RESILIENCE IN SAFEGUARDS – MITIGATING CHALLENGES IN PANDEMIC SITUATIONS, DIFFICULT-TO-ACCESS AREAS AND PREPARING FOR THE FUTURE

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Abstract

The government of the United Arab Emirates (UAE) introduced emergency directives and strict public health measures during 2020-2022 to curb the spread of the COVID-19 pandemic. It was essential, therefore, for the Federal Authority for Nuclear Regulation (FANR) to promptly accommodate the imposed government measures while maintaining its nuclear regulatory oversight functions in the fields of safeguards, safety and security, and to ensure the UAE was able to continue meeting its international safeguards obligations to the highest standards. This paper presents FANR's business continuity plans and its effective and efficient approach to managing the challenges encountered during the pandemic, how the challenges were overcome, the experiences gained and the lessons learned.

The challenges encountered during the pandemic included maintaining communications with licensees, continuing to provide safeguards information to the IAEA, maintaining access to the UAE for IAEA safeguards inspectors, and continuing to execute a domestic nuclear inspection programme to ensure the peaceful, safe and secure conduct of regulated nuclear activities across the country, including oversight of the operation and construction of the Barakah Nuclear Power Plant. The success of FANR's pandemic response was based around a well-established business continuity plan and its leadership's readiness to embrace nuanced changes to its regulatory approaches. A key element of the response included a modern and well managed IT infrastructure and information systems, and readiness to provide secure access to the infrastructure from outside of FANR HQ. The response also relied on excellent cooperation with the national authorities responsible for public health and border controls.

Ultimately, FANR's well-laid plans, together with its agile and innovative approaches to the COVID-19 pandemic, resulted in uninterrupted nuclear regulatory oversight. Furthermore, the UAE won praise from the IAEA department of safeguards for establishing arrangements to maximize the efficiency of IAEA inspector's time in the UAE, for minimizing delays during the IAEA's verification activities, and for continuing to honor the country's nuclear non-proliferation obligations.

1. INTRODUCTION

The outbreak of the COVID-19 pandemic in 2020 had a significant impact on the global ecosystem, resulting in disrupted economies, social systems, and business operations. It has tested the resilience of institutions and systems worldwide. The pandemic also presented unique challenges to the implementation of nuclear safeguards, which are critical to preventing the proliferation of nuclear weapons and ensuring the safe and peaceful use of nuclear material.

Resilience refers to the ability of a system or organization to anticipate, prepare for, quickly adapt to and recover from disruptive events in order to maintain essential functions and performance. Resilience has become increasingly important in today's rapidly changing and uncertain world, where disruptive events such as natural disasters, cyber-attacks, epidemics and pandemics are becoming more frequent and complex. The key components of resilience can vary depending on the system or organization.

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However, foresight and preparedness, robustness, flexibility, adaptability, and learning are common elements that are important for any systems or organization to maintain their performance.

The resilience of nuclear safeguards has been tested and challenged as regulatory bodies, operators, and inspectors have been forced to adapt to new working conditions and practices. The effectiveness of the nuclear safeguards infrastructure in the face of these challenges is crucial for maintaining international security, safety and safeguards. In this paper, the resilience of the Federal Authority for Nuclear Regulation (FANR) during the COVID-19 pandemic is examined, including the challenges faced by FANR and the mitigation strategies implemented. By analysing the response to the pandemic, insights are provided into the strengths of current nuclear safeguards systems and areas for improvement are identified to further strengthen resilience in the face of future disruptions.

2. THE IMPORTANCE OF RESILIENCE AND PREPAREDNNESS

The UAE National Standard for Business Continuity Management System (BCMS), also known as the AE/SCNS/NCEMA 7000:2021 standard, is an essential part of the regulatory framework of FANR. It outlines the requirements for emergency management systems and the business continuity in the UAE for all governmental and private entities. FANR is required to comply with this standard to ensure that they have effective emergency management systems in place to respond to any potential emergencies or crises that may arise.

FANR considers foresight and preparedness, robustness, flexibility, adaptability, and learning in its business continuity management (BCM) policy and procedure, which are based on the guidance from the UAE's National Standard for Business Continuity Management System, AE/SCNS/NCEMA 7000:2021. These components are interconnected and work together to enhance the resilience of the system or organization. FANR also adheres to the Business Continuity Readiness Guidelines for UAE Organizations in the event of the Novel Coronavirus (COVID-) AE/SCNS/NCEMA 7002:2020, V(1) issued in March 2020. These Guidelines explains ways to address the risks arising from the outbreak of epidemics in the organizations that may directly affect business continuity and community stability. During the pandemic FANR demonstrated precautionary and preventive measures to eliminate the spread of the COVID-19 virus among employees at the workplace and to ensure fulfilling its mandates during the pandemic.

Foresight and horizon scanning allows nuclear State Regulatory Authorities (SRAs) to anticipate adverse scenarios and be adequately prepared against potential risks. Such preparedness forms a vital component for business continuity that must be continuously maintained and documented in a systematic manner. Robustness is critical, and SRAs must ensure that their systems are designed and constructed to withstand a wide range of potential hazards, including pandemics. Flexibility refers to the ability of a system to adapt to changing conditions and continue to function effectively. It is another key component, and SRAs must ensure that verification measures and techniques can be adapted to changing circumstances, such as the need for employing remote inspection techniques or alternative methods of verification during a pandemic where conventional access by inspectors may be constrained. Adaptability refers to the ability of a system to change in response to new information or changing conditions. SRAs must be able to quickly incorporate new information and experiences into their regulatory processes and procedures to continuously improve the effectiveness of nuclear safeguards. Finally, SRAs must be committed to learning from past experiences to ensure continuous improvement through ongoing monitoring, evaluation, and feedback. By incorporating lessons learned from past events and incorporating best practices from other SRAs and industry, SRAs can improve their resilience. This in turn enhances the effectiveness of national safeguards activities that underpin their state's international nuclear non-proliferation obligations.

3. STRATEGIES FOR BUILDING RESILENCE AGAINT PANDEMICS

In order to maintain the functions of the FANR Department of Safeguards, it was vital to first minimize the risk of a depleted workforce. Ensuring a fit, healthy, and available workforce was essential to conducting the fundamental regulatory processes of licensing, inspection, and enforcement. Moreover, from a nuclear non-proliferation perspective, it was a national imperative to continue to satisfy the obligations of the UAE's comprehensive safeguards agreement (CSA) and additional protocol (AP).

FANR quickly realized the need for a central coordinating body to deal with the plethora of situations and evolving governmental measures emerging from the pandemic. Consequently, FANR established a committee known as "The Team" to deal with health, safety and administrative issues related to the pandemic. The Team was formed from a cross-section of senior

management and subject matter experts. The Team had various responsibilities, such as ensuring FANR implemented government health instructions, providing personal protective equipment such as facemasks and sanitizers, and communicating with all staff on new and evolving national and organizational requirements. The Team also provided advice, guidance, and sessions on improving mental health during the period of substantial change. One of the key measures introduced by The Team to mitigate the spread of COVID-19 and ensure workforce availability was to require 50 percent of staff to operate remotely from FANR HQ. Employees working remotely, typically from home, alternated on a weekly basis with those working in HQ. The reduction of the number of staff in HQ allowed The Team to rearrange the office environment and maximize social distancing.

To further reduce the spread of COVID-19, FANR required a mandatory PCR test every seven days for entry to HQ. This precautionary measure allowed FANR to detect and take action to reduce the spread of disease. Additionally, inspectors that physically visited licensee sites were required to perform a PCR test and receive a negative result before returning to HQ.

The Operations Coordination Working Group (OCWG), consisting of members from Operations departments in FANR, as well as the Legal Affairs Department, adjusted its priorities to respond to the challenges of the pandemic. The cross-functional working group examined the impact of COVID-19 on FANR's regulatory processes and on regulatory compliance by licensees and proposed interim and permanent solutions to senior management. The OCWG provided technical support to the Operations departments, including establishing and implementing remote inspection techniques within 3S inspections, to maintain an effective inspection program throughout the pandemic. The OCWG's implemented various measures, including those imposed by UAE Cabinet decisions, during the pandemic and harmonized such implementation across the FANR Operations departments. The OCWG also coordinated the approval and the issuance of various approvals through online systems during COVID-19. These modifications to FANR regulatory processes were pivotal to supporting health organizations to respond to the emerging public health crisis, and to facilitating industry to continue its activities.

The work of the OCWG and The Team can be characterised by innovation. FANR realized from an early point that innovation is a crucial driver for progress and for overcoming challenges. One of FANR's strategic objectives is to enhance innovation culture within the organizational work environment, and

It is noteworthy that FANR's regulations displayed resilience during the pandemic. FANR adopts a non-prescriptive regulatory approach which provides a certain flexibility on how licensees can meet the requirements of FANR regulations. This approach is beneficial during disruptive events such as the COVID-19 outbreak. The approach enabled FANR to regulate a rapidly evolving industry while maintaining a strong focus on safety, security, and safeguards. FANR sets overarching goals and principles for nuclear safety, security, and safeguards, while providing guidance and instructions for licensees to comply with the regulations. For example, FANR-REG-10 allows ICRs and PILs to be submitted using other methods agreed in writing by the Authority. From a specifically safeguards perspective, FANR launched an on-line system to allow Locations Outside Facilities (LOFs) to submit Inventory Change Reports (ICR) and Physical Inventory Listings (PIL) through a secure on-line platform. These on-line systems not only remove the need for paperwork, and the inherent risks of spreading infection, but also improve accessibility to information for FANR and the licensee to support remote working.

FANR remained committed to providing awareness sessions to its licensees and adapted quickly to the new circumstances by leveraging technology to conduct virtual sessions and ensure that licensees received the necessary guidance to comply with FANR's regulations. In this way, FANR was able to continue honouring the UAE's commitments to maintain the highest standards of nuclear safety, security and safeguards.

With FANR adopting a remote working strategy, it was vital for FANR to also establish a robust IT infrastructure, allowing FANR staff to maintain effective, efficient, through secure access to FANR's digital information resources. By providing Virtual Private Network (VPN) access for the relevant staff, the FANR Department of Safeguards was able to continue accessing its internal nuclear material accountancy and safeguards systems. This, for example, allowed safeguards staff to prepare for inspections, collect and manage safeguards information, and prepare and submit notifications, reports and declarations to the IAEA.

The pandemic also highlighted the importance of FANR providing comprehensive digital services for licensees. While FANR had already invested in developing digital services well before the pandemic, there had still been a need for regular physical administrative-related interactions with licensees at FANR HQ. However, physical interaction has since been minimized by allowing, for example, on-line payments of license fees and the electronic issuance of licences. The first phase of an integrated and on-line approach to licensing was completed with the issuance of FANR 3S (Safeguards, Safety and Security) licenses. FANR's E-Licensing System allows applicants to apply for, renew and amend licenses without visiting FANR HQ or submitting hard-copy application forms by mail (the mail service was also considered as a possible conduit for the spread of COVID-19). Moreover,

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FANR licence application reviewers and assessors use the E-Licensing System to provide their administrative and technical feedback to applicants.

FANR also launched the WASL Platform as a client relationship management platform. This enables customers, suppliers, or even a community member to submit suggestions, complaints, and appreciation or enquires.

While information management systems are vital to supporting FANR regulatory activities, the physical interaction with licensees to conduct inspections remains fundamental. FANR introduced integrated 3S inspections in the first quarter of 2020 as part of its goal to become more efficient in ensuring licensee compliance with FANR regulatory requirements, and to reduce impact on licensees. With lockdowns and restrictions on the movement of people across the UAE during the pandemic, the FANR Department of Safeguards established an innovative approach to maintaining FANR's inspection program. The approach minimizes the number of FANR inspectors physically engaged in each inspection at the licensee's premises by allowing inspectors to participate via virtual means (e.g., Microsoft Teams or Zoom). These so-called 'hybrid' inspections allow interview-based parts of inspections and, to a large extent, the review of records and procedures to be conducted virtually. In some cases, this required the services of the FANR IT Department to support licensee's use of these virtual meeting services. The work of the inspectors physically present at the licensee's premises during hybrid inspections are focused on those verification activities that are not easily performed virtually, such as nuclear material measurements. The application of remote inspection techniques minimizes the number of inspectors potentially exposed to virus, and the period of exposure, allowing FANR regulatory oversight to be maintained.

In addition to maintaining the FANR inspection program, it was also essential to continue meeting the obligations of the CSA and AP in terms of providing access for IAEA inspectors to conduct inspections, design information verification and complementary access. With strict public health measures in place across the UAE, the FANR Department of Safeguards cooperated with federal and national competent authorities, such as the National Emergency Crisis and Disasters Management Authority (NCEMA), the Ministry of Health and Prevention and the Abu Dhabi Health Authority, to make arrangements for IAEA safeguards inspectors to continue their verification activities in the UAE during the pandemic. The cooperation required the FANR Department of Safeguards to first explain the UAE's safeguards obligations and the importance of supporting the IAEA's mission to those responsible for the health and security of the nation. The established arrangements ultimately provided conditional exemption on IAEA inspector quarantine requirements, which minimized the impact of the pandemic on IAEA resources.

The FANR Department of Safeguards, in cooperation with UAE competent authorities and other FANR departments were ultimately successful in building resilience against the COVID-19 pandemic. By identifying and eliminating obstacles to safeguards implementation, FANR and the IAEA were able to maintain business continuity within the UAE and continue their missions.

Learning from our experience is essential for growth and progress. The pandemic has presented many important challenges and lessons have been learned both on successes and limitations of modified working practices. The innovative introduction of hybrid inspection allowed FANR safeguards team to fulfil their objectives. However, the approach also had its limitations and it is not routinely applied. FANR considers it important to be physically present at licensee premises when possible as it provides the best opportunity to detect emerging issues, including non-compliances. Being able to observe original records, facility operations and take measurements and to engage in face to face communications are important aspects of inspections that are diminished by virtual interactions. As the organization continue to shift towards digitizing their services, it will remain crucial to determine how these services can be best deployed.

During periods of disruption such as pandemics, SRAs need to ensure that their regulatory processes and systems are agile and flexible enough to respond to new challenges. This requires ongoing research and development (R&D) to identify new technologies and approaches that can support safeguards effectiveness in the face of unexpected events. In addition, SRAs may need to invest in advanced data analytics and machine learning technologies to improve the efficiency of their monitoring and inspection processes. These technologies can help identify anomalies and potential breaches of safeguards agreements more quickly and accurately, allowing for a more timely response. Ultimately, the exact nature of R&D and technology investments needed will depend on the specific challenges faced by each SRA and the unique needs of their regulatory framework. It is important for SRAs to engage in ongoing dialogue with other agencies and stakeholders, including licensees, to ensure that they are investing in the most relevant and effective technologies to support safeguards during periods of disruption.

4. CONCLUSION

Building systems that are resilient against pandemics is essential for SRAs to maintain regulatory oversight of nuclear material and for the IAEA to continue drawing safeguards conclusions. For FANR, the COVID-19 pandemic highlighted the importance of planning for and adapting to unexpected challenges. SRAs must engage in foresight and horizon-scanning activities to assess potential risks and prioritize resilience-building strategies to ensure their regulatory processes, systems, and legal frameworks are sufficiently agile and flexible to respond to future pandemics or similar crises. SRAs must also consider the needs of their licensees in meeting regulatory requirements during such crises. Adequate R&D, investing in relevant technologies and enhancing inter-agency communications are all vital elements for being prepared to maintain safeguards effectiveness during periods of disruption. Finally, it is critical to learn from the past and continuously improve preparedness and resilience-building strategies. By doing so, SRAs and those other agencies responsible for supporting safeguards implementation can help maintain the integrity of the global nuclear non-proliferation regime, ensure the security of nuclear material and promote public confidence in their ability to cope during times of crisis.