



What is it?

Following the partial core meltdown of Unit 2 at Three Mile Island in 1979, the traditional deterministic approach to the safe design and operation of nuclear reactors was rapidly supplemented by the development of additional probabilistic studies, referred to more commonly as Probabilistic Safety Analysis (PSA). PSA can be carried out at three levels for nuclear power plants: Level 1 (Core Melt); Level 2 (Radiological Release); Level 3 (Impact on Public & Environment). PSA can assess all plant faults as well as hazards across the full range of operational conditions.

PSA is a widely used tool to support the safe design, construction, commissioning and operation of nuclear facilities.



Why is it important?



PSA provides a numerical indication of risk to the public, workers and society. Comparison against numerical targets is a regulatory requirement that must be met in most countries before permission is given to design, construct and operate a nuclear power plant or facility.

Compliance with these targets is used to support the demonstration that the risk associated with the operation of nuclear power plants is As Low As Reasonably Practicable (ALARP). PSA can also be used

to demonstrate a 'balanced' design such that no fault, or group of faults, dominates the operational risk. PSA can also provide a huge range of additional insights including pointing to potential shortfalls in the deterministic safety case.

What we do

CRA has the largest integrated team of PSA/HFA/Safety Case Consultants in the UK. Our strength lies in translating complex systems into logical models that can then be populated with relevant plant, engineering and human failure data to gain valuable risk insights.

We have the capability to develop Level 1, Level 2 and Level 3 PSAs, which provides a full risk analysis from frequency of core damage due to plant faults and hazards (e.g. fire, flood, and seismic), to the radiological risk to the public and environment. Our team has considerable experience of using a range of fault tree/event tree analysis software, including FT+, and the suite of Risk Spectrum software. Also, we have developed a number of state-of-the-art approaches to maintaining PSA models in line with international best practice and regulatory expectations.

Our capability statements describe each of our PSA services.



Today, CRA is maintaining the PSA/HFA models for the existing UK fleet of NPPs, aiding the development of PSA/HFA for the next generation of NPPs, and leading the debate in the future of integrated PSA/HFA/Safety Case development.