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The Operation, Safety and Security of Nuclear and Radiation Facilities and Activities during the COVID-19 Pandemic

Progress Update

Report by the Director General

Summary

This document presents an updated overview of the Agency's support to Member States for the operation, safety and security of nuclear and radiation facilities and activities, including the Agency's actions undertaken to facilitate information exchange among stakeholders, collect feedback, and provide support for requesting Member States in mitigating the impact of COVID-19 pandemic. It also provides summary information on actions taken by operators and regulators during this period.

The Operation, Safety and Security of Nuclear and Radiation Facilities and Activities during the COVID-19 Pandemic

Progress Update

Report by the Director General

A. Introduction

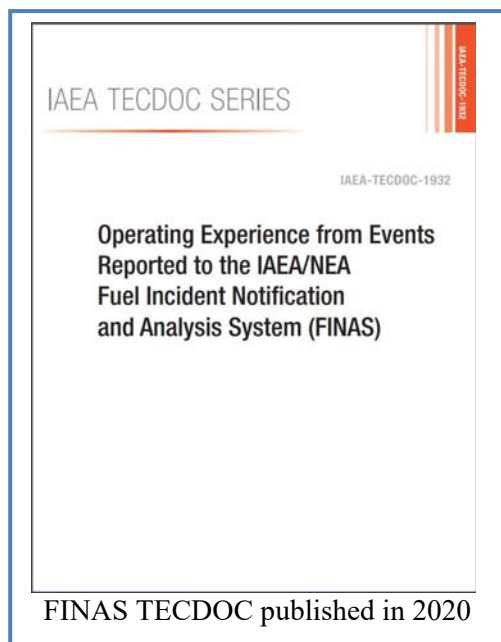
1. COVID-19 is the first pandemic of this scale in the history of the nuclear industry and its impact has been far reaching. Governments around the world have adopted and implemented strict health and safety related measures such as physical distancing, restricting inbound and outbound travel, free movement and closing borders. National policy decisions made by governments have direct and indirect repercussions on organizations in the nuclear and radiological field.
2. In Member States, organizations continued to ensure safety, security and continuity of business as the pandemic progressed. The Agency significantly adjusted its ways of working to maintain and enhance its support to Member States. In particular, the Agency's efforts to facilitate information exchange were enhanced in order to gather and share experiences, including good practices, of Member States as the pandemic spread. This rapid mobilization enabled the Agency to understand the specific challenges faced by Member States and to respond via appropriate support.
3. The Agency continues to work under this new normality, delivering on its mandate through routine and novel ways of working.
4. Document GOV/INF/2020/8 summarizes the actions to ensure safety, security and reliable operation of nuclear and radiation facilities and activities undertaken by the Agency and by operators and regulators up to May 2020, with an update issued in August in document GC(64)/INF/6.

B. Actions undertaken by the Agency to support Member States in mitigating the impact of the COVID-19 pandemic

B.1. Facilitating information exchange with Member States

5. The International Reporting System for Operating Experience (IRS) for nuclear power plants (NPPs), the Incident Reporting System for Research Reactors (IRSRR) and the Fuel Incident Notification and Analysis System (FINAS) for nuclear fuel cycle facilities remain fully operational and

reports relating to plans and actions taken to mitigate the impact of the COVID-19 pandemic have been received from Member States through these systems.



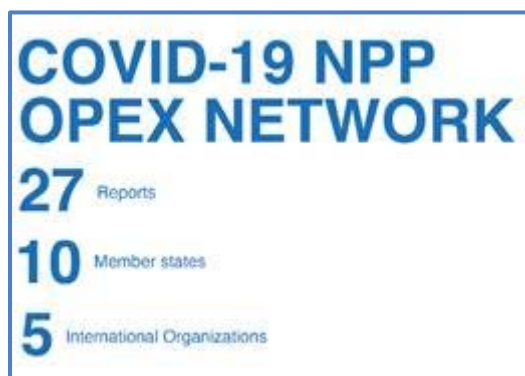
6. The Incident and Trafficking Database (ITDB) remains fully functional.

7. The Agency's Incident and Emergency Centre (IEC) continues to ensure that the communication channels for notification and information exchange on nuclear and radiological emergencies remain fully operational on a 24/7 basis.

8. Member States have provided details on the pandemic's impact on NPP performance, including details on outage scope, schedules and timing, through the Power Reactor Information System (PRIS). Input to the Country Nuclear Power Profiles (CNPP) resource were used to gather, collate and summarise officially supplied and published open source information related to the impact on operating NPPs, as well as advanced new build projects.

9. The IAEA received reports of outage impacts at NPPs in 26 of the 30 Member States with commercially operating NPPs. In some cases, outage scopes were reduced by eliminating non-critical work to minimise external staff brought on-site. In other cases, outages were extended to allow work to proceed at a slow pace that accommodated physical distancing constraints. In still other cases, entire outages were deferred to the following year. The full impact will play out over at least the next year as future outage plans are revised to complete deferred work.

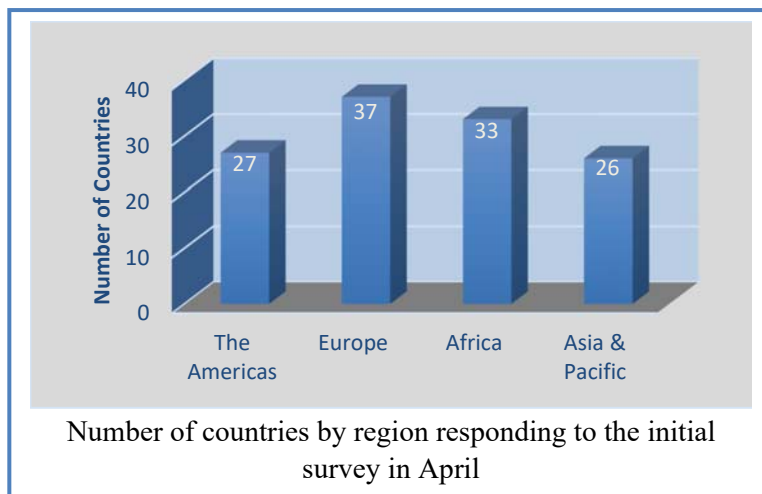
10. The Agency rapidly developed and piloted an international peer-to-peer network, the NPP COVID-19 Operating Experience Network (COVID-19 NPP OPEX Network), through the Technical Working Group (TWG) on NPP Operation. The Network was established for information and experience sharing between operating organizations, technical support organizations, relevant international organizations and other stakeholders, and has proven to be very valuable with 27 reports from 10 Member States and 5 international organizations.



11. Information on the pandemic's impact on training activities and human resources policies, gathered through the TWG on Managing Human Resources in the Field of Nuclear Energy, was shared in the Nuclear Energy Capacity Building Hub, hosted on the NUCLEUS platform. The topic was discussed and validated in a special session of the TWG meeting in October 2020.

12. Operators of research reactors continued to use the Agency's network for research reactors to share information on their status and the remedial measures being implemented.

13. The Agency keeps an open communication with national regulatory bodies for nuclear and radiation safety. In addition, the Agency has conducted a survey with radiation safety regulators with the objective to have a first overview of the impact of the COVID-19 pandemic on the safety of radiation sources and their regulatory oversight. The survey was launched in April and responses were received from 93 regulatory bodies.



14. Following the survey conducted in April 2020, a second slightly modified survey questionnaire, was distributed in August 2020 to seek information regarding: challenges faced by regulatory bodies when executing regulatory programmes; lessons learned to share with other regulators; new regulatory practices that mitigate COVID-19 restrictions in safety regulation; and areas where the IAEA Safety Standards could be strengthened. An additional 30 responses were received as of 23 September 2020.

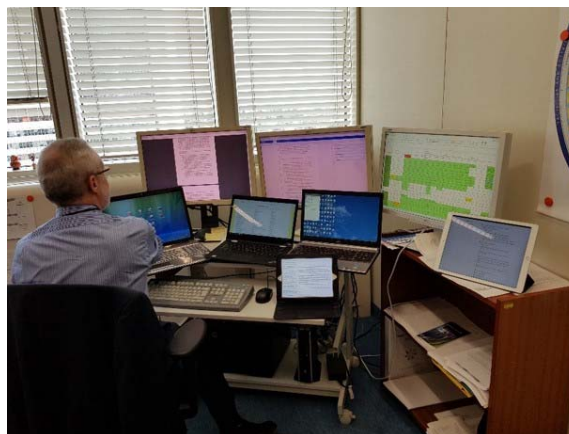
15. The IAEA organized a webinar with more than 300 regulators in the four regions (Latin America, Europe, Africa, and Asia and the Pacific) to discuss the findings of the survey. The main conclusions of the survey are:

- Regulatory activities were affected by the pandemic in many Member States and some functions such as authorization and inspection were not fully implemented; and
- Regulatory bodies have concerns regarding issues related to the safety and security of the radiation sources, including:
 - Disused and orphan radioactive sources;
 - Lack of medical staff for the medical use of radiation sources;
 - Unjustified exposures; and
 - Limited provision of technical services to ensure radiation protection.

16. As a main recommendation, the regulatory bodies have requested more Agency guidance on business continuities under special circumstances, such as performing inspections and other regulatory functions virtually. The Agency has already acted on this recommendation to inform the analysis of safety standards and nuclear security guidance that is underway, and for example is continuing the development of remote inspection guidance.

B.2. Safety standards and nuclear security guidance

17. The process for developing and revising safety standards and nuclear security guidance has continued. Instead of the regular Headquarters meetings for the Commission on Safety Standards (CSS),



The CSS Scientific Secretary supporting the virtual CSS

the Safety Standards Committees (SSCs) and the Nuclear Security Guidance Committee (NSGC), procedures for online review and approval of documents, using video-conference meetings of members to enable discussion, were adopted.

18. The Secretariat initially undertook a preliminary analysis of safety standards and nuclear security guidance to identify whether pandemic situations are currently addressed, and whether the safety standards and nuclear security guidance in this field should be strengthened. On the basis of this initial work, the Secretariat has mapped its preliminary analysis of safety standards and nuclear security guidance against

drafts currently under revision and has already proposed enhancements addressing pandemic situations in a few draft Safety Guides that will continue to be presented to the CSS, the SSCs and the NSGC for final approval.

19. As a second step, a deeper analysis of the safety standards and nuclear security guidance is underway, with the involvement of the CSS, SSCs and NSGC, as well as the international organizations involved in their development.

20. The Secretariat is developing a Technical Report Series document on experiences in Member States in ensuring safety, security and reliable operation of nuclear and radiation facilities and activities during the COVID-19 pandemic. This report is technical in nature and aims to: 1) summarize the actions taken by various stakeholders to manage the risks to the continued operation of facilities and activities posed by the pandemic; 2) promote the enhancement of plans for preparation, response and recovery for future pandemics by sharing the experiences of the stakeholders from the pandemic by the identification of good practices; and 3) review the impact of the pandemic on the electricity markets and on nuclear power programmes in Member States. The final publication is expected by the end 2021.

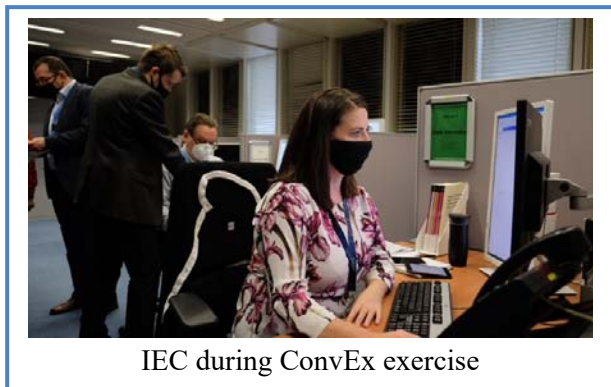
21. The International Nuclear Safety Group (INSAG) will continue to consider the implications of the COVID-19 pandemic on nuclear safety. Reflections on the implications of the response to COVID-19 for nuclear safety were the focus of the annual letter sent by the Chairman to the Director General in June. The letter was circulated to Member States ahead of the General Conference. The implications of the pandemic were the focus of the INSAG Forum, which occurred in the margins of the General Conference.

B.3. Emergency preparedness and response

22. The Agency's Incident and Emergency System continued to be operational, and a programme of emergency exercises continued to be carried out. The IEC continued conducting and planning for Convention Exercises (ConvEx) in accordance with existing plans, including the following:

- A ConvEx-1a exercise on 14 October 2020 to test the availability of contact points to receive urgent information and to acknowledge the receipt;
- A ConvEx-2a exercise conducted on 12 May 2020 to test the availability of contact points to complete the appropriate reporting forms and to upload monitoring data on the IAEA's International Radiation Monitoring Information System (IRMIS);

- Of particular note was the ConvEx-2b exercise conducted on 24 – 26 March 2020 in order to test the arrangements for a request for assistance and the provision of assistance. Thirty-five Member States and two Regional Specialized Meteorological Centres (RSMCs) of the World Meteorological Organization (WMO) participated in the exercise;



- A ConvEx-2c exercise conducted with Finland on 9 December 2020 to test arrangements for response to a transnational nuclear emergency; and
- Three ConvEx-2e exercises were conducted to test the IAEA's assessment and prognosis process and tools on 25 August 2020 with France, on 10 November 2020 with the IAEA LEU Bank in Kazakhstan and on 9 December 2020 with the Netherlands.

23. A review and revision of two safety standards (GSG-14 and GS-G-2.1) was conducted to include aspects related to pandemics and EPR.

24. The IAEA has published a document in its EPR series on “Preparedness and Response for a Nuclear or Radiological Emergency Combined with Other Incidents or Emergencies”, which contains guidance on implementing Safety Standards GSR Part 7 for building adequate EPR arrangements taking into account the impact of the pandemic in EPR.

25. A questionnaire was launched to the EPR Standards Committee (EPReSC) members on actions taken in Member States during the pandemic to address its potential impact on national EPR frameworks and resources. Responses from fifteen countries have been received. Based on the response to the questionnaire the following aspects can be highlighted:

- There has been no declaration of nuclear or radiological emergencies directly related to the pandemic; and
- Regulatory bodies, operating organizations, and offsite response organizations have taken many measures to ensure continuity of adequate EPR capabilities during the pandemic. These measures include:
 - enforcement of relief of activities that would place personnel at risk of contracting the virus (for example, training and exercises);
 - introduction of additional hygiene measures to protect essential response staff (on-site and off-site) and modification of rosters/schedules/turnover procedures to minimize personnel interactions; and
 - re-evaluation of response arrangements for a nuclear and radiological emergency, including reference levels, and modification of criteria for protective actions.

26. Some Member States reported that the use of national personal protective equipment stockpiles for the pandemic response have influenced the stockpiles of such equipment prepared for response to a nuclear or radiological emergency. Further analysis of the responses to the questionnaire will continue to be discussed at the EPReSC, for example to consider any additional need for guidance to address any impact of the pandemic on EPR.

27. The IEC actively utilised virtual tools to continue delivering capacity building activities for Member States. During the period from April to December 2020, the IEC conducted 84 webinars; nine virtual Consultancy Meetings; two meetings of the EPRReSC; two virtual Technical Meetings and eight virtual training events at regional or national levels.



B.4. Meetings of Conventions and other legal instruments

28. The Eighth Review Meeting of the Convention on Nuclear Safety (CNS) was postponed by a consensual decision of the Contracting Parties. A decision was taken not to organize the Review Meeting in 2021. The Presidency has, in consultation with the IAEA Secretariat, prepared a proposal for a plan of further actions including a framework for wrapping-up of the eighth review cycle in 2021 and merging the Eighth with the Ninth Review Meeting in 2023.

29. The Organizational Meeting for the Joint Convention Seventh Review Meeting of the Contracting Parties was postponed by a consensual decision of the Contracting Parties and was held as a hybrid meeting over four days from 28 September 2020 to 2 October 2020. The Seventh Review Meeting of the Joint Convention planned to be held from 24 May to 4 June 2021 was also postponed by a consensual decision of the Contracting Parties and will be held from 27 June to 8 July 2022.

30. The 10th Meeting of the Representatives of Competent Authorities identified under the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the case of a Nuclear Accident or Radiological Emergency took place as a virtual meeting from 15-19 June 2020. The meeting endorsed nine conclusions with 22 associated action items. These actions, for both the Secretariat and Member States, are expected to be completed before the next Competent Authorities Meeting in 2022. They include actions related to adherence to the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, the USIE, Response and Assistance Network (RANET), public communication in a nuclear or radiological emergency, IAEA's role on assessment and prognosis, IRMIS, ConvEx, and reporting nuclear and radiological incidents and emergencies irrespective of their cause.



10th Meeting of the Representatives of Competent Authorities

31. The International Meeting on Code of Conduct on the Safety of Research Reactors, which was scheduled for August 2020, was postponed to June 2021. The Agenda of the meeting will remain as initially planned and will discuss the experience of research reactor operators in addressing pandemics.

32. The Meeting of the Preparatory Committee for the 2021 Conference of the Parties to the Amendment to the Convention on the Physical Protection of Nuclear Material (2021 Conference) was held as a virtual meeting from 7 to 11 December 2020, having been postponed from the original dates of 29 June to 3 July 2020. At the meeting, the Parties discussed formal preparations for the 2021 Conference, including a draft agenda and programme for the 2021 Conference, as well as draft Rules of Procedure for the 2021 Conference. The Agency has taken steps to ensure that the situation with respect to COVID-19 does not impact the robustness of the preparations for the 2021 Conference.



DG Grossi delivering his opening remarks to the virtual PrepCom

B.5. Collaboration with other United Nations organizations and other international bodies

33. Regular interaction between the IAEA and the World Organisation of Nuclear Operators (WANO), the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (NEA) and other organizations continued to enable an effective exchange of information and lessons learned.

34. Through the coordination of the Inter-Agency Committee on Radiological and Nuclear Emergencies (IACRNE), the Agency and the International Organisations which are co-sponsors of the Joint Radiation Emergency Management Plan continued to prepare the ConvEx-3 (2021) exercise which will be conducted in October 2021, based on a nuclear power plant accident scenario to be hosted by the United Arab Emirates. Two ConvEx-3 (2021) Task Group Meetings were conducted virtually on 8 September 2020 and on 23 November 2020. Key features of the exercise scenario and injects were reviewed at the meetings and the workplan for the preparation of the exercise was updated. Representatives of Comprehensive Nuclear-Test-Ban Treaty Organisation (CTBTO), European Commission (EC), World Health Organisation (WHO) and WMO participated in both Task Group Meetings. A representative of Euro-Atlantic Disaster Response Coordination centre (EADRCC) also participated in the meeting on 8 September 2020.

35. There has been significant disruption in the distribution of medical isotopes and radioisotopes. The Agency has contacted stakeholders to ascertain means to support mitigation of these disruptions including the International Civil Aviation Organisation (ICAO), the International Air Transport Association (IATA) and the International Federation of Air Line Pilots' Associations (IFLAPA).

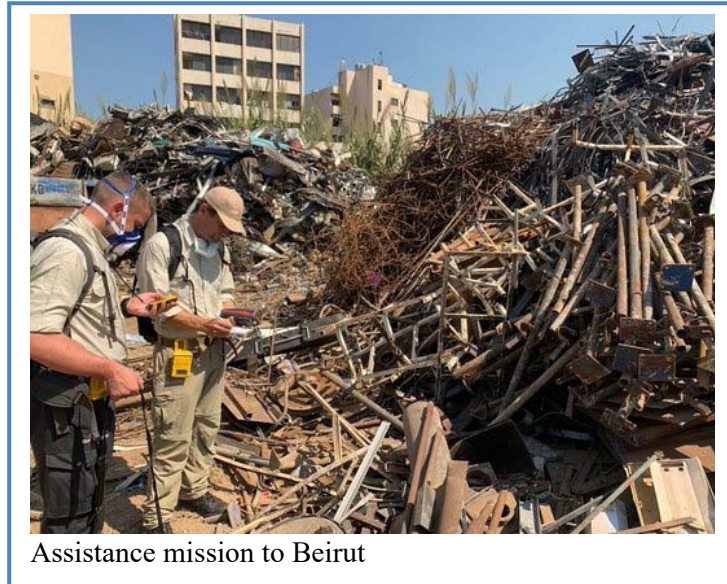
B.6. Other support to Member States

36. The Agency initiated a new webinar series on supply chain. This webinar series highlights the global view on the world's nuclear supply chain, presents challenges and avenues for the future and takes stock of the recent IAEA work in the area. It discusses project delays and temporary shutdowns of NPPs due to detection of counterfeit items, obsolescence of original technology, and increased reliance on digital equipment. The series included a session on challenges brought by the COVID-19 including difficulties related to mobility of contractors.

37. The IAEA has launched a Nuclear Supply Chain Toolkit to support countries in coordinating among regulators, technical support organizations, owner/operators of nuclear facilities and their suppliers. The toolkit provides examples, case studies and good practices to help ensure that procurement by nuclear

power plants, research reactors and fuel cycle facilities is done efficiently and at high quality. It is intended to assist both newcomer and operating countries in the use of sound quality and management principles.

38. Following an explosion in the Beirut port, the IAEA responded to the Lebanese Republic's request for assistance by deploying its Assistance Mission with the involvement of RANET. The Assistance Mission was conducted under pandemic conditions by IAEA, Danish and French experts, who



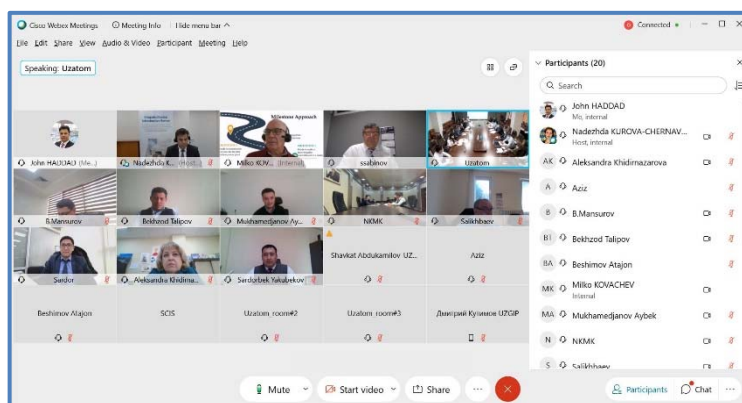
Assistance mission to Beirut

confirmed the radiation safety and security of radioactive sources in hospitals in Beirut and checked that no hazard was presented by materials containing naturally occurring radionuclides that are stored at the Beirut port. The mission experts strictly followed the IAEA's and the Lebanese authorities' safety regulations to prevent the spread of COVID. In addition, environmental samples collected by the Lebanese Republic and analysed at laboratories in France (IRSN) and Switzerland (Spiez Laboratory) confirmed that they did not contain elevated radiation levels.

39. The Agency was able to continue to provide critical support and assistance to remove and consolidate disused sealed radioactive sources. This included consolidation of nine high-activity disused radioactive sources in Colombia and support to a mission to Brazzaville in the Secure Management of High-activity Radioactive Sources, with emphasis on transport, 16-19 November, in close cooperation with the Division of Africa, Department of Technical Cooperation.



Experts dismantling a teletherapy head used for cancer care in Colombia in preparation for its safe and secure storage

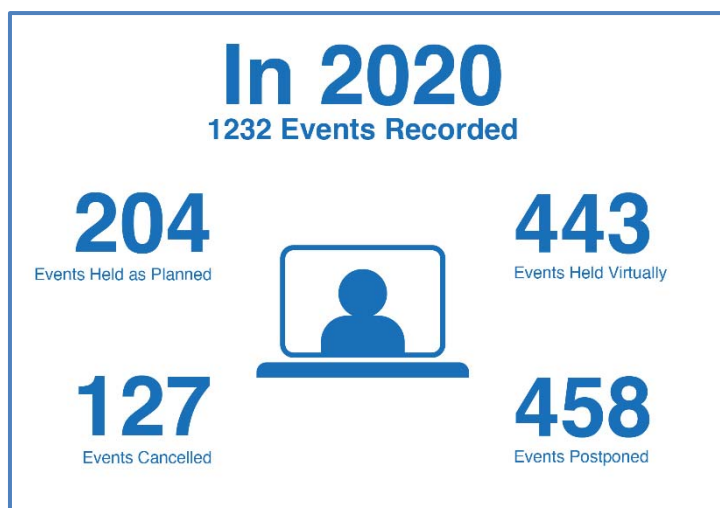


40. The IAEA conducted two Combined Self Evaluation Support Mission - Pre-INIR Missions virtually in preparation for the main Integrated Nuclear Infrastructure Review (INIR) missions in Sri Lanka and Uzbekistan. The INIR missions planned for 2020 to 2021, including INIR Phase 1 Follow-up to Kenya, INIR Phase 1 to Sri Lanka, and INIR Phase 2 to Uzbekistan were postponed by Member States.

41. A new webinar series was launched in 2020 on Training and Qualification for Nuclear Facility Personnel. The webinar series aims to strengthen the capacity of Member States to analyse, design, develop, implement, and evaluate training programmes for nuclear facilities. Three webinars were held in 2020, and 4 more are planned in 2021.

42. E-learning courses on nuclear security, emergency preparedness and response and radiation protection are available to Member States. The Secretariat has noted an increase in enrolments in and completion of its e-learning courses in this regard. In addition, the Agency successfully tested and deployed several upgraded e-learning modules as planned. The Agency also provided Member State organizations with training course material in order to conduct training themselves and provided human resource development (HRD) planning and training support and reviewed Member States' HRD documentation.

43. In summary, the Agency adapted its ways of working to continue its support to Member States. Specifically, regarding the safe, secure and sustainable operation of nuclear facilities, 1232 events had been planned for 2020. Many events were carried out as planned, either face to face (204 events) or altered to a virtual format (443 events). Many events planned for 2020 were also postponed (458 events) to await easing of COVID-19 restrictions. Some events planned for 2020 were cancelled (127 events).



C. Actions undertaken in Member States to mitigate the impact of the COVID-19 pandemic

C.1. Nuclear Power Plants

44. Member State actions focussed on ensuring the safety and wellbeing of staff through prompt action to minimise the risk of the pandemic's spread, while maintaining business continuity and adequate levels

of safety, security and sustainability of NPPs. No Member State reported the enforced shutdown of any nuclear power reactors resulting from the effects of COVID-19 on their workforce or essential services such as supply chains. Regulatory bodies have generally applied a graded approach during the pandemic and adjusted the scope of regulatory or other inspections based on their safety significance.

45. Member States indicated different levels of impact on planned outages, scheduled maintenance plans or programmes due to limited availability of manpower caused by travel restrictions as well as for the protection of health of employees, while ensuring adequate levels of safety and security at the NPPs. In some cases, operators have proposed to the regulatory bodies the deferment of the planned outages to 2021, which could eventually show higher than average yearly contributions to electricity production by nuclear power in 2020. In some cases, economic slowdowns led to decreased energy demand leading operators to reduce power or even shutdown.

46. In Canada, one unit completed a long-term outage for a major refurbishment and life extension programme and returned to operation with COVID-19 measures in place, while refurbishment efforts began at two other units.

47. Ongoing and future challenges include the implementation of planned maintenance activities to ensure interim- to long-term reliability. Current mitigation actions minimise the site presence of external staff by deferring nonessential online and outage work to ensure safety. This work is being rescheduled, but uncertainties regarding how the pandemic might progress are posing a challenge for many Member States.

48. During the pandemic major milestones were achieved at new nuclear unit sites in the Russian Federation, for example concreting the inner containment shell and the hydraulic test of the reactor of Kursk 2-1. In 2020, five reactors were connected to the grid and three construction starts were observed. As planned before the COVID-19 pandemic, 5 units have been permanently shut down.

2020 Operational Highlights		
Grid Connections	New Construction Starts	Permanent Shutdowns
China (2)	China (2)	France (2)
Russian Federation (1)	Turkey (1)	United States of America (2)
Belarus (1)		Russian Federation (1)
United Arab Emirates (1)		Sweden (1)

49. The pandemic impacted resources at new units in Belarus, United Arab Emirates, Turkey and Bangladesh, but did not stop construction activities.

50. Actions taken by Member State regulatory bodies focussed on maintaining an adequate level of regulatory oversight whilst ensuring the safety and wellbeing of staff. Regulatory bodies generally reported adopting remote working practices with some able to maintain a physical regulatory presence at nuclear installation sites through resident inspector offices.



C.2. Research reactors and the production of radioisotopes

51. Most research institutions and universities, which operate many research reactors for education, training, and research, decided to temporarily shut down the facilities. They have also implemented

measures to maintain safety of the reactors during the extended shutdown state, for example by partial unloading of fuel from reactor cores and monitoring safety in accordance with existing procedures for long-shutdown periods.

52. Most Member States decided to postpone (or reduce the scope of) regulatory inspections during the pandemic period. Along with the universities and research institutions in which they operate, many research reactors that focus on training and research are in temporary shutdown – a state in which a reactor’s operations are on hold until circumstances change.

53. Most research reactors in operation remain operable, with specific measures implemented to address the pandemic.

54. Six of the major producers of radioisotopes surveyed continue to operate and have developed business continuity plans with defined proactive measures to ensure safety of the facility and personnel during the pandemic, while continuing production. These include revised staffing arrangements (minimum staffing during operation shifts, on-call duties and non-essential staff work from home), and implementation of the national health requirements on the spread of the COVID-19 virus (physical distancing, hygienic procedures, similar to the actions taken in NPPs).

55. Production of medical radioisotopes and radiopharmaceuticals has been recognized as “essential services” in most countries. The production has currently remained sufficient to meet the demand. However, the COVID-19 crisis resulted in a re-prioritization of hospital medical procedures, and a drop of around 20% of the global demand of Mo-99. The IAEA held a Webinar on “COVID-19 Pandemic: Supply of Medical Radioisotopes and Radiopharmaceuticals” in April 2020 to evaluate the situation worldwide.

56. A reduction in nuclear medicine procedures worldwide has been reported, reaching up to 45% to 80% depending on the procedure and the country. This is due to postponement of non-urgent procedures and the disruption in the supply chain. The regions most affected are Africa, Latin America, Middle East and South East Asia, with some cases of suspension of services. Plans have been made to restore the deferred services.

C.3. Nuclear Fuel Cycle Facilities

57. Most nuclear fuel cycle facilities (NFCFs) continued operation, except some radioactive waste management facilities and some mining and processing facilities, which were temporarily shut down.

58. Operating organizations of NFCFs have adopted measures to ensure business continuity, nuclear safety and security. Typical measures included prioritization of strategic activities. Similar to NPPs, measures also focused on minimizing the potential transmission of the virus among personnel.

59. The greater challenge to NFCFs, especially those dealing with radioactive waste management (RWM), lies in managing the significant economic effects of the pandemic. Measures will likely include tighter prioritization of activities and increased resourcefulness in making visible the longer-term benefits of RWM, including possible sharing of RWM facilities between Member States.

C.4. Facilities using radiation sources

60. The survey on the impact of the COVID-19 pandemic on the regulatory activities for the safety of radiation sources has identified a number of issues that may be of interest for the regulatory oversight in the current circumstances. The survey indicates that users may be constrained due to economic challenges to continue business and thus may fail to ensure safety of sources, including disused sealed sources. Some of the facilities, for example, may not be able to meet necessary staffing needs and thus could jeopardise the safety of radiation sources, occupational workers, patients or the facilities itself.

61. Almost all the regulatory bodies are following a graded approach and adjusting their inspection programme to deal with the challenges presented by the pandemic.

62. Medical physicists in a diagnostic radiological setting queried the potential impact on medical and occupational radiation protection from COVID-19 pneumonia imaging activities. With chest CT being used in the management of patients with known or suspected COVID-19 infection, sometimes repeatedly, and with the imaging sometimes being performed in locations outside the traditional radiological imaging departments, a continued focus on radiation protection of patients and workers is strongly recommended. The prevention of COVID-19 infections of patients and medical staff also needs to be considered in these imaging activities.

D. Remarks and way forward

63. COVID-19 is the first pandemic of this scale in the history of the nuclear industry and its impact has been far reaching. The Agency continues to support Member States under this new normality, delivering on its mandate through routine and novel ways of working. The Agency, in collaboration with peer and partner organizations, will continue to reflect on and continue to share lessons learned from the pandemic and the relevant global response to it.

64. An example of successful delivery through novel ways of working is that the development of safety standards and other Agency guidance continued unabated throughout the period despite the restrictions imposed. A deeper analysis of safety standards and nuclear security guidance regarding pandemics is underway, including the guidance on emergency preparedness and response. Another example of successful delivery through novel ways of working is the completion of virtual peer review and advisory services. Some aspects of future services could continue to be delivered virtually, but it is anticipated that the vast majority of missions, and other large events such as review meetings for Conventions, would need to have a face to face component.

65. Response actions have been implemented by operating organizations and regulatory bodies in Member States to ensure safety, security and reliable generation of electricity, production of isotopes or supply of other relevant products and services to the extent possible. The Secretariat is developing a publication synthesising the actions taken by Member States.

66. The nuclear industry needs to monitor its supply chains to ensure that latent risks from broader industrial shutdowns are properly managed to ensure future nuclear installations safety, security and reliability. One of the anticipated challenges for Member States is that some companies may close as a result of the economic impact of the pandemic.

67. The IAEA recognizes the need to encourage the governments of the producers and users of medical radioisotopes, the operators of research reactors, and the relevant Member States involved in production and transport of radioisotopes to continue to take steps to strengthen arrangements for deliveries. This action will allow mitigation of potential supply risks as the pandemic continues at different rates in Member States.

68. The IAEA will continue to undertake its activities during the ongoing pandemic and will continue to update Member States.