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| **Part** | **Three Mile Island** | **Chernobyl** | **Fukushima** |
| **(i) Initiation** | Clogged resin filters in instrument air system cause trip in condensate booster pumps. Turbine trips, leading to reactor trip. | Continued running of the reactor core under low power conditions with Xenon buildup and pulled rods for substantial time | Earthquake causes trip at the plant. Tsunami follows and wipes out most forms of back-up power supply at the plant leading to a station blackout |
| **(ii) Key Reasons** | PORV opens to depressurize but does not close. This coupled with an operator error of stopping AFW system leads to small LOCA event and eventual partial core melt after primary coolant pumps trip due to two phase coolant situation | With control rods pulled past the safety limit and xenon having a higher concentration than usual, 2 recirc pumps were turned on causing a flattening of the core temp profile, making much of the fluid close to its flashing point. Once pressure fell and reactivity jumped liquid flashed and blew off biological shield | Crucial diesel generators fuel supply was wiped away by the tsunami, and backup batteries failed after only an hour or two rather than lasting for their designed time period. This loss of valve control caused systems to fail and lead to the partial melt of the core. |
| **(iii) Human Errors** | Operators did not understand the meaning of the dropping fluid levels in the core, and failed to open AFW valves to allow primary post-trip cooling to reach the reactor | Operators pulled a multitude of crucial safety control rods past design limit after running the reactor and increasing the xenon concentration. All ECCS safety systems were disabled by operators so that the experiment could be run without trip | There were no significant operator errors that contributed directly to the partial melt at the plant. One thing to be addressed as a result of the situation, however, is to improve communication of operator with outside during emergency events. |
| **(iv) Risks of Radioactivity** | Very Low Risk Containment and Core maintained integrity throughout accident | Extremely High Core blew off biological shield when core when prompt critical and spewed radioactive contents over all of Europe | Low Risk Primary Containments maintained integrity throughout accident. Some radioactivity was released in the venting but despite destruction of secondary containment melted fuel was all contained |