

Nuclear Power: In Harmony with Surroundings

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Plant area and Exclusion Zone

A twin unit Nuclear Power Plant needs about 250 Hectares of land for reactor, turbine & auxiliary buildings, switch yards and cooling water systems, intake outfall structures. In addition, in India, another 500 Ha is needed to be in the control of power station as an exclusion zone. This is maintained as a vacant space and developed as a green belt area. Thus the total requirement is about 700 Ha including the exclusion zone. Part of this requirement extends to sea for coastal locations thus reducing the land area further. With sharing of exclusion zone amongst many units at same site, the land requirement per kWh of electricity generation for nuclear is lowest amongst all other technologies including thermal and solar. In addition, there is no land requirement for transportation infrastructure and no coal handling units, ash ponds etc associated with thermal plants.

Sterilized Zone.

Area of 5 km radius is maintained by the plant as sterilized zone. No restriction is imposed by the plant on organic development activities of population in the annulus between 1.5 and 5 kms. Administrative actions ensure that there is no influx of large population in this area.

Regulatory Position

The Atomic Energy Regulatory Board finalized the desirable demographic characteristics for a site for nuclear plant during late 80s and notified in the year 1990. These are:

- Population density within 10 km radius: Less than two-third of state average;
- Population within sterilised zone (5Km radius) Less than 20,000;
- Population centres with more than 10,000 persons more than 10 km away;
- Population centres with more than 100,000 person) more than 30 km away;

These numbers were finalized more than two decades ago and given as only desirable characteristic. More important than the numbers is demonstration of

implementation of emergency preparedness in the highly unlikely accidental situations.

Emergency Preparedness

Nuclear facilities are designed and built to withstand, with significant margins, all possible natural events like earthquakes, Tsunami and floods. The operations of the plant are by highly qualified, trained and licensed operators. The operators have the expertise to handle and control all operational states of the reactor. In India we have an excellent safety record of 340 reactor-years of operations. Emergency preparedness, is however, ensured at all stages a matter of another layer of safety for protection of public at large in the highly unlikely event of an accident.

Nuclear accident is not like a bullet

Five layers of protection are provided by design of the reactor for release of radioactivity to the environment according to the defence in depth principles. An accident evolves progressively and each stage there are ways to control. The accident progression is therefore slow and gives adequate time for counter measures in public domain in terms of sheltering, iodine tablets and ultimate evacuation. The experience at Fukushima plant where 25000 families could be evacuated under stressed infrastructure condition and simultaneous evacuation of many other persons because of Tsunami in time and without need to actually in take iodine tablets demonstrates availability of adequate time for evacuation.

Technological Developments

The design of modern nuclear power reactors is much safer and has in-built learning from the accidents. The operating experience has demonstrated that the exposure at the exclusion boundary is a very small fraction of the permissible limits. Resulting from this experience and improved design features, exclusion zone, which is more of a historical rather than technical concept has been reduced world over for new reactors. In India too for the new reactors, an exclusion zone of 1 km is specified. *This is more from security than radiological*

safety considerations. Another effort that has seen considerable progress is to do away with the need to counter measures in public domain altogether. With introduction of core catchers and passive heat removal systems we are closer to concept of “*seperation of the reactor from the envoinment.*”

While safety in design has eveloved considerably, the regulotary changes have a time lag. We need to comply with statuory requirements of maintaining emergency preparedness regardless of high confidence that these measures will not be required to be taken.

The population in the area adjoining nuclear plant needs to be aware that nuclear plant requires much less area, its clean & green, built and operated with very levels of safety, imposes no restriction whatsoever in organic development of population outside the exclusion zone. The emergency preparedness excercises are meant for ehancing another safety layer to the public and in way undermines the safety confidence of the operators. This is important for harmonius co-existence.

