or alleviate all severe core damage progression scenarios, thus allowing time for more operator recovery actions**



Conclusion

- **Engineering insights from the previous severe core damage consequence analyses will be factored into the ACR Level 2 PRA**
- **CANDU design is inherently robust by having lots of water inventory in the moderator and calandria vault (shield tank) thus allowing more time for operator intervention**
- **The benefits of the passive RWT makeup to moderator and shield tank will be confirmed in the Level 2 PRA**



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