

7.4.1 PWR Safety Systems

In a PWR the ECCS (see figure 1) consists of a number of water injection and spray systems each with multiple injection points. There is a passive accumulator injection system consisting of two or more large tanks of water connected via a check valve to the primary coolant cold leg and maintained under a nitrogen pressure of 15 – 50 atm so that they inject water when the pressure in the primary coolant loop drops below a critical level. There are also several active water injection systems, typically a high pressure coolant injection system (HPCI) designed to operate when the primary coolant loop pressure is high and therefore to operate for small breaks. There is also a low pressure coolant injection system (LPCI) designed to operate for large breaks or when the primary coolant loop pressure is low. These injection systems are intended to flood the reactor core from below.

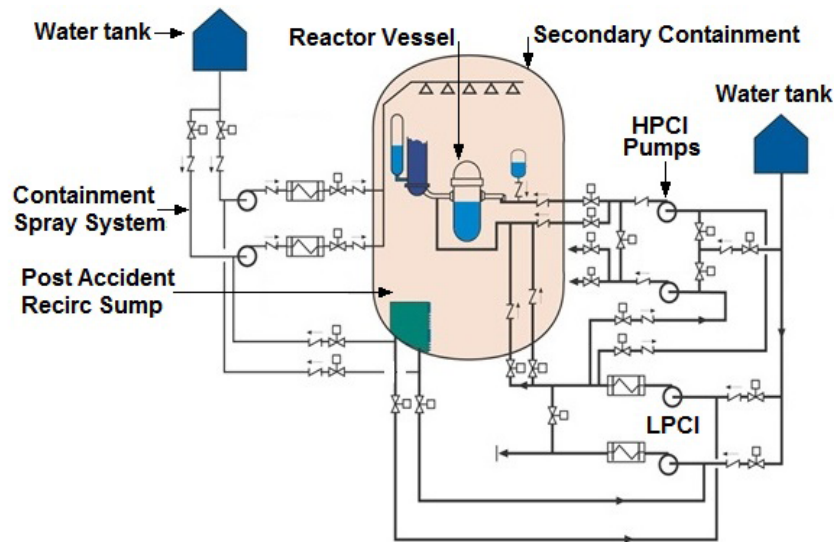


Figure 1: Schematic of the ECCS system in a PWR.

In a PWR the secondary containment structure (see figure 2) is designed to withstand the pressure that would be generated if all of the primary cooling water were released into that containment, a circumstance that is estimated to result in a maximum possible pressure of 5 atm. As shown it is also equipped with cold water spray systems (see figure 1) and, sometimes, ice to prevent the build up of excessive heat and pressure within that containment in the event of cooling water and other substances escaping from the primary containment.

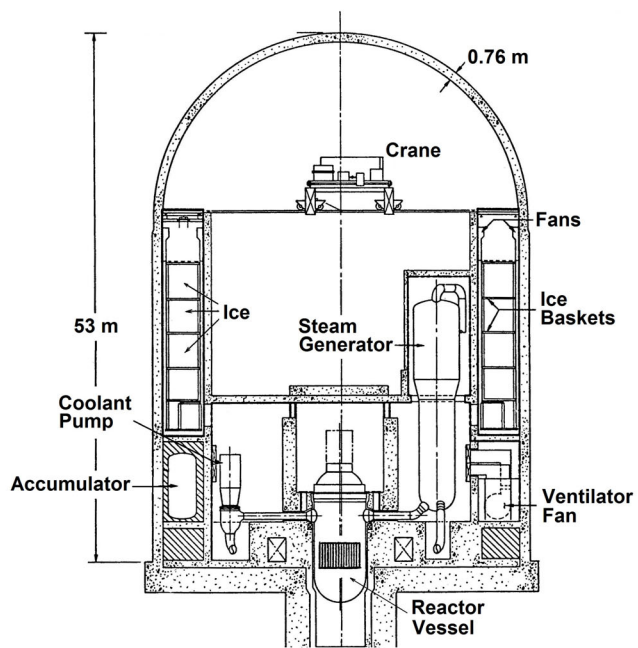


Figure 2: Typical PWR primary coolant loop and containment system. Adapted from USAEC (1973).