MULTINATIONAL DESIGN EVALUATION PROGRAMME

Annual Report

April 2019-June 2021

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Foreword from the Policy Group Chair

It has been a pleasure and an important responsibility to serve the Multinational Design Evaluation Programme (MDEP) as Policy Group Chair. MDEP is a unique multinational initiative leveraging the resources and knowledge of national regulators to review new reactor designs, an initiative that has been widely recognised as an effective framework for regulatory co-operation and harmonisation.

The MDEP Policy Group decided to "sunset" MDEP in its current form by the end of 2021 and it agreed that a new streamlined governance structure should be implemented for MDEP in 2022, with a framework much more suited to the smaller number of reactor technologies that will participate in MDEP in the future. The past two years have been a transition period for MDEP, and to that end this report will encompass all MDEP activities from April 2019 to June 2021.

Since early 2020 the global environment that we had all been operating in fundamentally changed due to the COVID-19 pandemic. However, thanks to the support and engagement of our members, we made great progress in several areas during the last two years despite the restrictions imposed on in-person interactions. Notably, the challenges in addressing hydrogen recombiners' reliability and effectiveness during the plant life have been discussed by all current Design-Specific Working Groups (DSWGs) and each working group has published a technical report on hydrogen management to establish a common understanding of the regulatory requirements between the national regulatory bodies of MDEP members.

In addition, as national regulators adjusted their vendor inspection programmes with enhanced use of remote inspection, the impact and learning from the COVID-19 response have been shared more widely as part of country-specific updates in the Vendor Inspection Cooperation Working Group (VICWG) meetings. The working group also trialled the delivery of a remote Multinational Vendor Inspection. This was successfully completed and represents a further example of efficient and effective regulatory co-operation that can be adopted more widely in the future.

The ability to maintain momentum, despite the difficult conditions, emphasises the importance of the strong relationships and communication routes established as part of MDEP pre-pandemic, which meant it has been quick and easy to communicate with colleagues from other regulators when issues arise.

We have made great steps towards the transition of MDEP to a more simplified governance framework. The details of the new framework have been agreed by the members of the future framework. We have created a transition team to focus on the activities required for a smooth transition. We have been working on a range of close-out activities, necessary knowledge management efforts, and the development of closure reports and other ongoing activities to achieve an orderly shutdown of the MDEP framework 2006-2021.

An overarching close-out report for MDEP 2006-2021 has been produced that draws together the work of MDEP during this period and provides a clear reference to all of the key MDEP documentation and reports that will be available for the future use of MDEP members in the MDEP Library, which will be maintained by the Nuclear Energy Agency (NEA) Secretariat.

The 5th MDEP Conference has been postponed to 2022 due to the global impact of COVID-19. It is anticipated that the conference can go ahead during the latter part of 2022, utilising the initial programme developed by the MDEP Steering Technical Committee (STC), but the detailed arrangements for the conference will now need to be developed under the new framework. Hopefully, we can gather all MDEP members as well as wider MDEP stakeholders at this event, to hear about the great co-operation and excellent work completed under the current framework and look to the future and the benefits that can be delivered under the new one.

Please stay safe and well in these difficult times.

Mark Foy
MDEP Policy Group Chair

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Executive summary

The Multinational Design Evaluation Programme (MDEP) aims to leverage the resources and knowledge of national regulatory authorities that are currently, or will shortly be, undertaking the review of new reactor power plant designs. MDEP members are the regulatory authorities of Argentina (Nuclear Regulatory Authority, ARN), Canada (Canadian Nuclear Safety Commission, CNSC), the People's Republic of China (National Nuclear Safety Administration, NNSA), Finland (Radiation and Nuclear Safety Authority, STUK), France (French Nuclear Safety Authority, ASN), Hungary (Hungarian Atomic Energy Authority, HAEA), India (Atomic Energy Regulatory Board, AERB), Japan (Nuclear Regulation Authority, NRA), Korea (Nuclear Safety and Security Commission, NSSC), Russia (Rostechnadzor), South Africa (National Nuclear Regulator, NNR), Türkiye (Turkish Atomic Energy Authority, TAEK), the United Arab Emirates (Federal Authority for Nuclear Regulation, FANR), the United Kingdom (Office for Nuclear Regulation, ONR) and the United States (Nuclear Regulatory Commission, NRC). The OECD Nuclear Energy Agency (NEA) performs the Technical Secretariat function in support of MDEP. The International Atomic Energy Agency (IAEA) also takes part in the work of MDEP. This programme incorporates a broad range of activities including enhancing multilateral co-operation within existing regulatory frameworks and increasing multinational convergence of codes, standards, guides and safety goals. A key concept throughout the work of MDEP is that national regulators retain sovereign authority for all licensing and regulatory decisions.

According to the Policy Group's decision made in October 2020, MDEP is moving forward with plans to close the EPR Working Group, AP1000 Working Group, and APR1400 Working Group by the end of 2021, and a new MDEP governance structure will be implemented in 2022. Although MDEP is in a period of transition, working groups continued to share information and experience on the safety design reviews with the purpose of enhancing the safety of the design and enabling regulators to make timely licensing decisions. This annual report encompasses all MDEP activities from April 2019 to June 2021.

Substantial progress has been made on the overall MDEP goals of increasing co-operation and convergence of requirements and practices. In addition, the lessons learnt from the 11 March 2011 accident at the Fukushima Daiichi Nuclear Power Plant have been addressed appropriately by all designs under MDEP and incorporated into MDEP activities in the Design-Specific Working Group (DSWG) programme plans. Accomplishments to date provide confidence that the MDEP membership, structure and processes offer an efficient method of co-operating in regulatory reviews for new designs. At the level of the working groups, the key accomplishments for April 2019-June 2021 include:

- The EPR Working Group published Technical Reports on Hydrogen Management for EPR (TR-EPRWG-06), and an EPR Assessment of 2A Large Break Loss-of-Coolant Accident (2A-LOCA) Analysis (TR-EPRWG-07). It also published updated Common Positions on the EPR Instrumentation and Controls Design (TR-EPRWG-01).
- The AP1000 Working Group published the Technical Reports: Hydrogen Control System for the AP1000 Design (TR-AP1000WG-04), Lessons Learnt from Implementation of the Common Position on FPOT for AP1000 (TR-AP1000WG-05), and Hot Functional and Startup Testing Lessons Learnt (TR-AP1000WG-06). It also finalised a Technical Report on AP1000 Technical Exchanges during the Design, Construction, and Commissioning of AP1000 Reactors, which is restricted to AP1000WG members at the request of the members.
- The APR1400 Working Group continued to exchange information on country-specific design issues in Korea, the United Arab Emirates, and the United States. It published the Common Position CP-APR1400-04: Irradiation Effect on the APR1400 Fuel Bundle Spacer Grid Strength. The working group also published the Technical Reports: Hydrogen Recombiner Survey Results for APR1400 design and Comparison of the Regulatory Requirements for Probabilistic Risk Assessment (PRA).
- The VVER Working Group completed a Common Position (CP-VVERWG-02) on Addressing Ex-vessel Corium Stabilization in Core Catcher. It published the Technical Reports: Regulatory Approaches Related to Accidents and Transients Analyses (TR-VVERWG-03), Core Catcher (TR-VVERWG-04), and Hydrogen Recombiners (TR-VVERWG-05). It also finalised a draft of the Common Position: Reactor Pressure Vessel

and Primary Components Reliability for AES-2006 designs. The working group also continues to develop two technical reports on similarities and differences among the VVER designs VVER-1000 and VVER-1200.

- The HPR1000 Working Group published the Common Position CP-HPR1000WG-01: Addressing Fukushima Daiichi Nuclear Power Plant Accident-Related Issues. It also published the Technical Reports: Hydrogen Control During Severe Accidents (TR-HPR1000WG-01) and Regulatory Requirements and Practices for Severe Accidents (TR-HPR1000WG-02). The working group is now developing Common Positions on the Vienna Declaration on Nuclear Safety, and Sump Strainer Performance. The HPR1000 Severe Accidents TESG is developing a Common Position on Addressing In-Vessel Retention Strategy, and the Internal and External Hazards TESG is finalising a Technical Report on HPR1000 Hazards.
- The Vendor Inspection Co-operation Working Group (VICWG) published a Technical Report on Safety Culture in the Nuclear Supply Chain (TR-VICWG-07). It finalised the Technical Report: Assessment of Multinational Vendor Inspection of ENSA (Spain) (TR-VICWG-06) which is restricted to VICWG members at the request of the members. The VICWG updated two Common Positions (CP-VICWG-02 and CP-VICWG-04): Witnessed, Joint and Multinational Vendor Inspection Protocol; and Mitigating the Risks of Counterfeit, Fraudulent, and Suspect Items. The VICWG conducted the 3rd and 4th Multinational Vendor Inspection in 2019 and 2021, respectively.

1. Introduction

The Multinational Design Evaluation Programme (MDEP) develops innovative approaches to leverage the resources and knowledge of national regulatory authorities who are, or will shortly be, reviewing new reactor power plant designs. MDEP is primarily focused on design evaluation, but also includes inspection activities and generic issues. A key concept throughout the programme is that MDEP will better inform the decisions of regulatory authorities through multinational co-operation, while each regulator retains the sovereign authority to make licensing and regulatory decisions.

Working groups are implementing the activities in accordance with their programmes, and have established the necessary interfaces both within and outside MDEP members. Although MDEP is in a period of transition to a new framework, significant progress has been made over the past two years on the overall MDEP goals of increased co-operation and convergence of requirements and practices. Accomplishments to date provide confidence that the MDEP membership, structure and processes provide an effective method of increasing co-operation in regulatory design reviews for new reactors.

MDEP was established in 2006 as a multinational initiative for a five-year period. It was extended for another five-year period in 2012 by the MDEP Policy Group, which oversees MDEP operations, based on the value gained by the members. In 2015, the Policy Group determined that MDEP should continue in its current form, for at least five more years following 2017. The Policy Group recommended and the NEA Committee on Nuclear Regulatory Activities (CNRA) agreed to transfer of two of the issue-specific working groups (Codes and Standards Working Group [CSWG] and Digital Instrumentation & Control [DI&C] Working Group) and one design-specific working group (Advanced Boiling Water Reactor Working Group) to the CNRA. In September 2019, the Policy Group decided to sunset MDEP in its current form by 2022 and affirmed that ongoing work on VVER and HPR1000 should continue. A slimmer MDEP structure has been established for this work in 2022 and beyond. In October 2020, the Policy Group approved moving forward with plans for the closure of the EPR Working Group, AP1000 Working Group, and APR1400 Working Group by the end of 2021, and determined that a new MDEP governance structure would be implemented in 2022. This annual report encompasses all MDEP activities from April 2019 to June 2021.

2. Programme goals and outcomes

The main objectives of the Multinational Design Evaluation Programme (MDEP) effort are to enable increased co-operation within existing regulatory frameworks and establish mutually agreed upon practices to enhance the safety of new reactor designs. The enhanced co-operation among regulators will improve the effectiveness and efficiency of the regulatory design reviews, which are part of each country's licensing process. The programme focuses on co-operation on regulatory practices that aim at harmonising regulatory requirements. The International Atomic Energy Agency (IAEA) safety standards, which provide a general level of harmonisation, provide input to the work and can benefit from the final results.

MDEP is meeting its goal of enabling increased co-operation through the activities of the working groups. MDEP has been successful in providing a forum for regulatory bodies to co-operate on design evaluations and inspections. In addition to organising working groups, MDEP has provided each regulator with peer contacts who share information, discuss issues informally and disseminate information rapidly. For example, the Design-Specific Working Group (DSWG) members have benefitted significantly from the sharing of questions among the regulators, resulting in more informed and harmonised regulatory decisions. MDEP interactions are useful in confirming findings that had previously been made. It also improved the safety focus of the design review, and helped identify previously undiscovered safety issues or expanded the scope of review. MDEP members have also been highly successful in co-ordinating vendor inspections during which the regulators share observations and insights. MDEP has made improvements in communicating information regarding the members' regulatory practices through development of an MDEP Library which serves as a central repository for all documents associated with the programme. Moreover, successful interactions with stakeholders via MDEP have built links with regulators, industry, standard development organisations (SDOs) and other international organisations, and have been beneficial in reviewing different reactor designs.

3. Programme implementation

3.1 Membership

Participation in the Policy Group and Steering Technical Committee is intended for national safety authorities of interested countries that already have commitments for new build or firm plans to have commitments in the near future for new reactor designs. The Multinational Design Evaluation Programme (MDEP) current members are: Argentina, Canada, China, Finland, France, Hungary, India, Japan, Korea, Russia, South Africa, Türkiye, the United Arab Emirates, the United Kingdom and the United States. The International Atomic Energy Agency (IAEA) also takes part in the work of MDEP.

3.2 Organisational structure

The programme is governed by a Policy Group (PG), made up of the heads of the participating organisations, and implemented by a Steering Technical Committee (STC) and its working groups. The STC consists of senior staff representatives from each of the participating national safety authorities in addition to a representative from the IAEA.

The Policy Group provides guidance to the Steering Technical Committee on the overall focus of MDEP, monitors the progress of the programme, and determines participation in the programme.

The STC manages and approves the detailed programme of work, including: defining topics and working methods; establishing technical working groups and the nomination of experts; approving procedures and technical papers developed by the working groups; establishing interfaces with other international efforts to benefit from available work and avoid duplication; developing procedures for the handling of information to be shared in the project; reporting to the PG; identifying new topics for the programme to address; and establishing subcommittees of the STC to study specific topics.

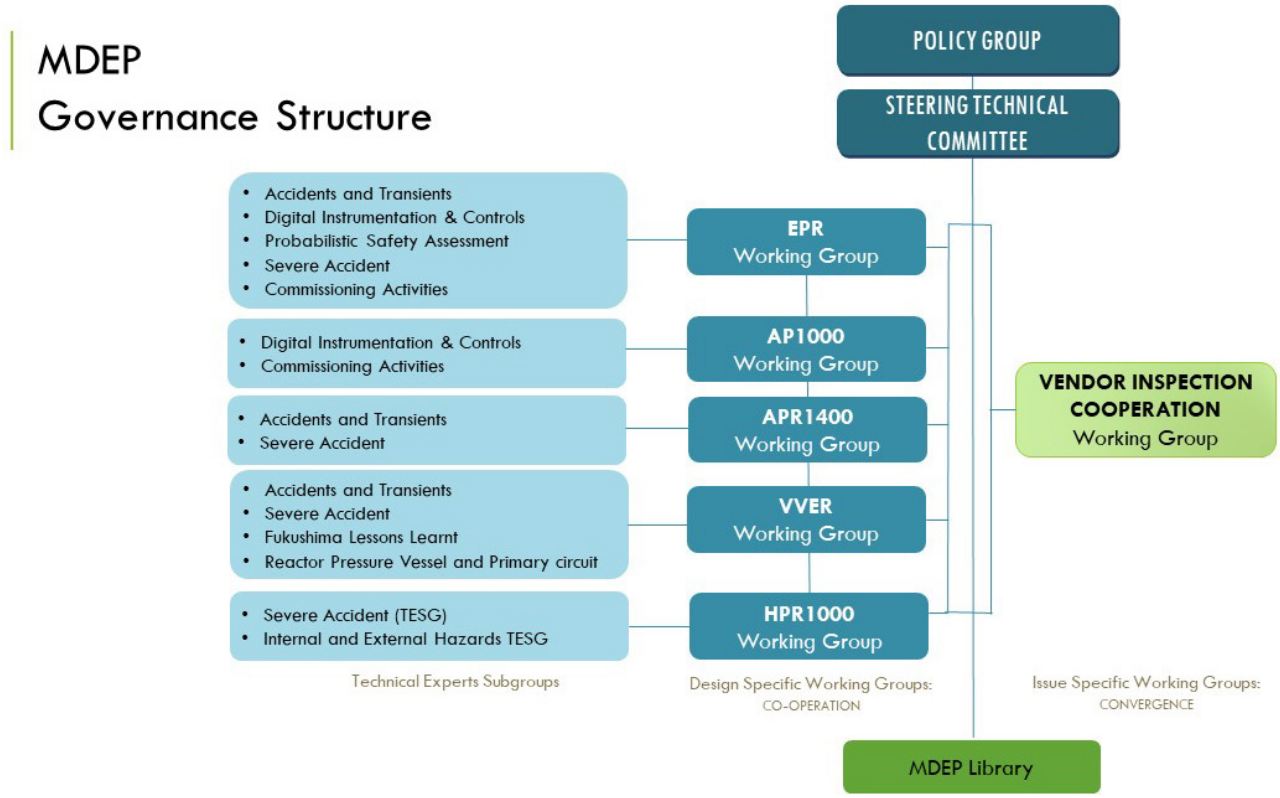
The Nuclear Energy Agency (NEA) performs the Technical Secretariat function in support of MDEP.

Two lines of activities have been established to carry out the work of MDEP:

- Design-specific activities: Design-specific working groups share information on a timely basis and co-operate on the areas of specific reactor design evaluations, construction oversight and the commissioning and early phase operation of new reactors. Participants in these working groups are the regulatory authorities that are actively reviewing, preparing to review, or regulating the construction of the specific new reactor designs. A Design-Specific Working Group (DSWGs) is formed when three or more MDEP member countries express interest in working together. Under the Design-Specific Working Groups, expert subgroups have been formed to address specific technical issues. Non-MDEP regulators could request MDEP membership in order to join a DSWG.

- Issue-specific activities: Working groups may also address specific technical and regulatory process areas within the programme of work. MDEP has one issue-specific working group addressing vendor inspection issues (VICWG); it previously incorporated working groups on codes and standards (CSWG) and digital instrumentation and controls (DICWG). Membership in issue-specific working groups is open to all MDEP participating countries and the IAEA representatives. These topics were chosen because the activities are of general interest and of safety significance to the licensing of new reactors in MDEP member countries. The approaches followed by the MDEP regulators are not completely alike, and successful completion of the activities related to the issue-specific working groups will likely result in increased harmonisation and convergence in regulatory practices or increased co-operation. In June 2015, the MDEP PG determined that the programme should focus on design-specific activities going forward and the issue-specific working groups should be closed or transferred to another organisation over the next few years. The Digital I&C and Codes and Standards working groups were transferred to the CNRA in 2017 and 2018, respectively. The official transition of VICWG is expected in 2023. The following chart illustrates how the programme is currently organised.

Figure 3.1: MDEP organisational structure as of June 2021



3.3 MDEP Library

In part, MDEP information is communicated among the members through the MDEP Library, which serves as a central repository for all documents associated with the programme. The NEA provides the technical support for development and maintenance of the MDEP Library on a secured password-protected website. The website provides two levels of access which are: 1) general access open to every member, and 2) restricted area access for each MDEP working group's member regulators participating in that specific group. Publicly available documents related to MDEP are available on the MDEP page of the NEA website (www.oecd-nea.org/mdep). The STC, through the secretariat, maintains the library and makes enhancements to improve its effectiveness.

In order for MDEP to be successful in fulfilling its goal of leveraging the work of peer regulators in the evaluation of new nuclear power plant designs, a framework was developed to facilitate the sharing of technical information among MDEP participants which at times may include the sharing of proprietary and other types of sensitive information. As a general rule, the information exchanged as part of MDEP in meetings and the MDEP Library is for the sole use of the participating national regulatory authorities. The members of the working groups also follow the communications protocol to share new information related to new reactors with other members in advance of its release to the public. A large portion of the information shared may not be proprietary or sensitive; however, all participating members must protect and properly handle the information that an originator claims to be proprietary or sensitive.

The MDEP Library will continue to be a central repository for future frameworks of MDEP. When and if additional countries are admitted to MDEP, they shall have access to the library and shall abide by all relevant guidance and rules, including the protection and proper handling of proprietary and sensitive information contained in the library.

3.4 Common Positions

MDEP has developed a process for identifying and documenting Common Positions on specific issues among the member regulators based on existing standards, national regulatory guidance, best practices and group member inputs. Design-specific Common Positions document common conclusions that the working group members have reached during design reviews. Discussions among the members and the sharing of information in these areas help strengthen the individual conclusions reached.

Generic Common Positions apply generically rather than only to one specific design. Generic Common Positions document practices and positions that each of the working group members find acceptable. The Common Positions are intended to provide guidance to the regulators in reviewing new or unique areas, and will be shared with the IAEA and other standards organisations for consideration in standards development programmes. After a Common Position is agreed to by a working group, it is presented to the STC for endorsement. Upon endorsement by the STC, the proposed Common Positions are made publicly available on the NEA MDEP website in order to keep external stakeholders informed of the work completed within MDEP. Those Common Positions will become commendable practices, recommended by MDEP. There is no obligation on the part of any regulatory body to follow them. A key concept throughout the work of MDEP is that national regulators retain sovereign authority for all licensing and regulatory decisions. If a regulatory body chooses to formally adopt a Common Position, it would be through that country's regular processes.

4. Interactions with other organisations

The Multinational Design Evaluation Programme (MDEP) strives to maintain an awareness of, and interactions with, other organisations that are implementing programmes to facilitate international co-operation on new reactors. Interactions focus on ensuring that MDEP does not duplicate efforts and benefits from the outputs of these organisations.

A key outcome of MDEP's co-operation with external organisations was the MDEP Conferences. MDEP has organised four conferences, and these events provided a forum for MDEP stakeholders (including industry representatives, standard development organisations and other international organisations) to share the results of their engagement with the programme and to deliver presentations on ongoing activities related to new reactor licensing. The 5th MDEP Conference was initially scheduled for October 2020, but was postponed to 2022 due to COVID-19 restrictions.

4.1 NEA Committee on Nuclear Regulatory Activities (CNRA)

The CNRA Working Group on the Regulation of New Reactors (WGRNR) examines the regulatory issues of siting, licensing, and regulatory oversight of Generation III+ and Generation IV nuclear reactors. The current focus areas of the WGRNR are construction experience and construction inspection issues. The WGRNR co-ordinates its work with the work performed by MDEP such that it utilises its outputs, does not duplicate its efforts, and extends the results of MDEP to other CNRA members. To avoid overlap of activities between the groups, the WGRNR focuses on procedures and guidance, while MDEP focuses on design-specific issues.

MDEP interacts with the CNRA WGRNR and the Working Group on Inspection Practices (WGIP) through the NEA, which also serves as the Technical Secretariat for the CNRA. The WGRNR is the focal point of interactions between MDEP and the CNRA and its working groups, and will assist in co-ordinating communications and requests between the two activities in order to ensure that the MDEP's efforts take full advantage of the work already being done by the CNRA.

The Proceedings of the 2018 Committee on Nuclear Regulatory Activities/MDEP Workshop on Nuclear Supply Chain Management was published in November 2019. The recommendations and conclusions served to inform ongoing activities of the MDEP VICWG and provide the basis for the CNRA to decide on future activities or tasks. Enhanced stakeholder engagement in particular has been considered and prioritised by the VICWG.

In 2019, a teleconference was held to consider the WGRNR's programme scope on supply chain regulatory oversight. After discussion, the WGRNR will focus on the regulation of major project contracting models. The WGRNR and VICWG agreed to collaborate going forward to avoid potential duplication on regulation of supply chain. The VICWG also co-ordinated with the WGRNR on a survey of the oversight of suppliers at construction sites.

To consider the COVID-19 impacts on vendor inspection practice and the risks and opportunities, a joint workshop was held virtually by the CNRA WGIP and the Working Group on Human and Organisational Factors (WGHOF) and the MDEP VICWG on 24-25 February 2021. The draft output was shared with the participants and will be utilised to inform the WGIP 2022 workshop. Additionally, the VICWG has been supporting the CNRA Working Group on Digital Instrumentation & Controls (WGDIC) in considering how existing vendor inspection processes could be applied to support Digital I&C Vendor Inspections. The VICWG also supported the joint WGDIC and WGIP "Special International Nuclear Regulatory Inspection Workshop on Digital Instrumentation & Control (DI&C)" held in Toronto, Canada, in June 2019. Moreover, the CNRA Working Group on Safety Culture (WGSC) and the VICWG have been collaborating on safety culture in the supply chain.

In accordance with the PG direction to transfer the MDEP issue-specific working group activities to the NEA, MDEP has co-operated with CNRA leadership to undertake the transfer of additional activities to the CNRA. The benefits of continuing co-ordination among regulators on these topics have been recognised both within and outside of MDEP.

In 2020, the PG decided to transfer the VICWG to the CNRA. VICWG activities will close under the current MDEP framework at the end of 2021. During 2022, the VICWG will be working with the CNRA under the NEA auspices on the process of transition, with the official transition expected in 2023 when the CNRA starts a new structure. In addition, MDEP is currently working with the CNRA to transfer the EPRWG activities, as the EPRWG members have identified additional work related to operating reactors that is beyond the MDEP framework.

4.2 International Atomic Energy Agency (IAEA)

The IAEA takes part in the work of MDEP through participation in the PG, STC and issue-specific working group meetings. In addition, the generic Common Positions developed in MDEP are shared with the IAEA for consideration in the IAEA standards development programme.

As the IAEA is developing a Technical Document (TECDOC) on the acceptance process for using commercial grade items in nuclear power plant safety systems, the VICWG discussed their approach to provide input for the document, i.e. develop the regulatory perspective and Common Positions on the acceptance process for using commercial grade products in nuclear power plant safety systems.

4.3 Industry

The MDEP working groups are interested in understanding the perspectives of the design vendors, codes and standards organisations, component manufacturers and the challenges they face in dealing with numerous regulators and regulatory systems. The MDEP working groups interact with industry groups and invite them to participate in selective portions of meetings and other activities. For example:

- The EPR Working Group meets regularly with representatives of Framatome, EDF and other EPR licensees, applicants and potential applicants to discuss similarities and differences among the EPR designs being licensed in each country.
- The AP1000 Working Group meets with Westinghouse and the AP1000 applicants and licensees.
- The APR1400 Working Group meets with KHNP and representatives of the licensee for the Barakah nuclear power plant, an APR1400 in the United Arab Emirates.
- The VVER Working Group continues to interact with the Russian nuclear industry, as well as invited representatives of Rosatom, Rosenergoatom and design organisations (such as Atomenergoproekt, Atomproekt, and Gidropress) to take part in the meetings of the VVERWG and its subgroups to acquire additional information about safety-significant design solutions.
- The HPR1000 Working Group meets with Hualong Nuclear Power Technology Co., Ltd and the HPR1000 licensees in China.
- The Vendor Inspection Co-operation Working Group (VICWG) meets with SDOs and the World Nuclear Association (WNA).

4.4 World Nuclear Association

The World Nuclear Association's Working Group on Cooperation in Reactor Design Evaluation and Licencing (CORDEL) acts as the industry counterpart to MDEP. Since both MDEP and CORDEL have expressed interest in and have established a goal of furthering harmonisation of reactor designs, regulatory practices, and industry and international standards, the MDEP PG has agreed that co-ordination of efforts with CORDEL is appropriate in some cases. While co-ordinating efforts in areas of mutual interest, MDEP members will always retain their individual and independent regulatory roles and positions. Members of the MDEP STC meet with CORDEL periodically, and CORDEL has participated in meetings of the MDEP VICWG.

While MDEP is a regulatory forum and CORDEL is an industry organisation, both parties agree they can benefit from communications and co-operation where the organisations share common goals. Both MDEP and CORDEL maintain strong interests in the harmonisation of new reactor designs and design reviews, regulatory safety standards and practices, and related industry and IAEA standards. MDEP values continued interaction to assist in achieving these goals while each organisation functions in a manner consistent with its appropriate roles and responsibilities.

The WNA's Supply Chain Working Group is tied closely to CORDEL. During the reporting period, a WNA representative from the Supply Chain Working Group was invited to provide presentations on the activities of interest to the VICWG. The VICWG agreed to continue regular interactions with the WNA's Supply Chain Working Group in the future.

5. Current activities

The activities of MDEP are being implemented through design-specific and issue-specific working groups. The members of the Design-Specific Working Groups share information and co-operate on specific reactor design evaluations and construction oversight. MDEP also maintains one issue-specific working group that scrutinises technical and regulatory process areas within the programme of work. Each working group has a lead and co-lead regulator designated as chair and vice chair, and has developed a programme plan which identifies specific activities, schedules and contacts.

The Design-Specific Working Groups leverage national regulatory resources by sharing information and experience on the regulatory safety design reviews with the purposes of enhancing the safety of the design and enabling regulators to make timely licensing decisions. Design-specific working groups achieve this goal through:

- Exchanging experiences and lessons learnt on licensing process implementation, design reviews, and design-related construction and commissioning activities.
- Working to understand the differences in regulatory safety review approaches in each country to support potential use of other regulators' safety design evaluations, where appropriate.
- Identifying and understanding key design differences, including those originating from regulatory requirements, and then documenting the reasons for differences in regulatory requirements.
- Looking for opportunities to provide input to issue-specific working groups on potential topics of significant interest.
- Documenting common MDEP positions on aspects of a review.
- Documenting the group's activities in Technical Reports to ensure knowledge transfer.
- Communicating and co-ordinating communications on MDEP views and Common Positions to vendors and operators regarding the basis of safety evaluations and standardisation.

While the Design-Specific Working Groups typically address issues that the members find challenging, specific to each design, some topics are addressed by several working groups, for instance commissioning activities, the Fukushima Daiichi lessons learnt, and hydrogen management.

Commissioning activities

Members of Design-Specific Working Groups, especially EPRWG and AP1000WG, are presently devoting resources for co-operation on commissioning of first-of-a-kind (FOAK) reactor testing. Lessons learnt by MDEP will be transferred to the WGRNR for it to pursue the work on a generic basis, with participation open to a wider range of regulators.

The MDEP generic Common Position addressing first plant only tests (FPOT) provides high-level guidance to applicants and licensees that wish to take credit for a FPOT performed during the commissioning of the first unit of a similar type, if accepted by the applicants, licensees and regulators. An FPOT allows a test performed on the very first reactor of a specific design to be credited for the subsequent units of similar design.

- As China AP1000s have moved into the commissioning phase, the Commissioning Activities Technical Expert Subgroup (TESG) shared information on commissioning tests, significant issues related to the testing, and lessons learnt on pre-operational testing. The TESG increased co-operation on AP1000 hot functional testing lessons learnt from the Sanmen, Haiyang, and Vogtle sites, and on pre-operational and startup testing as more reactors start going through these phases. In May 2021, these efforts culminated with the publication of the Technical Reports: Hot Functional and Startup Testing Lessons Learnt (TR-AP1000WG-06) and Lessons Learnt from Implementation of the Common Position on FPOT for AP1000 (TR-AP1000WG-05).

Fukushima Daiichi Nuclear Power Plant accident lessons learnt

Lessons learnt from the Fukushima Daiichi Nuclear Power Plant accident have been discussed by all of the DSWGs and each working group has developed a Common Position that identifies common approaches to address potential safety improvements, as well as common general expectations for new nuclear power plants. As directed by the MDEP PG, the STC and working groups developed an integrated MDEP Common Position on the lessons learnt from the Fukushima Daiichi Nuclear Power Plant accident. The STC finalised this document in 2016 and placed it on the MDEP public web page. MDEP recognises that other related international initiatives have been implemented that are focused on operating plants. Therefore, it is important for new MDEP designs, such as the HPR1000, to address the Fukushima Daiichi lessons learnt. In November 2020, the HPR1000 Working Group finalised a Common Position addressing Fukushima Daiichi Nuclear Power Plant accident-related issues, which supplements the MDEP Common Position developed by the STC.

Hydrogen management

The challenges in addressing hydrogen recombiners' reliability and effectiveness during the plant life have been discussed by all current DSWGs (EPR, AP1000, APR1400, VVER and HPR1000 DSWGs) and each working group has published a technical report on hydrogen management to identify a common understanding of the regulatory requirements of the member regulators. These were follow-up efforts from the 2016 Severe Accident TESGs workshop.

MDEP co-operation in operational phases

MDEP was established primarily as a forum to co-operate on design reviews. As the designs are moving into the commissioning and eventually the operational phases, the PG and STC have discussed the benefits and challenges of continuing co-operation after construction is complete and into the operational stages. MDEP recognises the benefits of continuing the co-operative relationships formed during the design review stage, as well as the benefit to the members of the Design-Specific Working Groups (DSWG) who are still in the licensing phase. The PG has determined that the operational stage should not be included in the scope of MDEP. However, they stated there should be a means to ensure that operating experience related to design issues is addressed by DSWGs. With this in mind, MDEP will continue to share information on construction and commissioning of new reactors, and incorporate feedback from operating experience as it pertains to design.

MDEP members agree that operating experience, when it has an impact on designs, should be considered. In particular, information from the first two years of operation may be directly related to commissioning. MDEP members are encouraged to stay and participate in a group after the considered reactor begins to operate in their country to share operating experience.

This issue was raised once more at the STC meeting in June 2017. After an extensive discussion, it was clear that the members value the forum that MDEP provides. The discussion revolved mostly around the transition of a DSWG from MDEP to another area because there is a real value in the structured co-operation and dialogue that MDEP promotes. The STC discussed this challenge extensively and it is considering the Policy Group's guidance following their September 2017 meeting. The ABWRWG was the first design working group in MDEP to complete its programme of work and ceased its activities under MDEP in June 2018.

In 2020, the programmes of work for the EPR, AP1000 and APR1400 DSWGs are mostly focused on lessons from commissioning and early phase operation activities and these DSWGs are expected to complete their planned activities by 2022. At its October 2020 meeting, the PG approved moving forward with plans for closure of the EPR, AP1000, and APR1400 DSWGs by the end of 2021. The PG also decided that operating experience of a new design beyond two years of initial operation will not be considered within the scope of MDEP.

5.1 EPR Working Group (EPRWG)

The EPR DSWG includes the regulatory authorities of China (NNSA), Finland (STUK), France (ASN), India (AERB), and the United Kingdom (ONR). By leaving MDEP in 2020, Sweden (SSM) also left the EPRWG. Other members acknowledged their precious contribution and active participation.

Numerous meetings and technical exchanges have taken place to share information on the reviews being conducted in each country. Several major construction activities are ongoing: Olkiluoto 3 in Finland and Flamanville 3 in France are in late stages of commissioning. The twin unit plant at Hinkley Point C in the United Kingdom is in the early construction phase. The first of the two Taishan (China) units entered commercial operation in December 2018. The second unit followed in September 2019.

The EPR Working Group currently includes five technical expert subgroups (TESG) that are addressing information on specific technical issues: Accidents and Transients (A&T TESG), Digital Instrumentation and Control (DI&C TESG), Probabilistic Safety Assessment (PSA TESG), Severe Accidents (SA TESG) and Commissioning Activities (CA TESG). With the exception of the CA TESG, the expert subgroups reduced the frequency of meetings over 2019-2020, having the main objective to complete their programme of work and to develop their contribution for the EPRWG closure report. From 2021 there will only be the CA TESG. Besides, considering the situation of the EPRWG and the status of the projects, it was decided to merge CA TESG and EPRWG discussions gradually over 2021.

The EPRWG meets occasionally with representatives of Framatome and of EPR licensees, applicants, and potential applicants to discuss similarities and differences among the EPR designs being reviewed and licensed in each country. In June 2018, the EPRWG held a meeting in Bristol, United Kingdom, which included a visit to Hinkley Point C. In November 2018, the EPRWG met in Zhuhai, China, before visiting the Taishan plant. The EPRWG held a joint meeting in May 2019 with the EPR OOG (Operators Owners Group) to discuss various topics with the licensees and Framatome, including the early lessons learnt from the Taishan Unit 1 operations.

In addition to the May 2019 meeting, the EPRWG met once in Boulogne-Billancourt, France. Due to the special circumstances in 2020 and 2021, the EPRWG met remotely (twice in 2020, three times in 2021).

Considering the two EPR units in Taishan are in operation and the reactors in Finland and France are close to being completed, it was decided to sunset the EPRWG within MDEP at the end of 2021. The working group will focus its effort on completing its programme of work and on developing its closure report.

Accomplishments and plan of work

In 2018, the EPRWG completed and published a Common Position stating how the EPR design addresses the objectives of the Vienna Declaration, especially with regards to avoiding large and early releases and long-term contamination. This Common Position addresses design basis, design extension and severe accidents.

Given the move of most of the current EPR projects towards final commissioning and operation, a review of the plan of work and TESGs was undertaken, with most TESGs anticipated to complete their programme of work and close by the end of 2020.

The Probabilistic Safety Assessment (PSA) TESG mainly worked on developing its contribution for the closure report after having published a technical report identifying the main differences in the modelling of a number of reactor faults in the various EPR designs.

The Accidents and Transients (A&T) TESG has been discussing reactor physics data obtained from the post-fuel load commissioning tests at Taishan and various aspects of the EPR design, including the effectiveness of the pump filtration in design basis and severe accidents, and Heating, Ventilation and Air Conditioning (HVAC) designs. They have developed a Common Position on boron dilution issues. In addition, the subgroup has completed a paper on double-ended guillotine break loss of cooling accidents (2A LOCA).

The Digital Instrumentation and Controls (DI&C) TESG has developed a Common Position in EPR I&C designs. The paper was released in 2020. A technical report on EPR I&C designs is expected to be published in 2021. The subgroup will close following completion of these tasks.

The Severe Accidents (SA) TESG has completed a technical report on hydrogen management and then worked on its closure report.

The Commissioning Activities (CA) TESG met twice in 2018 and in 2019 to share experiences on a variety of commissioning-related issues. The group is now focused on developing a document on methodology for post-fuel load regulatory hold points definition. They intend to continue their activities as long as members continue to show interest in exchanging information regarding commissioning-related issues.

In addition to this work, the EPRWG is also planning to develop a technical report on the application of the break preclusion principle.

5.2 AP1000 Working Group (AP1000WG)

The AP1000 DSWG includes the regulatory authorities of China (NNSA), India (AERB) and the United States (NRC). The United Kingdom regulatory authority (ONR) has ceased regulatory review activities for the AP1000 design in the United Kingdom following NuGen's decision to pursue a different reactor design for the Moorside project in Cumbria. In Canada, since CNSC completed a pre-licensing assessment of the AP1000 in June 2013 as part of its Phase 2 evaluation, there has been no activity with Westinghouse Electric Company (Westinghouse) on further AP1000 review efforts. The Phase 2 vendor design review has been completed. In light of these developments, the regulatory authorities of the United Kingdom (ONR) and Canada (CNSC) remain in the AP1000 Working Group as inactive members.

Between 2009 and 2021, the NRC, ONR, and NNSA finished their safety assessments for the AP1000 design, and drew the conclusion that the AP1000 design was acceptable according to the regulations of the United States, the United Kingdom, and China. These assessments were outside the terms of reference for MDEP, but the outcomes facilitated the member regulators' understanding and provided significant grounding for AP1000WG discussion and co-operation.

In May 2019, the AP1000WG discussed the status of the AP1000 Digital I&C TESG and determined that the group, which had decided to meet as needed, had met once after making that decision and had no future work planned. Based on the lack of plans for design-specific work, a lack of input from the AP1000WG members on topics the TESG needed to address, and the existence of the active generic Digital I&C Working Group, the group decided to close the AP1000 TESG.

During the twentieth meeting in December 2019, the AP1000WG members decided that the group and its supporting Commissioning TESG had no continuing work programme or the possibility, within the following two years, of initiating a potential new work programme within the terms of reference of MDEP and thus there was no justification for the AP1000WG or its TESG continuing to meet. Then the members determined to close the remaining TESG; requested the STC to endorse the conclusion that the AP1000WG should hold no further meetings; and advised the STC to recommend to the Policy Group that the AP1000WG be closed, having completed its tasks within the framework of MDEP.

Both the STC and PG accepted the recommendation with a direction that the group produce a closure report highlighting its successes and recommendations for any future work that lay outside the terms of reference of MDEP.

Accomplishments and plan of work

Throughout the existence of the working group, members have exchanged information related to licensing, construction, commissioning, and initial operation issues in various countries. The documents have been shared through the MDEP Library. Discussion topics have included in-containment condensate return, main control room dose and habitability, reactor coolant pumps, squib valves and equipment qualification, hot and cold functional testing, hydrogen management, as well as discussions on lessons learnt from the Fukushima Daiichi accident and the prevention and mitigation of severe accidents.

During this reporting period, the AP1000WG finalised a Technical Report on AP1000 Technical Exchanges during the Design, Construction, and Commissioning of AP1000 Reactors (TR-AP1000WG-03) and it was approved by the MDEP STC in November 2019. This report has been limited to the AP1000WG only based on a request by members. The AP1000WG published Common Understanding of the Hydrogen Control System for the AP1000 Design (TR-AP1000WG-04) in September 2020. It also published the Technical Reports: Lessons Learnt from Implementation of the Common Position on FPOT for AP1000 (TR-AP1000WG-05) and Hot Functional and Startup Testing Lessons Learnt (TR-AP1000WG-06) in May 2021.

For the closure activities, the working group determined the final approach for storage of the working group materials that were to be saved. A closure report for the AP1000WG was finalised during its 21st meeting in June 2021. The AP1000WG was closed on 30 June 2021.

5.3 APR1400 Working Group (APR1400WG)

The APR1400 DSWG was established in August 2012 with four countries, though Finland later opted to leave following the cancellation of the Olkiluto 4 project in 2015. The current participants are the regulatory authorities of Korea, the United Arab Emirates, and the United States. The United Arab Emirates leads the working group.

The first APR1400, Shin-Kori Unit 3 in Korea, has been in commercial operation since December 2016. Shin-Kori 4 was connected to the grid in April 2019 and it started its commercial operation in August 2019. The operating licence for Shin-Hanul Unit 1 was granted in July 2021. Three additional units – Shin-Hanul 2 and Shin-Kori 5&6 – remain under construction. The operating licence for Barakah Unit 1 in the United Arab Emirates was granted in February 2020 and its commercial operation commenced in April 2021. The operating licence applications for Barakah Unit 2 and Barakah Units 3 and 4 were submitted in March 2015 and March 2017, respectively. At the time of writing this report, they were under review by the UAE Federal Authority for Nuclear Regulation.

The application for the design certification for the APR1400 was submitted to the US NRC in December 2014 by KHNP and KEPCO and docketed in March 2015. The contents of the application included Design Control Documents, Environmental Report, Technical Reports, Inspection, Tests, Analyses, and Acceptance Criteria (ITAAC) and Topical Reports. The Phase 1 safety evaluation was completed in February 2016 and the Phase 2 review was completed in May 2017. The NRC's Advisory Committee on Reactor Safeguards completed its review in July 2017. The Phases 4 and 5 reviews were completed in May 2018 and in July 2018, respectively. After the final stage, Phase 6, US NRC issued the Standard Design Approval (SDA) for the APR1400 in September 2018 following a 42-month design certification review process. In May 2019, the US NRC published the APR1400 Design Certification rule for public comments and finally the certified APR1400 design became an effective rule in Appendix F to 10 CFR Part 52 in September 2019.

Accomplishments and plan of work

Throughout 2019 and 2020, the nuclear regulatory agencies of Korea, the United Arab Emirates, and the United States continued to exchange information related to several significant APR1400 issues. The working group held the 12th, 13th, and 14th MDEP APR1400WG meetings in April and October 2019 and September 2020, respectively, including the Accident and Transient (A&T) TESG and the Severe Accident (SA) TESG meetings.

The United Arab Emirates took the lead on the Common Position on Irradiation Effect on the APR1400 Fuel Bundle Spacer Grid Strength and initially distributed a draft version at the 12th meeting. Through the discussion during the meeting and an additional comment period after the 12th meeting, the working group finally approved the Common Position paper at the 13th meeting. Since then, the Common Position paper was submitted to the 36th MDESP STC meeting in November 2019 and was approved as CP-APR1400-04. The STC Chair highlighted that this Common Position has generic applications to other fuel designs to ensure minimum risk of spacer grid crushing during seismic conditions and LOCA transients. The STC Chair suggested the Common Position be shared with the CNRA and the Committee on the Safety of Nuclear Installations (CSNI) under the Nuclear Energy Agency (NEA).

The United Arab Emirates took the lead on the Technical Report on Hydrogen Recombiner Survey Results for APR1400 design, and presented a draft version at the 12th meeting. Through the discussion during the meeting and an additional comment period after the 12th meeting, the working group approved this technical report at the 13th meeting. Afterwards, the technical report was submitted to the 36th MDESP STC meeting in November 2019 for approval. Since the MDEP STC recommended some additional points to improve the quality of the technical report, the working group revised it and the STC approved it at the 39th STC meeting in June 2021.

Through the active discussion in the 7th SA TESG meeting, the APR1400WG decided to work on drafting a technical report on the Comparison of the Regulatory Requirements for Probabilistic Risk Assessment (PRA). The United Arab Emirates took the lead on this task and the APR1400WG discussed the specific details of the technical report at the 13th meeting. As a follow-up, the working group decided to finalise the technical report at the 14th meeting and the STC approved it in June 2021.

Given the completion of the US NRC's APR1400 Design Certificate Review and Rulemaking Process in September 2019, the United States decided to reduce its participation in the activities of the APR1400WG. Considering this situation, the working group had submitted a new configuration of the APR1400WG with two active participating countries (Korea and the United Arab Emirates) and one non-active participating country (the United States). The Policy Group approved this new configuration at the 13th meeting in September 2019. Since the Policy Group also decided not to extend the current MDEP mandate beyond 2022, the APR1400WG decided to close its MDEP activities by the end of 2021, but Korea and the United Arab Emirates will continue working on APR1400 Operating Experiences through bilateral co-operation. The APR1400WG is working to complete its planned activities by the end of 2021.

5.4 VVER Working Group (VVERWG)

The VVER Working Group includes the regulatory authorities of China, Finland, Hungary, India, Russia and Türkiye. The working group members are reviewing plants at various stages of design and construction. In Russia, the Leningrad-II Nuclear Power Plant Unit 1 is in operation; Unit 2 received an operational licence and minimum controlled power level at the end of August 2020 and entered commercial operation on 23 October 2020; while Units 3 and 4 have siting licences. The Novovoronezh-II Nuclear Power Plant Unit 1 is in operation; Unit 2 began commercial operation at the end of October 2019. The Kursk-II Nuclear Power Plant Units 1 and 2 are under construction. The Smolensk-II Nuclear Power Plant siting licences have been issued for Units 1 and 2. In Finland, one unit is under review for a construction licence at the Hanhikivi Nuclear Power Plant. At the Kudankulam Nuclear Power Plant in India, two units are in operation, two units are under construction, and two more have received siting licences. At Akkyuy in Türkiye, Units 1 and 2 are under construction, while Unit 3 received a construction licence and the licence application for Unit 4 is under review. In China, four VVER-1000 units are in operation at the Tianwan Nuclear Power Plant, two VVER-1200 units were granted construction permission on 19 May 2021 and two more VVER-1200 units at the Xudapu Nuclear Power Plant have construction licences in July 2021. The Hungarian regulator is currently reviewing the construction licence applications for two VVER units at the Paks-II Nuclear Power Plant.

Accomplishments and plan of work

The VVERWG includes four technical expert subgroups that address specific technical issues: Severe Accidents (SA TESG), Fukushima accident Lessons Learnt (FUKU TESG), Reactor Pressure Vessel and Primary Circuit Components (RPV&PC TESG) and Transients and Accidents (T&A TESG). The members meet regularly to exchange information and experiences in their countries' regulatory activities, approaches and legal framework related to new designs.

In 2020-2021, the VVERWG published four Technical Reports and one Common Position after obtaining approval from the STC:

- (TR-VVERWG-03) Technical Report on Regulatory Approaches related to Accidents and Transients Analyses;
- (TR-VVERWG-04) Technical Report on the Core Catcher;
- (TR-VVERWG-05) Technical Report on Hydrogen Recombiners;
- (CP-VVERWG-02) Common Position addressing Ex-Vessel Corium Stabilization in the Core Catcher.

The T&A TESG has identified topics for the further development of technical reports, such as environmental qualification and uncertainty evaluation.

The SA TESG, after finalisation of two technical reports and the Common Position, started to develop a technical report on long-term heat removal from the containment.

The Fukushima TESG resumed development of a draft Common Position addressing the Vienna Declaration on Nuclear Safety since STUK and HAEA received the licensing documents.

The RPV&PC TESG finalised the Common Position on Reactor Pressure Vessel and Primary Components Reliability for AES-2006 designs. It is currently developing a Technical Report on additional technical issues related to reactor pressure vessel and primary components reliability for AES-2006 designs.

Furthermore, the VVERWG is drafting two Technical Reports on the similarities and differences between the VVER-1000 and VVER-1200 designs, regulatory safety review approaches, and resulting evaluations. It will also continue to document lessons learnt from design reviews and design issues faced during construction and commissioning and early phases of operation.

5.5 HPR1000 Working Group (HPR1000WG)

The MDEP HPR1000 Working Group (HPR1000WG) was approved by the MDEP Policy Group in September 2017. The group is focused on safety design reviews of the Hualong Nuclear Power Technology Co., Ltd. HPR1000 design. The HPR1000WG includes the regulatory authorities of Argentina (ARN), China (NNSA), South Africa (NNR), and the United Kingdom (ONR).

On 30 January 2021, the first HPR1000, Fuqing Unit 5 in China, reached commercial operation. By June 2021, construction work remains underway on 11 HPR1000 units at the Fangchenggang, Zhangzhou, Taipingling, Sanao, Changjiang, and Fuqing sites in China. On 13 May 2021, the NNSA completed the site review for Lufeng Units 5&6, which will build two more HPR1000 units in Guangdong, China.

In the United Kingdom, the Generic Design Assessment (GDA) of the UK HPR1000 officially commenced in January 2017. Step 1 and Step 2 of the GDA were finished in November 2017 and November 2018, respectively. In February 2020, the UK HPR1000 design passed Step 3 of the GDA, which continued the assessment work of the previous step with increased emphasis on the arguments that underpin the safety and security claims. The ONR is currently assessing the design for Step 4 of the GDA.

In Argentina, the government announced that the Secretary of Energy's plans included a decision to build an HPR1000. The ARN developed a Memorandum of Understanding (MOU) where a set of "high-level" requirements complementing Argentina standards were defined as mandatory for the HPR1000 project. The MOU was submitted to the licensee, Nucleoeléctrica Argentina S.A. (NA-SA).

Accomplishments and plan of work

During this reporting period, the HPR1000WG members continued to share information and experience on regulatory issues and the status of HPR1000 projects in their respective countries. The working group discussed the ONR Regulatory Observations (ROs) and the associated resolution plans as well as other important technical matters identified in the GDA for the UK HPR1000. As China progressed in the construction phase, the working group discussed the NNSA safety reviews on design changes and construction events of the HPR1000 units in China.

In September 2019, the members of the HPR1000 Working Group and its subgroups (Severe Accidents TESG and Internal and External Hazards TESG) met to discuss the regulation process and regulatory activities and to work on developing the planned reports. The vendor representatives participated in several parts of the meeting to provide detailed presentations on the technical topics of interest for the members, and the members also had opportunities to engage in direct dialogue with the vendor on critical technical issues. At the end of the September 2019 meeting, group members toured the Fangchenggang plant under construction and met with the licensee staff and site inspection staff. In addition to the September 2019 meeting, the HPR1000WG held two remote meetings due to the COVID-19 restrictions, and the Severe Accidents TESG (SA TESG) and Internal and External Hazards TESG (Hazards TESG) also had meetings via videoconferencing.

To compare the main differences between the basic design options available for the HPR1000 design, the working group decided to prepare a comparison table during the first meeting of the HPR1000WG. In August 2020, the Comparison Table of HPR1000 Design Characteristics, Version 1 was finalised. This table has been limited to the HPR1000WG based on a request by members. It is a living document to which new design options can be added in the future.

Between 2019 and 2020, the HPR1000 Working Group continued to develop a Common Position on Fukushima lessons learnt based on the MDEP Common Position CP-STC-02, issued by the STC in September 2016. Member countries provided inputs to the paper to reflect their regulatory expectations regarding the HPR1000 design and how the design could be enhanced to address Fukushima Daiichi issues. In November 2020, the working group finalised the Common Position (CP-HPR1000WG-01) Addressing Fukushima Daiichi Nuclear Power Plant Accident-Related Issues, which was approved by the STC at the 38th STC meeting in January 2021. This report identifies common preliminary approaches and regulatory expectations to address potential safety improvements for HPR1000 plants, as related to lessons learnt from the Fukushima Daiichi accident or Fukushima Daiichi-related issues. The report supplements CP-STC-02 and should be read in conjunction with that document.

Early in the establishment of the HPR1000 SA TESG, the members agreed to produce a technical report to compile the expectations of the regulators that are applied when assessing safety submissions and design aspects associated with severe accidents. Therefore, the SA TESG collected information from all the member countries regarding various aspects of the regulation, analysis, and management of severe accidents. In December 2020, the SA TESG finalised a Technical Report on Regulatory Requirements and Practices for Severe Accidents (TR-HPR1000WG-02) and provided it to the HPR1000WG. This report summarises the regulatory requirements and expectations of the member regulators and highlights where consensus or differences exist. Afterwards, the HPR1000WG reached a consensus on submitting this paper to the STC, which approved the technical report at the 38th STC meeting in January 2021.

The SA TESG also collected information from all the member countries regarding various aspects of the HPR1000 Containment Combustible Gas Control System, and prepared a technical report based on the collected information to identify common features of the HPR1000 design and develop a common understanding of the regulatory requirements of the member countries. In July 2020, the SA TESG finalised a Technical Report on Hydrogen Control During Severe Accidents (TR-HPR1000WG-01) and it was finally approved by the STC at the 37th STC meeting in September 2020.

The HPR1000 Hazards TESG has been developing a technical report on hazards to understand the similarities and differences in regulatory approaches to hazard assessment of the member countries, and the potential implications of this on the design of the HPR1000. The Hazards TESG members are finalising this report. It will provide a high-level summary of each country's regulator philosophy as well as a number of pertinent hazards as examples of how the approaches are applied in practice.

In its latest programme plan, the HRR1000WG has established a number of objectives to be completed during the 2021-2022 period. A new topic – high integrity components – has been added to the programme plan. The working group will continue its efforts developing its next three Common Positions, on Sump Strainer Performance, the Vienna Declaration on Nuclear Safety, and In-vessel Retention Strategy.

5.6 Vendor Inspection Co-operation Working Group (VICWG)

The goals of the VICWG are to:

- Support MDEP Design-Specific Working Groups;
- Maximise the use of the results obtained from other regulators' efforts in inspecting vendors;
- Understand the similarities and differences between MDEP national regulators' quality assurance and quality management (QA/QM) requirements in order to improve regulators' own requirements;
- Facilitate the adoption of good vendor oversight practices by national regulators;
- Harmonise the vendor inspection practices among MDEP regulators for inspections under the MDEP protocol;
- Continue joint and witnessed inspections and perform multinational inspections of vendors according to the common QA/QM requirements;
- Focus vendor attention on areas of emerging risks;
- Focus licensee and vendor oversight on effective supply chain performance;
- Focus licensee and vendor attention on positive nuclear safety culture expected within the supply chain;
- Continue to engage with the CNRA to consider how to maximise the use of information gathered through VICWG activities;
- Consider the establishment of an NEA working group for vendor oversight, as part of the transfer of ISWGs to NEA.

The working group enhances the understanding of each regulator's inspection procedures and practices by co-ordinating witnessed and multinational inspections of quality assurance arrangements and safety related components.

Witnessed inspections consist of one regulator performing an inspection of its criteria, observed by representatives of other MDEP countries. The benefits to the observing countries include additional information and added confidence in the inspection results.

Multinational inspections consist of one regulator conducting an inspection according to its own regulatory framework with the active participation of one or more regulators. This allows the participating members to use the results of the inspection that are applicable to their regulations. Multinational inspections are a tool to gain vendor performance insights with minimal inspection resources from the participating regulators.

The working group maintains an annual list of planned inspections, providing the opportunity to co-operate and fully maximise the results from vendor inspection activity. The inspection results are shared through the MDEP Library. The library includes not only the reports of witnessed and multinational

inspections, but other inspection reports that may be of interest to the MDEP members. The VICWG routinely engages with standard development organisations (SDOs) to exchange regulatory experience, encourage co-operation and influence the future activities of the SDOs. It continues to co-operate with important external stakeholders such as the International Atomic Energy Agency (IAEA), CORDEL and the World Nuclear Association (WNA) Supply Chain Taskforce. Furthermore, the VICWG engages with the CNRA Working Group on Inspection Practices (WGIP) to provide opportunities to WGIP members to observe vendor inspections and to share VICWG Common Positions.

Accomplishments and plan of work

The VICWG continued to exchange experience on vendor inspection processes in order to understand differences in regulatory approaches and to identify trends and vulnerabilities in the international supply chain encountered in vendor inspections. While inspection co-operation has been impacted by the COVID-19 pandemic, the working group has continued to engage and share information. A COVID-19 vendor inspection impacts survey was produced and considered in a topic specific video conference held on 19 May 2020 to support the sharing of good practices and potential future activity. As national inspection programmes adjusted with enhanced use of remote inspection, vendor inspection programme outcomes and the impacts and lessons from the COVID-19 response were shared as part of country-specific updates in the VICWG meetings.

During the reporting period, two witnessed inspections, one joint inspection, and two multinational inspections were completed. Notably, the VICWG's 3rd Multinational Vendor Inspection was conducted at a Spanish manufacturer on 21-25 October 2019. Afterwards, the VICWG developed and finalised a Technical Report on Assessment of Multinational Vendor Inspection of ENSA (Spain) (TR-VICWG-06). The 4th planned multinational inspection of Framatome was initially postponed due to COVID-19 restrictions. However, the working group trialled the delivery of a remote Multinational Vendor Inspection under the ASN's leadership. The multinational inspection was conducted in two stages, with the first completed on 3-6 May 2021 and examining quality management arrangements. The second stage was completed on June 2021 and examined special processes. This approach represents a further method for regulatory co-operation, and a learning report will be produced.

The VICWG reviewed the outcomes of the 2018 CNRA/MDEP Nuclear Supply Chain Management Workshop and published the proceedings from the joint workshop in November 2019. The proceedings served to inform the activities of the MDEP VICWG and provide the basis for the CNRA to decide on future activities or tasks. As one of the priority activities from the workshop, the VICWG has continually focused on the establishment of a strong nuclear safety culture in the supply chain. It conducted a survey on safety culture and co-ordinated with the CNRA Working Group on Safety Culture (WGSC) to ensure any work is complementary. In January 2021, the VICWG published a Technical Report on Safety Culture in the Nuclear Supply Chain (TR-VICWG-07). This report provides a high-level summary of how each member country encourages or regulates safety culture in the nuclear supply chain, based on the responses to the survey. Forward activities will continue to develop a technical report of best practices for influencing safety culture in the nuclear supply chain.

The joint WGIP, WGHOF and VICWG COVID-19 Impacts on Inspection Practice Workshop was held virtually on 24 and 25 February 2021. The draft output from the joint workshop has been shared with the participants and will be utilised to inform the CNRA WGIP 2022 workshop. All VICWG members will be invited to participate in the 2022 workshop. In addition, the VICWG has been supporting the CNRA WGDIC in considering how existing vendor inspection processes could be applied to support Digital I&C Vendor Inspections. The VICWG also supported the joint WGDIC and WGIP "Special International Nuclear Regulatory Inspection Workshop on Digital Instrumentation & Control (DI&C)" held in Toronto, Canada, in June 2019. Moreover, the VICWG co-ordinated with WGRNR on a survey of oversight of suppliers at construction sites.

The VICWG continues to ensure that its programme documents and inspection protocols are effectively maintained. In 2021, it published two updated Common Positions (CP-VICWG-02 and CP-VICWG-04) on Witnessed, Joint, and Multinational Vendor Inspection Protocols, and on Mitigating the Risks of Counterfeit, Fraudulent, and Suspect Items.

Next steps

The top 3 VICWG priorities for the next few years are:

- Collaboration – Sharing of intelligence from vendor inspection programmes during biannual meetings, enabling regulators to address areas of emerging risk, focusing on the risk of Counterfeit, Fraudulent and Suspect Items (CFSIs) and the establishment of a strong nuclear safety culture in the supply chain. Continued exchange of information and best practices on supply chain oversight among participating regulators, focusing on suppliers that manufacture products for multiple counties.
- Co-operation – Identify opportunities for witnessed, joint and multinational inspections, building on the effective multinational inspections conducted to date.
- Target areas of risk – Addressing the issues from the supply chain management workshop on a prioritised basis.

The VICWG programme plan has been updated to include the task sheets approved by the STC: (a) Supply chain nuclear safety culture – potential collaboration with the CNRA WGSC; (b) Enhanced stakeholder engagement – to ensure that the VICWG better leverages its regulatory influence to target areas of risk, i.e. licensees, regulators, industry groups, standard development organisations, IAEA; (c) Commercial grade dedication and equipment qualification – opportunity to influence IAEA publications in early stages of development. In addition, regulation of emerging technologies (i.e. digitisation, modular constructions, and additive manufacturing/3D printing) as well as supply chain oversight (i.e. supply chain mapping and interface management) will also be addressed by the working group in future.

In 2020, the MDEP Policy Group decided to transfer the VICWG to the CNRA. To facilitate a smooth transition, the VICWG has managed the transfer to maintain the existing core functionality while identifying opportunities to target further risk reduction of supply chain management and vendor activity, reviewed the programme plan and governance given the potential increased membership and wider mandate, and learnt from the transfer of the other MDEP ISWGs including the on-boarding new members.

The VICWG activities will close under the current MDEP framework at the end of 2021. During 2022, the VICWG will be working with the CNRA under the NEA auspices on the transition, with the official transition expected in 2023.

6. Interim results

MDEP is considered a long-term programme with interim results. Interim results are products that document agreement by the MDEP members and are necessary steps in working towards increased co-operation and convergence. The interim results for this reporting period include:

- The EPRWG published the Technical Reports: Hydrogen Management for EPR (TR-EPRWG-06), and EPR Assessment of 2A Large Break Loss-of-Coolant Accident (2A-LOCA) Analysis (TR-EPRWG-07). It also published updated Common Positions on the EPR Instrumentation and Controls Design (TR-EPRWG-01).
- The AP1000WG published the Technical Reports: Hydrogen Control System for the AP1000 Design (TR-AP1000WG-04), Lessons Learnt from Implementation of the Common Position on FPOT for AP1000 (TR-AP1000WG-05), and Hot Functional and Startup Testing Lessons Learnt (TR-AP1000WG-06). It also finalised a Technical Report on AP1000 Technical Exchanges during the Design, Construction, and Commissioning of AP1000 Reactors (TR-AP1000WG-03), which is restricted to the AP1000WG based on a request by the members.
- The APR1400WG published the Common Position (CP-APR1400WG-04) on Irradiation Effect on the APR1400 Fuel Bundle Spacer Grid Strength. It published the Technical Reports: Hydrogen Recombiner Survey Results for APR1400 design (TR-APR1400WG-04), and Comparison of the Regulatory Requirements for Probabilistic Risk Assessment (PRA) (TR-APR1400WG-05).
- The VVERWG published Technical Reports: regulatory approaches related to accident and transient analyses (TR-VVERWG-03), and hydrogen recombiners (TR-VVERWG-05). It published a Technical Report on the Core Catcher (TR-VVERWG-04) and a related Common Position (CP-VVERWG-02) addressing Ex-vessel Corium Stabilization in the Core Catcher. It also completed a draft Common Position on Reactor Pressure Vessel and Primary Components Reliability for AES-2006 designs. The VVERWG continues to develop two technical reports on similarities and differences among VVER designs, regulatory safety review approaches and resulting evaluations.
- The HPR1000WG published the Common Position (CP-HPR1000WG-01) Addressing Fukushima Daiichi Nuclear Power Plant Accident-Related Issues. It also published the Technical Reports: Hydrogen Control During Severe Accidents (TR-HPR1000WG-01), and Regulatory Requirements and Practices for Severe Accidents (TR-HPR1000WG-02). The HPR1000WG is finalising a Technical Report on HPR1000 Hazards. It is also developing Common Positions on the Vienna Declaration on Nuclear Safety, Sump Strainer Performance, and In-Vessel Retention Strategy.
- The VICWG published a Technical Report on Safety Culture in the Nuclear Supply Chain (TR-VICWG-07). It finalised the Technical Report on Assessment of Multinational Vendor Inspection of ENSA (Spain) (TR-VICWG-06), which is restricted to the VICWG based on a request by the members. The VICWG updated two Common Positions (CP-VICWG-02 and CP-VICWG-04) on Witnessed, Joint and Multinational Vendor Inspection Protocol; and Mitigating the Risks of Counterfeit, Fraudulent, and Suspect Items. The VICWG conducted the 3rd and 4th Multinational Vendor Inspection in 2019 and 2021, respectively.

7. Next steps – Future of the programme

MDEP was established in 2006 as a multinational initiative for a five-year period. It was extended for another five-year period in 2012 by the Policy Group based on the value gained by the members. At its May 2014 meeting, the MDEP Policy Group requested a data collection be conducted among the members to prepare for a discussion on MDEP's mid- and long-term strategy. The questions focused on MDEP's mission and expected deliverables, the use of MDEP products, and the future of MDEP. The results of the data collection indicated that the members continued to receive significant benefits from participation in MDEP and it should continue beyond 2017. The members confirmed that the core activity should be the Design-Specific Working Groups and identified some recommended improvements in the development of the programmes of work, defining the products and ensuring knowledge transfer as reactors begin the operational phase. These findings were shared with the Policy Group at its June 2015 meeting. At this meeting, the Policy Group determined that MDEP should continue in its current form for an additional five-year period after 2017 until the end of 2022. However, the Policy Group stressed that going forward, MDEP should focus on design-specific activities. At its September 2019 meeting, the Policy Group decided to sunset MDEP in its current form by 2022 as the EPRWG, AP1000WG, and APR1400WG were expected to complete all activities specified in the programme plan by 2022. However, the Policy Group affirmed that for the MDEP designs that will remain active after 2022 (VVER and HPR1000), the work should continue. At its October 2020 meeting, the Policy Group approved moving forward with plans to close the EPRWG, AP1000WG, and APR1400WG by the end of 2021, and determined that a new MDEP governance structure should be implemented in 2022. The STC is working with DSWGs on the scope of close-out activities, the required knowledge management effort, and to determine the optimal timing to close their programme of work to properly plan the closure reports and other activities required for an orderly shutdown.

The Policy Group also decided to transfer the VICWG to the CNRA. VICWG activities will close under the MDEP framework at the end of 2021. During 2022, the VICWG will be working with the CNRA under the NEA auspices on the process of transition, which is expected in 2023. The working groups on Digital Instrumentation and Control and Codes and Standards had both been transferred to the CNRA by 2019, since the STC and Policy Group had approved the transfer of the generic activities to other organisations.

MDEP member countries have also stressed the need for, and benefits of, continuing co-operation among members even after a specific design review has concluded. To that end, the STC has begun exploring different options that can be utilised to transition existing co-operation within a DSWG outside of the MDEP, once the working group has achieved its mandate under MDEP. It is working with the NEA to transfer the EPRWG activities to the CNRA, as the EPRWG members have identified additional work related to operating reactors that is beyond the MDEP framework. The ABWR Working Group closed its activities under MDEP in May 2018, and is now operating under the CNRA.

The regulatory authorities that are members of the VVER and HPR1000 Design-Specific Working Groups, as existing members and considering their desire to continue the successful and mutually beneficial collaboration under a new streamlined MDEP framework for international co-operation for new designs, agree that the programme of work will be governed and implemented by a MDEP Management Board (MB) with the NEA serving as the Technical Secretariat.

A special session of the MDEP Policy Group only for the members of the future framework, namely Argentina, China, Finland, Hungary, Russia, South Arica, Türkiye, and the United Kingdom, was held in March 2021. The general consensus from the special session was that: (a) a successful transition to the new MDEP framework should be delivered first and then, at a later time, new member countries and new technologies can be considered; (b) harmonising regulatory practice should be a greater focus of working groups going forward; (c) work on cross-cutting issues could still be part of MDEP but awareness of co-operation with NEA working groups on generic topics is necessary. The organisation of events and conversations with a broader group of regulators is still of great interest for the members of the new MDEP framework.

A transition team that consists of all member countries of the future framework was established to consider the roles and responsibilities of the Policy Group and the STC, in order to help define the roles and responsibilities of the new Management Board of the future framework. A Deputy STC Chair was selected to lead the MDEP transition to the future framework. Currently, the transition team is re-structuring the MDEP terms of reference (ToR) with the aim of presenting the final proposal during the first meeting of the Management Board. The transition team will also discuss the transition process and make preparations for the first Management Board meeting, which will follow the last Policy Group meeting, by the end of 2021.

Appendix 1: List of abbreviations and acronyms

ABWRWG	Advanced Boiling Water Reactor Working Group
AERB	Atomic Energy Regulatory Board (India)
ASN	Autorité de sûreté nucléaire (Nuclear Safety Authority of France)
CNRA	Committee on Nuclear Regulatory Activities (NEA)
CNSC	Canadian Nuclear Safety Commission
CORDEL	Cooperation in Reactor Design Evaluation and Licensing
CP	Common Position
CSWG	Codes and Standards Working Group
DI&C	Digital instrumentation and control
DICWG	Digital Instrumentation and Controls Working Group
DSWG	Design-Specific Working Group
EDF	Electricité de France
EPRWG	EPR Working Group
FANR	Federal Authority for Nuclear Regulation (United Arab Emirates)
FOAK	First-of-a-kind
FPOT	First plant only tests
GDA	Generic design assessment
HVAC	Heating, ventilation and air conditioning
HAEA	Hungarian Atomic Energy Authority
I&C	Instrumentation and controls
IAEA	International Atomic Energy Agency
ISWG	Issue-Specific Working Group
ITAAC	Inspection, Tests, Analyses, and Acceptance Criteria
KEPCO	Korea Electric Power Corporation
KHNP	Korea Hydro and Nuclear Power
LOCA	Loss-of-coolant accident
MDEP	Multinational Design Evaluation Programme
NDE	Non-destructive examination
NEA	Nuclear Energy Agency
NNSA	National Nuclear Safety Administration (China)

NRA	Nuclear Regulation Authority (Japan)
NRC	Nuclear Regulatory Commission (United States)
NSSC	Nuclear Safety and Security Commission (Korea)
OECD	Organisation for Economic Co-operation and Development
ONR	Office for Nuclear Regulation (United Kingdom)
OOG	Owners and Operators Group
PC	Primary circuit components
PG	Policy Group
PRA	Probabilistic risk assessment
PSA	Probabilistic safety assessment
QA	Quality assurance
QM	Quality management
RO	Regulatory observation
RPV	Reactor pressure vessel
SDO	Standard development organisation
SSM	Strålsäkerhetsmyndigheten (Swedish Radiation Safety Authority)
STC	Steering Technical Committee
STUK	Säteilyturvakeskus (Radiation and Nuclear Safety Authority of Finland)
TAEK	Türkiye Atom Enerjisi Kurumu (Turkish Atomic Energy Authority)
TESG	Technical Experts Subgroup
TR	Technical Report
VICWG	Vendor Inspection Co-operation Working Group
VVER	Water-water energetic reactor
VVERWG	VVER Working Group
WGDIC	Working Group on Digital Instrumentation and Controls (NEA/CNRA)
WGHOF	Working Group on Human and Organisational Factors (NEA)
WGIP	Working Group on Inspection Practices (NEA/CNRA)
WGRNR	Working Group on the Regulation of New Reactors (NEA/CNRA)
WGSC	Working Group on Safety Culture (NEA/CNRA)
WNA	World Nuclear Association

Appendix 2: Revised or new documents and publications

Working group programme plans: www.oecd-nea.org/mdep/

CP-EPRWG-01 Common Positions on the EPR Instrumentation and Controls Design, May 2020.

TR-EPRWG-06 Technical Report on Hydrogen Management for EPR, May 2020, https://oecd-nea.org/mdep/documents/EPRWG06_TechnicalReport_Hydrogen_Management.pdf.

TR-EPRWG-07 Technical Report on EPR Assessment of 2A Large Break Loss of Coolant Accident (2A-LOCA) Analysis, May 2020, https://oecd-nea.org/mdep/documents/EPRWG07_TechnicalReport_2A%20LOCA_public.pdf.

TR-AP1000WG-03 Technical Report on AP1000 Technical Exchanges during the Design, Construction, and Commissioning of AP1000 Reactors, November 2019.

TR-AP1000WG-04 Common Understanding of the Hydrogen Control System for the AP1000 Design, September 2020, https://oecd-nea.org/mdep/documents/Technical_Report_AP1000_Hydrogen_Control_System_Approved_Sept2020_FINAL.pdf.

TR-AP1000WG-05 Technical Report on Lessons Learnt from Implementation of the Common Position on FPOT for AP1000, May 2021, https://oecd-nea.org/mdep/documents/AP1000_TR_LessonsLearnt_ImplementationCP_FPOT_FINAL.pdf.

TR-AP1000WG-06 Technical Report on Hot Functional and Startup Testing Lessons Learnt, May 2021, https://oecd-nea.org/mdep/documents/AP1000_TR_hotfunctionaltesting_startuplessonslearnt_FINAL.pdf.

CP-APR1400-04 Common Position on Irradiation Effect on the APR1400 Fuel Bundle Spacer Grid Strength, October 2019, https://oecd-nea.org/mdep/common-positions/cp_apr1400wg_01_fuel%20seismic.pdf.

TR-APR1400WG-04 Technical Report on Hydrogen Re-combiner Survey Results for APR1400WG design, March 2021, https://oecd-nea.org/mdep/documents/TR-APR1400WG-04_hydrogenrecombiner_surveyreport_FINAL.pdf.

TR-APR1400WG-05 Technical Report on Regulatory Requirements for Probabilistic Risk Assessment (PRA) APR1400 nuclear power plants, April 2021.

CP-VVERWG-02 Common Position Addressing Ex-Vessel Corium Stabilisation in Core Catcher, June 2021, https://oecd-nea.org/mdep/documents/CP-VVERWG-02_CoriumStabilization_CoreCatcher_FINAL.pdf.

CP-VVERWG-03 Common Position on Reactor Pressure Vessel and Primary Components Reliability for AES-2006 Designs, 2021.

TR-VVERWG-03 Regulatory Approaches Related to Accidents and Transients Analyses, March 2019, https://oecd-nea.org/mdep/documents/VVERWG_TR_%20Accident_Transients_0_7_STC%20comm_FINAL.pdf.

TR-VVERWG-04 Technical Report on Core Catcher, June 2021, https://oecd-nea.org/mdep/documents/tr-vverwg-04_CoreCatcher_Final.pdf

TR-VVERWG-05 Technical Report on Hydrogen Recombiners, June 2021, https://oecd-nea.org/mdep/documents/TR-VVERWG-05_HydrogenRecombiners_FINAL.pdf.

CP-HPR1000WG-01 Common Position Addressing Fukushima Daiichi Nuclear Power Plant Accident-Related Issues, November 2020, https://oecd-nea.org/mdep/documents/CP-HPR1000WG-01_CP_AddressingFukushimaDaiichiNPPAccident-RelatedIssues.pdf.

TR-HPR1000WG-01 Hydrogen Control During Severe Accidents, September 2020, https://oecd-nea.org/mdep/documents/TR-HPR1000WG-01%20Hydrogen%20Control%20During%20Severe%20Accidents_clean%20copy_FINAL.pdf.

TR-HPR1000WG-02 Technical Report on Regulatory Requirements and Practices for Severe Accidents, December 2020, https://oecd-nea.org/mdep/documents/TR-HPR1000WG-02_TR_RegulatoryRequirements_Practices_Severe%20Accidents.pdf.

CP-VICWG-02 Common Position on Witnessed, Joint and Multinational Vendor Inspection Protocol, November 2020, www.oecd-nea.org/mdep/common-positions/cp-vicwg-02.pdf.

CP-VICWG-04 Common Position on Mitigating the Risks of Counterfeit, Fraudulent, and Suspect Items, June 2021, https://oecd-nea.org/mdep/documents/VICWG_CFSI_CommonPositions09Jun2021_approved_FINAL.pdf.

TR-VICWG-06 Technical Report on Assessment of Multinational Vendor Inspection of ENSA (Spain), September 2020.

TR-VICWG-07 Technical Report on Safety Culture in the Nuclear Supply Chain, January 2021, https://oecd-nea.org/mdep/documents/TR-VICWG-07_TR_SafetyCulture_NuclearSupplyChainFinal_Rev29Jan2021_FINAL.pdf.

NEA/CNRA/R(2019)3 Proceedings of the 2018 Committee on Nuclear Regulatory Activities/MDEP Workshop on Nuclear Supply Chain Management, November 2019, www.oecd-nea.org/nsd/docs/2019/cnra-r2019-3.pdf.

MULTINATIONAL DESIGN EVALUATION PROGRAMME

The Multinational Design Evaluation Programme (MDEP) was established in 2006 to develop innovative approaches to leverage the resources and knowledge of the national regulatory authorities that are currently or will be tasked with the review of new nuclear power reactor designs. MDEP members are the regulatory authorities of Argentina, Canada, China, Finland, France, Hungary, India, Japan, Korea, Russia, South Africa, Sweden, Türkiye, the United Arab Emirates, the United Kingdom and the United States. The Nuclear Energy Agency serves as Technical Secretariat for MDEP. The International Atomic Energy Agency also takes part in the work of MDEP.

NUCLEAR ENERGY AGENCY

The OECD Nuclear Energy Agency (NEA) was established on 1 February 1958. Current NEA membership consists of 34 countries: Argentina, Australia, Austria, Belgium, Bulgaria, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Luxembourg, Mexico, the Netherlands, Norway, Poland, Portugal, Korea, Romania, Russia (suspended), the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Türkiye, the United Kingdom and the United States. The European Commission and the International Atomic Energy Agency also take part in the work of the Agency.

The mission of the NEA is:

- to assist its member countries in maintaining and further developing, through international co-operation, the scientific, technological and legal bases required for a safe, environmentally sound and economical use of nuclear energy for peaceful purposes;
- to provide authoritative assessments and to forge common understandings on key issues as input to government decisions on nuclear energy policy and to broader OECD analyses in areas such as energy and the sustainable development of low-carbon economies.

Specific areas of competence of the NEA include the safety and regulation of nuclear activities, radioactive waste management and decommissioning, radiological protection, nuclear science, economic and technical analyses of the nuclear fuel cycle, nuclear law and liability, and public information. The NEA Data Bank provides nuclear data and computer program services for participating countries.

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