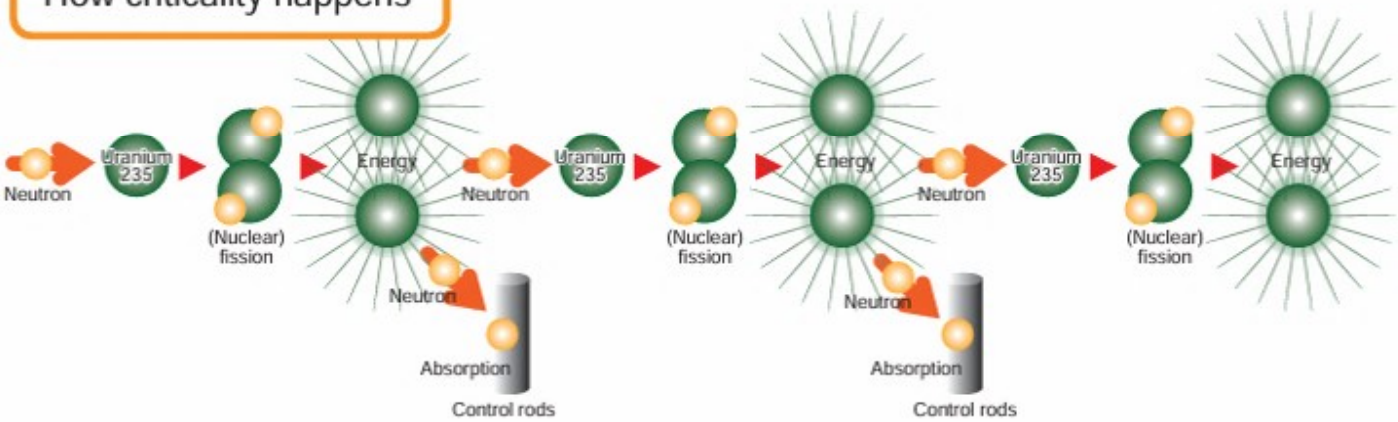
Criticality and radioactivity

Criticality

When a uranium 235 atom undergoes nuclear fission, two to three new neutrons are released and these then cause other nuclear fissions. Such a continuous chain of nuclear fission is called a "chain reaction of nuclear fission", and the state where this chain reaction continues at the same rate is called "criticality". Criticality should happen in a nuclear "reactor" facility, where there are "control rods" to control the criticality state. However, when criticality happens where it is not supposed to, such as outside a reactor, radioactive material and radiation leak out of the facility, which could result in serious accidents.

In the nuclear accident that happened at JCO Co., Ltd., a fuel processing facility in Tokai Village, on September 30, 1999, a criticality happened in a facility where it was not intended, and a nuclear chain reaction continued for about 20 hours. As there was no thick concrete wall to contain the radiation, some of it, including neutron rays, escaped to the atmosphere outside the facility.

How criticality happens



Radioactivity and radiation

Uranium ore contains "radioactive material" such as uranium and radium. These materials emit rays that are similar to light rays, although they are invisible. This is called "radiation". The ability to emit radiation is "radioactivity", and materials with radioactivity are "radioactive materials". In an analogy, if we think of radioactive material as being a light bulb, its radioactivity is its power to emit light.

Difference between radiation, radioactivity, and radioactive materials