

John Busby's review of Colin Tucker's Full Response in Appendix 2 of the Minutes of the SSG meeting 11 September 2014

Steam generator failures

Between 1979 and 2005 83 PWR failed steam generators were replaced, while in June 2013 the owners of two nuclear power plants at San Onofre in California announced plans to permanently retire them due to the leakage in the tubing of four new steam generators.

The earlier failure of steam generators was characterised by the tubing material being alloy 600, while the tubing of the San Onofre, as are the steam generators at SZB, are of a superior material, alloy 690. This is a complex matter and it is pointed out simply to emphasise the insecurity of these four vital SZB components. Although I accept SZB's assurance that there are currently no leaks in its steam generators, such cannot be ruled out in future.

Leaks from the primary coolant circuit to the secondary circuit

A leak or leaks in the steam generator tubing will allow radioactive corrosion products and tritium in the primary circuit to accrue in the feed water. They will be in the steam going to the turbines and in the steam when it is vented to the atmosphere.

EA monitoring of discharges

Although I accept that the SZB internal monitoring is satisfactory, it would provide assurance to the local residents if EA monitoring of the precipitation over the ground under the steam plumes were to be carried out during and after a steam venting occurrence.

For this to be performed SZB will need to keep records of the steam venting occurrences, their duration, the successive directions and strengths of the wind and the estimated total quantities of discharges.

Fukushima and TMI 2

After the application of the control rods, the decay heat was the agent of destruction of the Fukushima reactors and the core meltdown of TMI 2.

The hydrogen explosions resulted from the reduction in the hot water pressure by the operation of the relief valves, causing it to flash to steam. This reduced the heat transfer from the fuel cladding, thus raising the temperature of the cladding surfaces, the zirconium of which reacted with the steam to produce hydrogen, which when leaving the reactor vessel at more than its auto-ignition temperature and when it was at a concentration in the air within its explosive limits, exploded.

The resigned chair of the US Nuclear Regulatory Commission, Gregor Jaczko, has called for the re-design of reactor cores to eliminate the residual decay heat and fission after a shutdown, confirming my analysis of these catastrophic events.