Human aspects of nuclear safety: Challenges of the COVID-19 pandemic

NEA NUCLEAR ENERGY AGENCY

Getting the balance right: Effective nuclear regulation during a pandemic

In the face of a pandemic, an important pillar of any country's response strategy will be a reliable electricity supply. For many countries, nuclear power plants are part of this critical national infrastructure. While providing the flexibility and agile decision-making necessary to support licensee actions, regulators have an obligation to maintain high levels of nuclear safety. In doing so, they should:

- keep a critical eye on safety and security whilst not creating an undue burden on nuclear organisations as they manage the impact of the pandemic.
- confirm that nuclear power plants have adequate resources and competence to maintain safety and security including the capability to cope with emergencies.
- assure the health and safety of regulatory staff; if necessary changing how regulatory oversight is implemented, such as by using remote means to gain assurances.
- secure a timely information flow from nuclear organisations so that regulators have a clear and up to date understanding of what is happening on the sites they regulate.
- learn from global best practice at pace, so that learning can be implemented in a timely manner and captured in the aftermath.
- trust and verify; verification is done differently – reassessing the situation on the basis of past information available and remote inspections are other aspects of maintaining flexibility, with verification achieved with the support of nuclear operators and their internal assurance processes. There is a need for trust between licensees and regulators to enable remote regulation to function effectively.

The future: the lessons learnt will be critical to understanding and establishing the new normal. The way regulators operate in the future may need to evolve – especially if the impact of COVID-19 pandemic endures long-term. Greater application of risk-informed regulation and greater regulator-licensee trust may be part of the long-term legacy of the pandemic.

While the design and operating culture of nuclear power plants may differ globally, the safe application of nuclear technology relies on knowledgeable and capable human beings. Human aspects of nuclear safety, including organisational factors and a healthy safety culture, reflect the need to address complex, non-technical areas with large impact on the current and potential future uses and regulation of nuclear technology. The current COVID-19 pandemic is having a major impact on the workforce around the world: from how people carry out their work under necessary social distancing rules to the unavailability of workers due to sickness or taking care of others. The nuclear workforce must adapt in the short and long term to ensure the safe and reliable generation of nuclear energy around the world.

Special workshop

On 9 April 2020, the NEA convened a workshop to discuss the human and organisational factors challenges arising from the COVID-19 pandemic.

NEA Director-General William D. Magwood, IV moderated the discussion, opening with Suzanne Dolecki, Chair of the NEA Working Group on Human and Organisational Factors.

> The NEA must support its members as they adjust to the environment created by the COVID-19 pandemic. In the past, we have dealt with technical issues in emergency situations – but this virus attacks people, not equipment. People are our greatest asset and nuclear power plants cannot operate without them.
>
> William D. Magwood, IV
> Director-General, NEA

Leadership, resilience and learning from previous events

Key leadership aspects to consider during the pandemic include the following elements:

- *Considering the "whole person"* – leaders need to consider the health and safety of the social unit and not just the individual.
- *Redefining "normal"* – leaders need to consider the fundamental changes taking place without neglecting minor changes that might appear insignificant.
- *Managing without* – leaders need to recognise that many of the people they regularly depend upon to provide information or to undertake work may not be available.
- *Mental health* – leaders need to recognise the abnormal situation and pace of change in normal practices can create large amounts of stress, along with the stress a pandemic places on the entire society.

Mitigating the impacts on resiliency and decision making:

- The introduction of forced changes in work practice create challenges to maintaining resilience. These include the introduction of temporary arrangements and uncertainty about what practices are approved. There are also less face-to-face interactions, meaning that non-verbal cues are lost and communications can be less effective.
- Potential frequent changes in staff may mean that well-established relationships cannot be depended on as normal.
- There is a common misconception that people are working normally, when they are not – staff are carrying out routine operations in very abnormal circumstances.
- Decision making is more frequent and to compressed timescales, with less opportunity for broader input and challenge, with less clarity and more uncertainties. Decision-making processes and approaches need to adapt accordingly.
- The risks associated with these impacts can be mitigated by leaders who understand the vital role they serve as the heads of organisations of people: acknowledging the changes; encouraging staff; appreciating the impact of uncertainty; and avoiding a "business-as-usual" mindset.

Learning from the Fukushima Daiichi experience:

- The incident/situation itself spreads panic, fear and anxiety across society – the context in which people are working is significantly different and more challenging.
- There is a need for situational awareness during uncertain conditions including understanding how the pandemic is spreading in order to protect employee's health.
- The need to prioritise to understand what needs to be done and when, and what capability is needed to serve these priorities.

Industry responses: Business continuity activities

The critical role of a reliable and resilient energy supply has been well recognised during the COVID-19 pandemic. While nuclear power facilities around the world continued to operate safely and effectively during the COVID-19 pandemic, not all organisations were equally prepared to deal with this unprecedented global challenge. The nuclear industry must consider the following challenges:

- There needs to be an effective balance between sharing information — such as that needed to enable remote inspections and teleworking, and cyber security practices.
- Outage scopes, maintenance activities and modifications are being constrained by the impact of the reduced mobility of people. As a result, some tasks are being deferred to future outages. Although this is not causing immediate problems, there are concerns about the long-term impact on the planning of future outages.
- Operators are concerned about the sustainability of the nuclear industry supply chain; it is possible that some critical suppliers will need support in order to continue delivering their products and services through and after the pandemic.
- Where risk-informed approaches to nuclear regulation are in use, there appears to be an increased ability to adapt to new working practices; this is an area in which regulators could exchange experiences.
- Defence-in-depth is being maintained through the crisis; in fact, it is demonstrated in the ability of nuclear operators to deal with the many unplanned challenges created by the pandemic, including absenteeism and the need to assure social isolation on site.
- The World Association of Nuclear Operators (WANO) has collected plans globally to summarise what approaches are being taken to address the COVID-19 pandemic challenge. The following themes have emerged:
  - Increasing working hours to minimise shift handovers and doing shift handovers by video to minimise social interaction.
  - Augmenting capability and resilience by bringing in former and retired employees.
  - Modifying dining/rest areas and transport to ensure social distancing and using health monitoring at specified access points.
  - Reviewing training, maintenance activities and outage scopes to maximise the use of their own staff.
  - Implementing teleworking has been a challenge for some due to infrastructure and IT limitations.

Discussants

Mark Foy, Chief Nuclear Inspector, Office for Nuclear Regulation (United Kingdom)

Greg Lamarre, Director General, Canadian Nuclear Safety Commission (Canada)

Neil Wilmshurst, Vice President and Chief Nuclear Officer, Electric Power Research Institute

Ingemar Engkvist, Chief Executive Officer, World Association of Nuclear Operators

Maria Korsnick, President and Chief Executive Officer, Nuclear Energy Institute (United States)

Pia Oedewald, Principal Advisor, Radiation and Nuclear Safety Authority (Finland)

William Edward Webster Jr., Chairman and Hiromi Yamazaki, President and Chief Executive Officer, Japan Nuclear Safety Institute (Japan)

Over 344 attendees from nuclear authorities, industry, governmental and international organisations in 32 countries joined the discussants.