

Safety Corner

What is the “Defence-in-depth” Strategy in Safety Management??

In nuclear safety, the term “defence-in-depth” denotes the practice of having multiple layers of redundant safety systems to safeguard against severe accidents. The first line of defence is accident prevention – the plant must be designed, constructed, and operated so that the probability of an accident would be very small. Second, a plant protection system is required to ensure that safe conditions are maintained during normal operations, or as a result of operational transients or anticipated occurrences. Finally, the consequences of improbable accidents must be mitigated through engineered safety features to the point that public would not be subject to undue risks. An example of the defence-in-depth safety strategy is the requirement of failure of three specific barriers before a release of radioactivity would occur: fuel rods; the reactor coolant system/pressure vessel which has steel walls about 9 inches thick; and the containment building with concrete 3 to 5 feet thick.

The term defence-in-depth is originally a military strategy referring to the use of delay tactic that relies on the tendency of an attack to lose momentum over a period of time or as it covers a larger area. Rather than challenging an attacker with a single, strong defensive line, defence-in-depth defers confrontation with an attacker by either buying time and/or by yielding space.

In safety engineering, the defence-in-depth strategy ensures that safety will not be wholly dependent on a single element of a system or a facility. Defence-in-depth may mean engineering that emphasizes redundancy – a system that keeps working when a component fails – over attempts to design components that will not fail in the first place. For example, a defence-in-depth strategy to fire prevention would not commit all resources only on the prevention of a fire by the use of fire retarded materials; instead, it also requires education, safety promotion, employment of fire alarms, suppression system, evacuation plans, emergency rescue and fire-fighting equipment.

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