American Nuclear Society

Position Statement #51

Safety of Nuclear Power

Nuclear reactor safety is a matter of international importance. A significant event anywhere in the world today will affect the operation, regulation, and public perception of nuclear operations everywhere. Nuclear professionals dedicate immense time, effort, and resources to advancing their technology and ensuring safety. After nearly 75 years (19,000 cumulative reactor-years[1]) of commercial nuclear power reactor operating experience, nuclear professionals have developed a proven and effective state-of-the art approach to safety that is a model in any industrial setting, including in the development of next-generation nuclear technology.

The American Nuclear Society believes that, in following its state-of-the-art approach, the nuclear industry has reached and maintains an industry-leading level of safety. In addition, we believe that the culture of continuous improvement, alongside an independent, robust regulator,[2] plays a critical part in this state-of-the-art approach to safety applied by the nuclear industry.

The cumulative experience over the history of operation shows that nuclear power is a safe energy source. When compared with generally accepted risks posed by other energy industries, the risk from nuclear power is low.[3,4] Furthermore, use of nuclear power has saved and continues to save lives through avoided emissions.[5] Decisions concerning the use of nuclear energy should appropriately balance risks and benefits, and regulators should adopt a holistic approach to regulation that aligns how we treat risk across various hazards.[6]

Background

Nuclear energy's state-of the-art approach to safety includes the following essential attributes:

- well-staffed, well-funded safety regulatory authorities, which are responsible for independently assuring operational safety and protection of the environment by utilizing performance-based goals and risk insights derived from analysis and experience;
- a robust design that uses consensus-based codes and standards and embodies margins, qualified materials, and sufficiently redundant and diverse safety systems;
- construction and testing in accordance with the applicable design specifications and safety analyses;
- a comprehensive organizational safety culture;
- qualified operational and maintenance personnel that have a profound respect for the reactor core, radioactive materials, and any supporting systems;
- technical requirements that define and control the appropriate boundaries for safe operations;
- a strong engineering function that provides support to operations and maintenance;
- adherence to a risk-informed, performance-based, defense-in-depth safety philosophy that maintains adequate barriers, both physical and procedural, to protect people and the environment;
- effective quality assurance practices;
- emergency plans protecting both on-site workers and off-site populations;
- access to a continuous program of nuclear safety research; and
- a strong and fiscally sound management organization.

These attributes embody a sound approach to reactor safety. Nuclear operators and industry regulators strive to minimize the potential for accidents and avoid harmful consequences through adaptation of safety programs. Our regulators and operators, and the industry as a whole, continuously improve to ensure that nuclear energy remains an important contributor to our clean energy portfolio. For example, in response to the March 2011 accident at the Fukushima Daiichi nuclear power plant, the International Atomic Energy Agency Member States endorsed an "Action Plan on Nuclear Safety," which worked to strengthen the global nuclear safety framework.[7] The tradition of safe operations includes ongoing innovation and anticipation of changing environments.

In addition, new reactor designs incorporate inherently safe design features while offering flexible operations, maintenance, and surveillance. A risk-informed and performance-based framework for design and regulation enables designs for advanced reactors that streamline fabrication, installation, maintenance, and testing of safety-related systems and components.[8]

References

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