MULTINATIONAL DESIGN EVALUATION PROGRAMME

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NUCLEAR ENERGY AGENCY

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FOREWORD FROM THE POLICY GROUP CHAIRMAN

MDEP is a unique ten-nation initiative being undertaken by regulators from Canada, China, Finland, France, Japan, Republic of Korea, the Russian Federation, South Africa, the United Kingdom, and the United States with the purposes of co-operating on safety design reviews of new reactors and indentifying opportunities to harmonise and converge on safety licensing review practices and requirements. The OECD Nuclear Energy Agency provides the technical secretariat support. The International Atomic Energy Agency participates in many of MDEP's activities. This Annual Report highlights the activities and accomplishments of MDEP in its second year.

MDEP's expected outcomes are as follows: improved effectiveness and efficiency of regulatory safety design reviews; increased quality of safety assessments; and identified areas for the convergence of regulatory requirements and practices. Making each regulator stronger in its ability to make sovereign safety decisions is a key objective that cuts across all MDEP activities.

At its March 2009 annual meeting the Policy Group (PG), which comprises the heads of the ten national regulators, approved the conversion of MDEP to a long-term programme that focuses on specific interim results. Among other objectives, the PG also directed MDEP to communicate its activities, including results and achievements, to other stakeholders such as industry and non-MDEP regulators. On 10 and 11 September, the first "MDEP Conference on New Reactor Design Activities" was organised at OECD headquarters to support the effort to communicate MDEP activities to important stakeholders including non-MDEP regulators and industry representatives from reactor vendors, operators and standards development organisations. Over 170 people attended from 23 different countries and eleven international organisations, which showed a great interest in MDEP activities.

In addition to the PG, which gives overall objectives and guidance to the Programme, MDEP's organisational structure includes the Steering Technical Committee (STC), which implements MDEP activities and directs the various working groups such as the two design-specific and three issue-specific working groups.

The design-specific working groups include the EPRWG and the AP1000WG which co-operate on the safety reviews of EPR and AP1000 designs, respectively. The EPR Working Group includes regulators from China, Canada, Finland, France, the United Kingdom, and the United Sates. The AP1000 Working Group involves the regulators facing reviews of that design from Canada, China, the United Kingdom, and the United States. Key accomplishments in these groups included continued exchanges on safety review issues and the sharing of safety evaluations to facilitate timely decisions by national regulatory authorities.

The issue-specific working groups are charged with studying the similarities and differences in regulatory requirements and practices in generic safety areas. For instance, in the Codes and Standards Working Group, MDEP's regulators are working with the various mechanical codes and standards development organisations to study why and how codes differ among MDEP countries. Similar efforts are ongoing as part of the Digital Instrumentation and Control Working Group, but in the field of digital control and safety systems. The Vendor Inspection Co-operation Working Group is co-ordinating inspections of reactor parts manufacturers among interested MDEP countries. Key accomplishments in these groups include agreements with standards development organisations regarding identifying potential areas for possible convergence of mechanical codes, development of common positions on digital instrumentation and controls issues, and co-ordinating over 15 witnessed inspections of reactor vendors in five different countries.

In 2009, MDEP continued to make progress on sharing design-review information to enhance the safety of new reactor designs. In addition, MDEP efforts are important to understanding differences and similarities among regulatory review and licensing requirements and practices, and are helping to identify opportunities for further harmonisation and convergence of licensing approaches. MDEP also encourages

the industry's efforts in achieving standardisation, this issue being considered as an important one for safety. MDEP looks forward to continuing its interaction with industry in order to improve standardisation of reactor designs and further convergence of regulatory approaches

André-Claude LACOSTE
MDEP Policy Group Chairman

March 2010 – MDEP Policy Group meeting

EXECUTIVE SUMMARY

The Multinational Design Evaluation Programme (MDEP) is a multinational initiative to develop innovative approaches to leverage the resources and knowledge of mature, experienced national regulatory authorities who are, or will shortly be, undertaking the review of new reactor power plant designs. Current MDEP members are: Canada, China, Finland, France, Japan, Korea, the Russian Federation, South Africa, the United Kingdom and the United States. In addition the IAEA takes part in the work of MDEP. The OECD Nuclear Energy Agency (NEA) performs the Technical Secretariat function in support of MDEP. MDEP 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.

The programme of work consists of activities chosen because they could be accomplished in the near term, and would result in significant benefits while requiring minimum resources. Working groups are implementing the activities in accordance with programme plans with specific activities and goals, and have established the necessary interfaces both within and outside of MDEP's membership. This report provides a status of the programme after its second year of implementation.

Significant progress is being made on the overall MDEP goals of increased co-operation and enhanced convergence of requirements and practices. Particularly noteworthy accomplishments include: completion of 13 vendor inspections with multinational co-operation, drafting of generic common positions in the area of digital instrumentation and controls, agreements with standards development organisations regarding co-operation in pursuing convergence, and completion of a comparison of the Korean, Japanese, and French codes for class I pressure vessels against the ASME code.

MDEP has developed a process for identifying common positions on specific issues among the member countries which may be based on existing codes, standards, national regulatory guidance, best practices, and group inputs. These common positions may be endorsed by MDEP members and would become good practices, recommended by MDEP.

Two design-specific working groups are facilitating MDEP's programme goal of enhanced co-operation. The EPR working group consists of the regulatory authorities of France, Finland, the United States, the United Kingdom, China, and Canada. The EPR Working Group has been successful in identifying issues that were addressed by one country but not fully considered in other countries. In the MDEP library, the working group maintains a listing of EPR Technical Issues that have been identified and are currently being evaluated by each of the participating regulators. The library provides a synopsis of the issues, the status within each technical body, and links to relevant documents. Four expert subgroups are currently interacting on specific technical issues and additional topics have been proposed. The AP1000 design-specific working group consists of the regulatory authorities of Canada, China, the United Kingdom, and the United States. Three expert subgroups have been formed in the areas of control rod drive mechanisms, civil engineering, and squib valves.

The Vendor Inspection Co-operation Working Group is well-established and succeeding at enhancing vendor inspection activities. The group co-operated on 13 vendor inspections in 2009, in which one regulator performed an inspection to its criteria, observed by representatives of other MDEP countries. The lead country has the benefit of discussion, insights, and suggestions from the observing countries. The benefits to the observing countries include additional information and added confidence in the inspection results. The working group developed an MDEP Vendor Inspection Protocol document with guidelines for witnessed and joint inspections. This document will facilitate inspections that are observed and attended by multiple regulators. The working group conducted a survey on quality assurance requirements used in the oversight of vendors to identify those areas where the various regulators have common regulatory frameworks.

The Digital Instrumentation and Controls Working Group identified proposed generic common positions on specific issues among the member countries which are based on the existing standards, national regulatory guidance, best practices, and group inputs using an agreed upon process and framework. To date, the working group has identified a number of areas for potential convergence and is drafting additional common positions. The working group continued to achieve the objective of efficient and structured information exchange by developing a formal process to generate and process inquiries from member countries. The working group engaged the International Electrotechnical Commission (IEC) and Institute of Electrical and Electronics Engineers (IEEE), as well as IAEA, regarding their increased co-ordination. The group issued letters recommending the continued participation of IEC and IEEE in the working group activities, suggested that the standards organisations consider the MDEP common positions when revising their standards, and recommended that the organisations increase their co-operation to achieve enhanced harmonisation of relevant standards.

The Codes and Standards Working Group has made significant progress in comparing Class 1 pressure vessel standards. The initial effort focusing on pressure vessel codes resulted in a database which identified the similarities and differences between the Korean, Japanese, and French codes and the ASME code. Based on the results of the comparison exercise, the CSWG has concluded that, while full convergence of the ASME, JSME, KEPIC and RCCM codes is not feasible, harmonisation is. "Harmonisation," in this sense, means that there is no substantial difference from a safety perspective between each country's Code used in the design and construction of pressure-boundary components. The working group will identify, from the comparison tables, sections of the codes that are equivalent or identical, and the sections that are not equivalent. For sections that are not equivalent, the working group will identify significant differences and examine potential paths for reconciliation of the code differences including identifying those that should be pursued for potential convergence. Once an understanding is gained of the differences between the codes, each MDEP participant could endorse, in whole or in part, the pressure boundary codes and standards of other countries. The SDOs have begun a comparison of Class 1 piping, pumps and valves and may eventually expand to include Class 2 and 3 vessels, piping, pumps and valves. In addition, the CSWG has established an agreement in principle that standards development organisations will consult with each other and consider the affect of future changes on harmonisation.

Accomplishments to date provide confidence that MDEP's structure and process is an effective method of accomplishing increased co-operation in regulatory design reviews. The progress that has already been achieved demonstrates that a broader level of co-operation and convergence is both possible and desirable. MDEP is considered a long-term programme with interim results. Interim results are products that document agreement by the MDEP member countries and are necessary steps in working towards increased co-operation and convergence. The interim results for 2009 include:

- Issuing technical expert subgroup technical reports that identify and document similarities and differences among designs, regulatory safety review approaches and resulting evaluations;
- Maintaining a listing of EPR Technical Issues that are currently being evaluated by each of the participating regulators, including a synopsis of the issues, the status within each technical body, and links to relevant documents;
- Establishing a preliminary set of technical considerations to be used for novel civil engineering construction (such as modular steel composite structures) and technical guidelines for the design, qualification, and in-service inspection/ testing of explosive-actuated valves;
- Maintaining a Vendor Inspection Planning Table with a list of scheduled vendor inspections to assist the member regulators in identifying opportunities to observe an inspection, or obtain the results of an inspection carried out by another member;
- Publishing an MDEP Vendor Inspection Protocol document with guidelines for witnessed and joint inspections to facilitate inspections that are observed and attended by multiple regulators;

- Co-operating on thirteen vendor inspections, in which one regulator performs an inspection to its criteria, observed by representatives of other MDEP countries;
- Completing an evaluation of the quality assurance requirements used in the oversight of vendors including those areas where the various regulators have common regulatory frameworks;
- Completing a comparison table of the ASME Boiler and Pressure Vessel Code, AFCEN's RCCM Code, JSME S NC1, and KEPIC code for Class 1 pressure vessels;
- Reaching agreement by the SDOs that they will work together to reduce additional divergence of the codes;
- Identifying six common positions in the area of digital instrumentation and controls: software common cause failure, software tools, independent verification and validation, data communication, simplicity in design, and complex electronics;
- Establishing a formal process to generate and process inquiries from member countries to promote an efficient and structured information exchange.

MDEP Steering Technical Committee

MULTINATIONAL DESIGN EVALUATION PROGRAMME

1. INTRODUCTION

The Multinational Design Evaluation Programme (MDEP) is a multinational initiative to develop innovative approaches to leverage the resources and knowledge of mature, experienced national regulatory authorities who are, or will shortly be, undertaking the review of new reactor power plant designs. MDEP has evolved from primarily a design evaluation program to a multinational co-operation program that includes inspection activities and generic issues. MDEP incorporates a broad range of activities including:

- Enhancing multilateral co-operation within existing regulatory frameworks;
- Increasing multinational convergence of codes, standards, and safety goals;
- Implementing MDEP regulatory practices and products to facilitate licensing reviews of new reactors, including those being developed by the Generation IV International Forum.

A key concept throughout the programme is that MDEP will better inform the decisions of regulatory authorities through multinational co-operation, while retaining the sovereign authority of each regulator to make licensing and regulatory decisions.

The idea for the programme was initiated in 2005, and a planning meeting of the original ten participating countries and the IAEA was held in June 2006. Initial efforts consisted of multilateral co-operation on the European Pressurised Water Reactor (EPR) design reviews, and a pilot project to assess the feasibility of enhancing multinational co-operation and convergence of codes, standards, and safety goals within existing regulatory frameworks. The multilateral co-operation on the EPR expanded on bilateral interactions that had already been established between France and Finland. A structure for the programme was developed; it consists of a Policy Group to oversee the programme, and a Steering Technical Committee with Working Groups to implement the programme with the Nuclear Energy Agency (NEA) serving as the Technical Secretariat. In addition the IAEA takes part in the work of MDEP. Terms of Reference for the programme were approved in September 2006.

The original programme of work consisted of ten activities which were chosen because they could be accomplished in the near term, and would result in significant benefits while requiring minimum resources. Working groups are implementing the activities in accordance with programme plans with specific activities and goals, and have established the necessary interfaces both within and outside of MDEP's membership. Significant progress has been made over the past year on the overall MDEP goals of increased co-operation and enhanced convergence of requirements and practices. Accomplishments to date provide confidence that the MDEP structure and process is an effective method of accomplishing increased co-operation in regulatory design reviews. The progress that has already been achieved demonstrates that a broader level of co-operation and convergence is both possible and desirable. In March 2009, the MDEP Policy Group agreed that the programme must continue beyond the original two year mandate to fully achieve the established goals. Therefore, MDEP is considered a long term programme with interim results. Interim results are those products that document agreement by the MDEP member countries and are necessary steps in working towards increased co-operation and convergence.

This report provides the programme's status after its second year of implementation.

2. PROGRAMME GOALS AND OUTCOMES

The main objectives of the MDEP effort are to enable increased co-operation 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. As stated in MDEP's Terms of Reference, the programme focuses on co-operation and convergence of regulatory practices that will lead to convergence of

regulatory requirements. Co-operation will allow a better understanding of each other's processes to encourage and facilitate eventual convergence. The goal of MDEP is not to independently develop new regulatory standards, but to build upon the similarities already existing and existing harmonisation in the form of IAEA and other safety standards. In addition, the common positions will be shared with the IAEA for consideration in the IAEA standards development programme.

MDEP is meeting its goal of enabling increased co-operation through the activities of the working groups. MDEP has been very 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 members have benefitted significantly from the sharing of questions among the regulators, resulting in more informed, and harmonised, regulatory decisions. MDEP members have also been highly successful in coordinating vendor inspections in which the regulators share observations and insights. MDEP has made improvements in communicating information regarding members' regulatory practices through development of an MDEP library which serves as a central repository for all documents associated with the programme.

As stated in the MDEP Terms of Reference, enhanced co-operation is "facilitated by establishing reference regulatory practices" (now called Common Positions) which are identified through the following process: MDEP members increase knowledge transfer through the exchange of information on regulatory practices used by member countries in their design reviews. MDEP identifies similarities and differences in the regulatory practices, and obtains insights to understand the basis for the differences. The MDEP members can then choose to move towards harmonisation by identifying best practices among the member countries, engaging each regulatory authority in its decision making process, including reaching out to external stakeholders on possible changes to regulatory processes, and ensuring that each working group member has obtained the support of his regulatory authority on an agreed upon generic common position. For areas where harmonisation is not practical, the working group members will work to understand the differences to facilitate more efficient and effective design reviews.

MDEP is meeting this goal by making comparisons of the regulatory practices in the member countries, identifying differences, and drafting common positions. The working groups are also working with codes and standards organisations to identify differences and propose areas of convergence. MDEP has identified similarities and differences in inspection practices, and plans to develop a common MDEP vendor inspection procedure to be used for multinational vendor inspections.

Progress towards harmonised regulatory practices and requirements for Generation IV reactor designs will be a natural outgrowth of this programme, as the participating regulatory authorities find that multinational co-operation and convergence of regulatory practices become routine elements of their planning and execution of new design evaluations. It is noteworthy that nine of the ten MDEP member countries are also members of the Generation IV International Forum (GIF).

MDEP has been successful in meeting the expected outcomes as defined in the MDEP Terms of Reference by: increasing knowledge transfer, identifying similarities and differences in the regulatory practices; increasing stakeholders' understanding of regulatory practices; and enhancing the ability of regulatory bodies to co-operate in reactor design evaluations, vendor inspections, and construction oversight, leading to more efficient and more safety-focused regulatory decisions.

3. PROGRAMME IMPLEMENTATION

3.1 Membership

Participation in the Policy Group and Steering Technical Committee is intended for the mature, experienced 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. Current MDEP members are: Canada, China, Finland, France, Japan, Korea, Russian Federation, South Africa, the United

Kingdom and the United States. The 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, plus a representative from the International Atomic Energy Agency (IAEA).

The Policy Group provides guidance to the STC on the overall approach; monitors the progress of the programme; and determines participation in the programme.

The Steering Technical Committee manages and approves the detailed programme of work including: defining topics and working methods, establishing technical working groups, and 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 Policy Group; identifying new topics for the programme to address; and establishing subcommittees of the STC to study specific topics.

The OECD 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: design-specific activities and issue-specific activities.

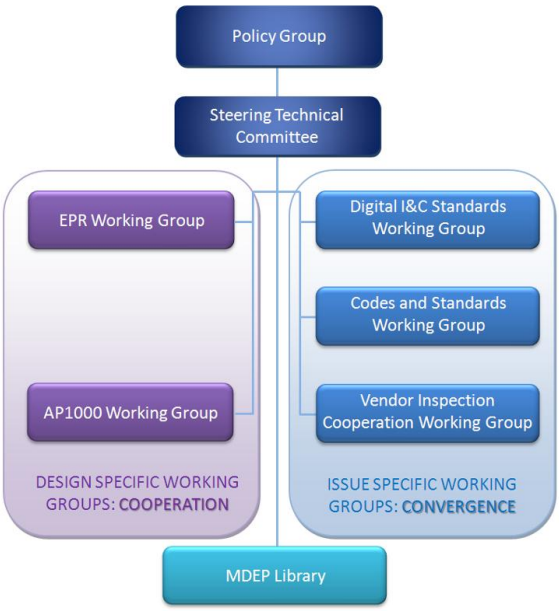
Design-specific activities

Working groups for each new reactor design share information on a timely basis and co-operate on specific reactor design evaluations and construction oversight. Participants in these working groups are the regulatory authorities that are actively reviewing, preparing to review, or constructing the specific reactor design. A design-specific working group is formed when three or more MDEP member countries express an interest in working together. An "Observer" level of engagement is available for MDEP regulatory bodies engaged in regulatory action based on interest expressed by governmental authority and/or by a utility for exploring the potential for licensing new nuclear power plants of certain designs. Observers can participate in the meetings as long as appropriate controls regarding the use and discussion of proprietary information are established. This status is temporary with expectations that circumstances and the necessary agreements that will allow full participation will develop in a short time period. Under the design-specific working groups, subgroups have been formed to address specific technical issues.

Issue-specific activities

Working groups are organised for the technical and regulatory process areas within the programme of work. These currently include, but are not limited to, vendor inspections, pressure boundary component codes and standards, and digital instrumentation and control standards. Membership in issue-specific working groups is open to all MDEP participating countries and the IAEA representatives.

The following chart illustrates how the programme is organised.



3.3 MDEP Library

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 the development and maintenance of the MDEP library on a website. The website includes a folder structure and provides two levels of access both of which are password protected: (1) MDEP member countries, and (2) member countries participating in design-specific working groups. Access to the library is determined by the STC and implemented by the NEA. Publicly available documents related to MDEP are available on the MDEP page of the NEA website.

Each MDEP member country has designated a contact within their regulatory organisation who is responsible for identifying documents to be included in the library, track library status and associated activities, and maintain contact with the NEA librarian. The NEA has issued a guidance document detailing library functions, access, and use. The library documents are either in English or include an abstract in English describing the contents. The NEA is pursuing a process for translating documents.

The STC, through the secretariat, will continue to add documents and make enhancements to improve the effectiveness of the library. In the future, the STC will evaluate whether to make portions of the library available to all NEA countries, and if so, which portions should be made available to the general public.

The Digital Instrumentation and Controls Working Group uses the library to process inquiries from member countries. This “Quick Inquiry” process is used to promote the efficient and structured exchange of information and provide for its storage in a retrievable database.

In the MDEP library, the EPR working group maintains a listing of EPR Technical Issues that have been identified and are currently being evaluated by each of the participating regulators. The library provides a synopsis of the issues, the status within each technical body, and links to relevant documents.

In order for MDEP to be successful at fulfilling its goal of leveraging the work of peer regulators in the licensing 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 during the MDEP meetings and in the MDEP library is intended for the sole use of the participating national regulators. The members of the design-specific working groups also have a communication protocol to share MDEP positions on topics with other members before releasing this information into the public domain. 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.

3.4 Common Positions

MDEP has developed a process for identifying and documenting common positions on specific issues among the member countries which may be based on existing standards, national regulatory guidance, best practices, and group member inputs. Design-Specific Common Positions will document common conclusions that each of the working group members have reached during design reviews. Discussions among the members and the sharing of information in these areas help to strengthen the individual conclusions reached. Because of the need to issue these statements more quickly, and because responsibility for these decisions rests with the regulators who are performing the design reviews, Design-Specific Common Positions require only agreement by the working group members.

Generic Common Positions may be drafted by issue-specific working groups or design-specific working groups, but would apply generically rather than only to one design. Generic Common Positions document practices and positions that each of the working group members find acceptable. The common positions will be shared with the IAEA, and other standards organisations, for consideration in standards development programmes. Draft Generic Common Positions will be made available to external stakeholders as appropriate during the approval process. After a Generic Common Position is agreed to by a working group, it is

presented to the STC for endorsement, and then to the Policy Group for approval. Upon approval by the PG, the Generic Common Positions are published in the MDEP annual report and will be made publicly available on the NEA MDEP website. There is no obligation on the part of any regulatory body to follow them. If a regulatory body chooses to adopt a Generic Common Position, it would be through that country's normal processes.

4. INTERACTIONS WITH OTHER ORGANISATIONS

MDEP recognises that other organisations are implementing programmes to facilitate international co-operation on new reactors. Because of MDEP's limited membership, these other avenues should be available to countries who are interested in new build, but do not meet the criteria for entrance to MDEP. MDEP strives to maintain an awareness of, and interact with, these other groups to ensure that it does not duplicate efforts, to benefit from the results of these activities, and to communicate MDEP activities and results to other organisations. To ensure that efforts are not duplicated between the groups, MDEP's scope is focused on short-term activities related to specific design reviews being conducted by the member countries, and efforts to harmonise specific regulatory practices and standards.

Brief descriptions of these other programmes and their interfaces with MDEP are below.

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 siting issues. The WGRNR co-ordinates its work with the work performed by MDEP such that it utilises its outputs and does not duplicate its efforts, and extends the results of MDEP to other CNRA members. MDEP interacts with the CNRA WGRNR and Working Group on Inspection Practices through the NEA staff who also serve as the Technical Secretariat for the CNRA. In addition, the chairs of CNRA WGRNR and MDEP STC meet frequently to discuss on-going activities and plans. 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.

4.2 International Atomic Energy Agency (IAEA)

The IAEA participates in the work of MDEP through participation in the Policy Group and STC meetings and issue-specific working groups. In addition, the Generic Common Positions will be shared with the IAEA for consideration in the IAEA standards development programme.

4.3 Western European Nuclear Regulators Association (WENRA)

WENRA is a non-governmental organisation comprised of the heads and senior staff members of nuclear regulatory authorities of European countries with nuclear power plants. The main objectives of WENRA are to develop a common approach to nuclear safety, to provide an independent capability to examine nuclear safety in applicant countries and to be a network of chief nuclear safety regulators in Europe exchanging experience and discussing significant safety issues. The WENRA Reactor Harmonisation Working Group (RHWG) issues common reference levels with the objective of attaining a common approach to nuclear safety within Europe. Reference Levels for Existing Reactors have been issued and are in the process of being implemented in WENRA countries. The RHWG is developing objectives for new reactors. MDEP will interact with WENRA on these objectives. Three members of the MDEP Policy Group are also members of WENRA. The MDEP STC has had the benefit of presentations on WENRA activities at meetings. In addition, WENRA documents are recognised as a valuable source of information and insights and can assist the MDEP STC in selecting future topics. In the area of safety goals, MDEP recognises the work already underway by the WENRA RHWG in this area, and has reached out to WENRA to initiate a dialog between MDEP and RHWG specialists, including attendance by the chairman of the RHWG at a meeting of the MDEP Safety Goals subcommittee. MDEP and WENRA have agreed to provide each other an

opportunity to review and comment on each other's reports.

4.4 Generation IV International Forum (GIF) Risk And Safety Working Group (RSWG)

MDEP interacts with GIF through the NEA staff who also serve as the Technical Secretariat for GIF, as well as through the UK representative to the MDEP STC who is an observer at all RSWG meeting. The MDEP Safety Goals Subcommittee has held discussions with the RSWG. The chairman of the STC has also met with the chairman of the GIF Risk and Safety working group, and the GIF Policy Group, to discuss activities of mutual interest.

4.5 Industry Groups

MDEP's working groups are very interested in understanding the perspectives of the design vendors, codes and standards organisations, and component manufacturers in MDEP activities, and the challenges they face in dealing with numerous regulators and regulatory systems.

MDEP working groups interact with, and invite industry groups to participate in selective portions of meetings and other activities. For example:

- The EPR Working Group invited AREVA to make a presentation on variations among EPR Designs in the United Kingdom, the United States, France and Finland at a working group meeting.
- The Codes and Standards Working Group is interacting with a committee of standards development organisations (SDOs) (ASME, JSME, KEPIC, AFCEN, and CSA) in a code comparison project. A representative from the US NRC represents the CSWG on the steering committee. .
- The Vendor Inspection Co-operation Working Group heard presentations by EDF, South Texas Nuclear Operating Company, Westinghouse, AREVA, Korea Electric Power Company and Mitsubishi Heavy Industries. They provided vendors' perspectives regarding the regulatory requirements of pressure containing components at the working

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group meetings.

- The Digital Instrumentation and Controls Working Group issued letters to IEC and IEEE encouraging their continued co-operation on MDEP initiatives.
- The World Nuclear Association CORDEL group presented a proposal for the harmonisation of regulations at the September 2009 MDEP Conference. MDEP responded to CORDEL's proposal; the STC will continue to monitor CORDEL's activities in order to identify opportunities for effective co-operation.

4.6 MDEP Conference

In addition to the interactions discussed above, MDEP held its first conference on 10-11 September, 2009, in Paris. The conference was organised by the NEA to communicate the goals, achievements and plans of MDEP to regulatory authorities not participating in MDEP and to other interested parties including the nuclear industry, standards development organisations, and other multinational organisations including IAEA. The conference was attended by about 170 individuals from 23 countries and 11 international organisations.

At the opening session, Luis Echávarri (Director General of NEA), André-Claude Lacoste (Chairman of ASN and Chairman of the MDEP Policy Group), and several other head regulators all expressed support for MDEP as an important element of the much needed international co-operation on new reactors.

The conference included presentations and panel discussions on the activities of each MDEP working group, industry initiatives for new reactor designs, and international organisation initiatives. The participants in the panel discussions included MDEP participants, other regulators, standards organisations, and representatives from industry. Broad support for the efforts made by MDEP was expressed by all participants. Several participants presented their views or specific proposals for expanding MDEP's scope and for increasing communications with outside organisations. Some regulators of small nuclear programs and several representatives of industry expressed their desire for some type of international or multinational approval of new reactor designs. Other regulators of small nuclear programs and all MDEP participating regulators reinforced the importance of strong, independent national regulators who are supported in their decision making through enhanced co-operation with other regulators.

Some of the conclusions that came out of the conference were:

- MDEP is an effective and efficient method of pooling experts from different countries. It improves the design reviews and enhances the safety level, and its efforts should be continued.
- Stakeholders have great expectations of MDEP.
- The definition of "harmonisation" must be better articulated.
- The design-specific working groups should focus on achieving a form of standardisation, which is as similar as possible.
- MDEP should improve how information is disseminated to external stakeholders.

5. CURRENT ACTIVITIES

The current activities of MDEP were initiated as a result of the MDEP pilot project, and are being implemented through design specific working groups, issue-specific working groups, and subcommittees of the STC. The members of the design specific working groups share information and co-operate on specific reactor design evaluations and construction oversight. Issue-specific working groups are organised for the technical and regulatory process areas within the programme of work. Each working group has a lead and co-lead country designated, and has developed a programme plan which identifies specific activities, schedules and contacts.

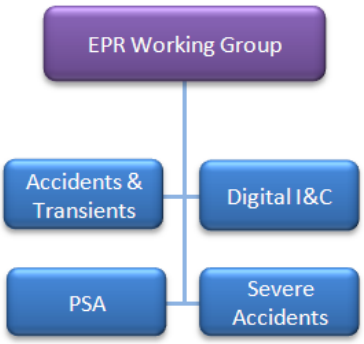
5.1 EPR Design-Specific Working Group

Highlights

With the purpose of leveraging technical and regulatory resources, members of the EPRWG worked together on emerging issues related to safety of the EPR designs that are under review in Canada, China, Finland, France, the United Kingdom. and the United States.

Most notably the group exchanged information and co-operated on the reviews of the Digital Instrumentation and Controls safety systems. This effort has enabled the regulators to provide a united front on addressing the most safety significant issues in this area.

The EPRWG exchanged information on other topics important to the safety design reviews of the EPR including the areas of Severe Accidents, Accidents and Transients, and Probabilistic Safety Assessments. These efforts again have helped focus limited regulatory and technical resources on the most challenging and safety significant issues facing each regulator in licensing and construction reviews.



The EPR working group currently consists of the regulatory authorities of France, Finland, the United States, the United Kingdom, China and Canada. This working group was established in January 2006 as multilateral co-operation between France, Finland and the United States. Numerous meetings and technical exchanges have taken place to exchange information on the reviews being conducted in each country: Olkiluoto 3 (OL3) which is under construction in Finland; Flamanville 3, which is under construction in France; and the US version of the EPR which is under review for design certification in the United States and is referenced by four combined license applications currently under review. In November 2008, China and the UK were added as members. China - NNSA issued a construction permit for an EPR at the Taishan site in August 2009.

UK/NII is performing a Generic Design Assessment of the UK-EPR at the joint request of EDF and Areva. The design is essentially the same as the French design being constructed by EDF at Flamanville. Canada- CNSC is in the first phase of its review of the EPR design application.

The EPR DSWG chair is Finland, which is in the process of constructing an EPR; and France, as the country of the design originator, is the vice-chair. The goals of the working group are to reach convergence in aspects of the the EPR design review where possible and find areas where member countries can co-operate. The working group currently includes four subgroups: Accidents and Transients, Digital Instrumentation and Controls, Probablistic Safety Assessment, and Severe Accidents.

Accomplishments

The EPR Working Group has been successful in identifying issues that were addressed by one country, but not yet fully considered in other countries. For example: STUK and ASN have shared portions of the detailed design of the EPR Instrumentation and Control system. This was useful to countries such as the US and the UK that had not seen the detailed design at that time. In addition, STUK shared its letter to AREVA outlining the instrumentation and control issues identified in their review. The working group has also shared the resolution of issues by one country that may not have been fully considered in other countries. For example, the US shared its interim staff guidance for the independence of data communications among diverse instrumentation and control systems.

The working group members have also discussed tools and methods used in their reviews that may be useful to other members. For example, NII discussed the use of statistical software testing as demonstration for software meeting a particular software reliability goal that

can be used in the overall plant PRA. Additionally, STUK's contractor provided a presentation of a software modelling tool that was used to evaluate the OL3 software and identified some requirements/design specification issues. This tool may be of value to other regulators when the software for the plants they are reviewing is under development.

In the MDEP library, the working group maintains a listing of EPR Technical Issues that have been identified and are currently being evaluated by each of the participating regulators. The library provides a synopsis of the issues, the status within each technical body, and links to relevant documents.

The status of the technical expert subgroups is discussed below.

EPR Digital Instrumentation and Controls subgroup

All participating regulators and the design vendor view instrumentation and controls as a major licensing issue for the EPR. Independence of Digital I&C systems is a common theme with every MDEP regulator involved in the reviews of the various EPR designs. The member regulators have also come to a common conclusion regarding sufficiency of the level of design detail provided. The benefits of interactions of this group include a common understanding of each of the regulators' positions on technical issues. In many areas the regulators' safety positions are consistent.

One notable accomplishment of this subgroup is the work the members completed in identifying a potential single failure issue which led to design changes by AREVA. This is notable because the identification of the problem was made and shared pursuant to MDEP efforts and directly resulted in design changes. As a next step, the subgroup plans to co-ordinate audits of the I&C design process to evaluate the verification and validation process during the design phase.

Flamanville 3 under construction © EDF 2010.

EPR Probabilistic Safety Assessment Subgroup

The EPR PSA subgroup members have compared their level 1 PSAs, and are beginning to compare level 2 PSA reviews. STUK provided a summary of the EPR PSA to NRC for review. Based on the interactions and review of materials, the NRC identified additional questions for the applicant. These questions were shared with STUK and ASN to assist in their review.

Technical areas discussed by the subgroup include fire PSA, external hazards, and common cause failures. Additional topics and documentation were identified for future information exchange.

The working group members continue discussions of the differences between the French, Finnish, and US designs and regulatory approaches. In particular, they are working to understand the differences in HVAC design and system interdependencies, and diesel generator battery design capacity.

EPR Severe Accident subgroup

The severe accident subgroup has discussed the use of the two-room concept in the containment response evaluation and molten core cooling system and structures. The subgroup compared the use of the codes that were utilised for various parameters and determined that there are some significant similarities, and some differences, among the approaches. The subgroup considers that the Operating Strategies for Severe Accident (OSSA) review is an important subject because of the new items specific to EPR (and not to currently operating PWRs).

EPR Accidents and Transients subgroup

The first topics discussed in this subgroup have been containment response evaluations, accident analyses methodologies, and criticality safety during outages. The subgroup will continue to discuss containment response evaluations and the containment sump design issues (resolution of the generic safety issue and issues such as chemical effects on sump performance). Other issues that may be added include fuel burnup.

Other topics

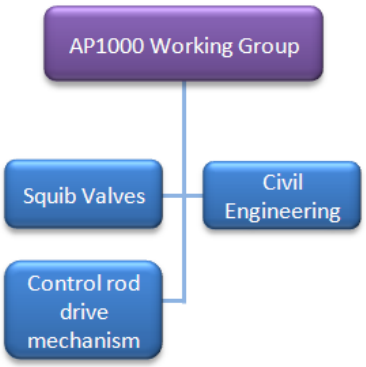
Other topics under discussion by the working group include fire protection: (rules and regulations, fire analysis and fire protection issues), human factors (control room design), radiation protection, grouted tendons in civil structures, operational safety and design-related construction experience.

5.2 AP1000 Design-Specific Working Group

Highlights

The working group has shared design information, application documents, and preliminary findings within the group, and identified the most significant review issues. Subgroups of experts have been formed to address specific technical issues that were identified by all participants as being significant because they involve unique or unresolved design features. Current subgroups include: Shield building, squib valves, and control rod drive mechanisms.

Other topics to be discussed may include: the methodology, knowledge and results of Inspection, Tests, Analyses and Acceptance Criteria (ITTAC); Radiation protection; instrumentation and controls; and human factors.



The AP1000 design-specific working group was established in November 2008 with initial participation by China (NNSA), the United Kindom (NII), and the United States (NRC). Canada (CNSC) was added as a member in March 2009. NNSA issued a construction permit in March 2009 for two AP1000 units at the Sanmen site, and issued another construction permit in September 2009 for two AP1000 units at the Haiyang site. A total of four AP1000 units are being constructed in China. The NRC is reviewing Revisions 16 and 17 to the AP1000 design certification and is concurrently reviewing combined license applications for 12 AP1000 units. The Vogtle plant, for which the NRC has issued an early site permit and Limited Work Authorisation, is expected to be the first AP1000 to go into construction in the US. NII has completed Step three of the four-step generic design assessment process of the AP1000 design. CNSC has started the pre-project review on the potential choices for new reactor construction, including the AP1000. The AP1000 DSWG chair is the United States, the country of the design originator; and China, as the first country to begin the construction of an AP1000, is the vice-chair.

A status of the expert subgroups follows.

Shield Building Subgroup

The shield building design was selected for further discussion by an expert subgroup due to the uniqueness of the design as well as the fact that there are currently outstanding questions regarding the modular construction techniques to be used and the use of former plates, rather that rebar in the design of the concrete retaining walls. This expert group is led by the US.

The subgroup members compared results of their separate reviews of the shield building design and came to similar conclusions regarding fundamental concerns. The discussions were helpful in confirming conclusions already identified by the regulators. In the absence of applicable design standards for concrete composite structures, the expert subgroup developed a preliminary set of technical considerations to be used for novel civil engineering construction (such as modular steel composite structures). These considerations may be used to propose a code case to the standards organisations for modular construction.

Squib Valve Subgroup

The in-containment refuelling water storage tank injection valves (squib valves) were selected because of the uniqueness of these valves and their relative risk significance. Such valves are not currently in existence and will require a new design and associated qualification programs. The squib valves to be used on the AP1000 are much larger than those used in existing nuclear applications. Questions have also been raised regarding the adequacy of the current in-service testing requirements for such valves, since there is little to no operating experience. The members agreed that the lack of experience with large squib valves requires particular care in the design, qualification, and in-service inspection/

testing of these valves. This expert group is led by NII. The Squib Valve subgroup has prepared an initial draft of technical guidelines for the design, qualification, and in-service inspection or testing of explosive-actuated valves. The guidelines are intended to be helpful to regulators and the nuclear industry in understanding the technical issues associated with large explosive-actuated valves used in AP1000 reactors and other reactor designs.

Control Rod Drive System Subgroup

The control rod drive system was selected because its safety classification (classified as non-safety) has been questioned by NNSA, particularly the classification of the latch mechanisms and the adequacy of any associated testing or analysis to show that the latch mechanisms can perform their intended safety function. This expert group is led by NII.

AP1000 under construction, Sanmen, China; © SNMPC 2010.

5.3 Vendor Inspection Co-operation Issue-specific Working Group

Highlights

With the purpose of maximising the use of each other's inspection results and to learn more about each regulator's requirements and practices regarding vendor inspections, the VICWG co-ordinated 13 witnessed inspections in five different countries and involving seven different national regulatory authorities.

The VICWG produced an inspection protocol document to clearly define the roles of participants in MDEP VICWG inspections to maximise the efficiency of such interactions.

The VICWG completed a Quality Assurance comparison table among the ten participating countries to facilitate understanding of quality assurance (QA) requirements for vendors.

The VICWG produced an inspection planning table for 2010 to continue its efforts in sharing vendor inspection experience.

Background

A Working Group on Component Manufacturing Oversight was established as part of the MDEP Pilot Project to assess the regulatory requirements and review associated with the manufacturing processes for components for use in nuclear power plants. The working group met with the design code bodies from the United States, France, Japan, and Korea, and found that component manufacturing is currently subject to multiple inspections and audits similar in scope and in safety objectives, but conducted by different organisations. The pilot project concluded that the formation of multi-national regulatory teams to perform inspections of component manufacturers would improve effectiveness and efficiency in the regulatory assessment of the highest safety class components.

A working group was established to continue the work of the pilot project to identify areas of commonality and differences between the regulatory practices of participating countries in the area of vendor inspection programmes. ASN chairs this working group. The long term objectives of the working group are to maximise the use of the results obtained from other regulators' efforts in inspecting vendors, and to perform multinational inspections of vendors according to common quality assurance requirements.

To improve the usefulness of other's inspection results, the working group will continue enhancing the understanding of each regulator's inspection procedures and practices by co-ordinating witnessed inspections of safety related mechanical pressure retaining components (Class 1) such as pressure vessels, steam generators, piping, valves, pumps, etc., and quality assurance (QA) inspections. The working group plans to develop and maintain a process to share inspection results including a library of all inspection results. In the long term, a process will be developed to adapt the scope of an inspection according to the need of other regulators

Accomplishments

The VICWG developed matrices that identify the scope of inspections in each country. Understanding which inspection areas are covered by each regulator helps the MDEP countries to co-ordinate vendor inspections, and will provide each regulator a better understanding of the applicability of inspection findings by other countries.

The group is currently performing witnessed inspections, which consist of one regulator performing an inspection to its criteria, observed by representatives of other MDEP countries. Thirteen such inspections were conducted in 2009, in five countries and with the involvement of seven regulatory bodies. The VICWG maintains a Vendor Inspection Planning Table with a list of scheduled vendor inspections to assist the member regulators in identifying opportunities to observe an inspection, or obtain the results of an inspection carried out by another member.

The benefits to the observing countries include additional information and added confidence in the inspection results. As an example, the CNSC representative, who observed an NRC inspection at Doosan (which was also observed by a representative of KINS), found the witnessed inspection especially helpful

since CNSC has not inspected such facilities in ten years and will probably perform such inspections in the future. The thorough nature of the NRC inspection may be a good basis for CNSC's acceptance of the inspected vendors and CNSC may augment the scope of the NRC's inspection by doing a more detailed desktop review of the vendor's programs and procedures.

The working group developed an MDEP Vendor Inspection Protocol document with guidelines for witnessed and joint inspections. This document facilitates inspections that are observed and attended by multiple regulators.

The working group has initiated an activity to identify common quality assurance requirements of the regulatory bodies. The group conducted a survey on quality assurance requirements used in the oversight of vendors to identify those areas where the various regulators have common regulatory frameworks. A comparison table has been drafted and will be finalised in 2010.

Future Actions

In 2010, the working group plans increase the number of witnessed vendor inspections. This will continue to enhance the exchange of information between the regulators and provide better understanding of the inspection scopes and safety findings and how these findings may be utilised. In order to improve the process for sharing inspection results, the WG will write a procedure to share inspection results, and improve the MDEP library to include an inspection results data base.

In 2010, the group plans to develop and implement the common processes needed to adapt the scope of vendor inspections to take into account the needs of other member countries; and to develop a framework that will allow MDEP members to take into account other regulators' vendor inspections.

The WG plans to identify common quality assurance requirements that could be acceptable to MDEP regulators. The long term goal of the WG is to harmonise a significant portion of the quality assurance inspection procedures so that the results of an inspection conducted by one member could be used by the other members, requiring that other member countries only inspect that portion of their requirements not covered by the common inspection procedure.

The next planned phase is 'joint' inspections which consist of one lead regulator and other MDEP members participating. This would allow the participating members to use the results of the inspection that are applicable to their regulations. To implement this, the WG will update the protocol for conducting joint inspections and identify training needs to support joint inspections. MDEP plans to organise at least two or three joint inspections by the end of 2011.

In the long term, the working group may develop a common MDEP vendor inspection procedure that could be used for vendor inspections.

The working group will explore expanding their activities beyond pressure boundary components into areas such as electrical and mechanical components, concrete, and examine modular construction as areas where vendor inspections can be useful to MDEP members.

5.4 Codes and Standards Working Group

Highlights

The CSWG worked closely with the various Standards Development Organisations (SDOs) from France, Korea, Japan, and the United States. to essentially complete and fully comprehend the nature of the differences among these various mechanical codes and standards for Class 1 pressure vessels. The group also started the code comparisons for Class 1 pumps, pipes, and valves.

The CSWG worked closely with the SDOs from Canada and Russia to commence the code comparisons for these countries.

The CSWG achieved agreement in principle with the SDOs to pursue options to preclude further divergence among the various Codes and Standards.

The CSWG proposed several options for potential code convergence where possible to encourage harmonisation and standardisation.

The CSWG is exploring regulatory options to enable the use of foreign codes in the licensing of new reactors.

Background

The primary goal of the Codes and Standards Working Group (CSWG) is to achieve convergence of regulatory requirements in the area of component design. A major initial step towards this goal is establishing a retrievable data base of the similarities and differences among the codes and standards used in the design of pressure boundary components. The initial effort emphasised the similarities and differences among the codes and standards used in the United States (ASME), France (RCCM), Japan (JSME), and Korea (KEPIC). Future efforts will address codes and standards in other countries including Canada (CSA) and the Russian Federation. The working group's goal is to perform an assessment of the similarities and differences for the codes and standards, and identify the most beneficial areas for convergence. Changes in codes and standards can only be made by the standards development organisations (SDOs) themselves and therefore, the role of the working group is to assist the SDOs in identifying and resolving important differences. The goal of both the SDOs and the CSWG is to achieve global harmonisation of pressure-boundary design codes for nuclear power plants.

Accomplishments

The CSWG has interacted with standards development organisations (SDOs) which have formed a steering committee composed of the representatives of ASME, JSME, KEPIC, AFCEN, CSA, vendors, and utilities. The CSWG is represented on the steering committee by the representative from the US NRC. The SDOs are performing a Code-comparison project in conjunction with the working group's efforts. The first phase consists of a comparison of each Code's requirements for Class 1 pressure vessels with those of ASME Code, Section III. This comparison includes the material, design, fabrication, examination, testing, over-pressure protection and general requirements. The SDOs have prepared a comparison table of the following pressure boundary codes for Class 1 pressure vessels: ASME Boiler and Pressure Vessel Code, AFCEN's RCCM Code, JSME S NC1, and KEPIC. This assessment was accomplished through correspondence and joint meetings between the working group and SDOs. The initial effort focusing on pressure vessel codes resulted in a database which identified the similarities and differences between the Korean, Japanese, and French codes as they compare to the ASME code. The project was designed to use the ASME code as the basis for the comparison since most of the codes under review originated from the ASME codes. The source of the differences in the codes, such as regulatory requirements or code organisation approach, are also addressed. The Phase 1 Code-comparison activity for KEA's KEPIC Code, JSME's S-NC1 Code, and AFCEN's RCCM Code comparison is complete. Canada recently agreed to join the Phase 1 task and perform a comparison of its CSA N-285 standard to the requirements of the ASME Code, Section III for Class 1 vessels. Russia has also initiated a Code-comparison effort.

Based on the results of the comparison exercise, the working group has concluded that the complete convergence on every aspect of pressure-boundary codes on an international scale is not currently feasible because of the

large differences in the scope of the different designs, each country's design and construction practices, regulatory requirements and processes, cultural patterns, and the manner in which Codes are adopted by regulatory agencies. It was determined that harmonisation is feasible. "Harmonisation," in this sense, means that there is no substantial difference from a safety perspective between each country's Code used in the design and construction of pressure-boundary components. "Convergence," is defined as each country's Code using identical Code requirements. The key to achieving harmonisation is to understand the source of and reasons for differences of Code requirements in order to assess their significance from a safety and risk perspective.

Using the comparison results of Class 1 pressure vessels, the working group has begun discussions to identify the sections of the codes that are equivalent or identical, and the sections that are not equivalent, and to examine potential paths for reconciliation of the differences in the codes including identifying those that should be pursued for potential convergence.

As an interim measure, the working group has obtained a commitment in principle from the SDOs to work together to minimise further divergence of code requirements. At the working group meeting held in November 2009, the issue of preventing further divergence of code requirements was discussed with the SDOs. The working group will pursue a more formal commitment to keep the future changes, during code updates, in the direction of global conversion.

Next Steps

The SDOs are continuing their Code-comparison effort for Class 1 piping, pumps and valves (Phase 2). This next phase is expected to be much simpler than Phase 1 because the general requirements and technical requirements for materials, fabrication, examination, testing, and over-pressure protection, which are being completed in Phase 1 for Class 1 Vessels are also applicable to Class 1 piping, pumps, and valves.

Once an understanding is gained of the differences between the codes, each MDEP participant could choose to initiate its national process to endorse, in whole or in part, the pressure boundary codes and standards of other countries. Also, the working group will continue discussions with the SDOs for finding potential paths for harmonisation of the differences in the Class 1 vessel codes.

Plans to further expand the scope of work to include Class 2 and 3 vessels, piping, pumps and valves will depend on the success of Phases 1 and 2. Ultimately, MDEP will expand the codes and standards harmonisation effort to areas beyond pressure boundary components.

5.5 Digital Instrumentation & Controls Working Group

Highlights

Based on the results of the comparison exercise, the working group issued letters to IEC and IEEE recommending that the standards organisations consider the MDEP common positions when revising their standards and increase their co-operation to achieve enhanced harmonisation of relevant standards.

The DICWG developed common positions on specific issues among the member countries. Two common positions on software common cause failure and software tools are complete.

The working group developed a formal "Quick Inquiry" process to generate and process inquiries from member countries to promote an efficient and structured information exchange and provide for storing this information in a retrievable database.

Background

The objective of the digital instrument and controls working group (DICWG) is to identify opportunities for convergence of applicable standards. The working group's activities include: identifying and prioritising the member countries' challenges, practices, and needs regarding standards and regulatory guidance regarding digital instrumentation and controls; identifying areas of importance and needs for convergence of existing standards and guidance or development of new standards; sharing of information; and identifying common positions among the member countries for areas of particular importance and need.

To enhance co-operation with the standards organisations, a member of the working group participated in IEEE and International Electrotechnical Commission (IEC) general meetings, and presented an overview and status of the working group. Both organisations expressed a significant interest in DICWG and expressed their commitment to co-operate with the working group. Representatives from IEEE, IEC, and IAEA participated in most of the working group meetings, and both IEC and IEEE allowed a number of their standards relevant to digital I&C to be made available in the MDEP library for use by the working group members. The IEC formalised an agreement with the OECD/NEA to facilitate co-operation between the two organisations.

The working group also interfaces with equipment designers and manufacturers to share their experience in, and challenges with, the differences in standards and regulatory requirements. For example, representatives of AREVA, Invensys, and Lockheed Martin met with the working group and made presentations. The working group also visited the Rolls-Royce digital manufacturing facility in France, the APR1400 simulator, and the construction of Shin-Kori nuclear power plants in Korea, and discussed issues relevant to the working group. The working group plans to engage additional vendors and utilities for information exchange in the future meetings and opportunities.

Accomplishments

The working group identified the member countries' most significant technical issues regarding standards and regulatory guidance related to digital instrumentation and controls. This list was used to better understand the main issues and determine priorities for the working group and is reviewed on a periodic basis. The working group performed a comparison exercise to identify the similarities and differences in regulatory requirements applicable to these areas, and prioritised the differences that should be addressed for increased convergence work. In particular, the working group evaluated the key differences between the regulatory framework established in accordance with the IAEA guidance and IEC standards, and with the NRC requirements and IEEE standards. In all of the priority areas, the working group identified that there were significant similarities and overlaps in the regulatory approaches.

The working group compared the list of IEC standards and IEEE standards relevant to digital instrumentation and controls. A detailed comparison table has been developed and reviewed by the working group. This comparison resulted in significant findings regarding the standards in terms of the development status,

scope and details as well as the differences and similarities at a high level. The working group engaged IEC and IEEE, as well as IAEA, regarding their participation in a comparison exercise of the standards and increased co-ordination related to digital instrumentation and controls. Based on the results of the comparison exercise, the working group issued letters to IEC and IEEE recommending that the standards organisations consider the MDEP common positions when revising their standards and increase their co-operation to achieve enhanced harmonisation of relevant standards.

The DICWG drafted common positions on specific issues which are based on the existing standards, national regulatory guidance, best practices, and group inputs using an agreed upon process and framework. Two common positions on software common cause failure and software tools are drafted, and additional ones are under discussion. The common positions under discussion include: independent verification and validation, data communication, simplicity in design, and complex electronics. Additional topics will be identified as the working group completes these common positions.

The working group continued to achieve the objective of sharing of valuable information. The working group developed a formal “Quick Inquiry” process to generate and process inquiries from member countries to promote an efficient and structured information exchange and provide for storing this information in a retrievable database. The working group also continued to exchange information regarding the status of and issues associated with licensing of new reactor digital instrumentation and control. The DICWG communicates frequently with the design-specific working groups, mainly with the EPR digital instrumentation and controls subgroup.

Next steps

The working group will continue to draft additional Generic Common Positions as technical issues are identified.

The working group will communicate specific suggestions to the standards organisations and IAEA for consideration of harmonisation in a timely manner when they are identified during its activities.

The working group will continue to exchange

DICWG visiting the APR1400 Simulator in Korea

information among members to contribute to efficiency and effectiveness of the licensing of new reactor digital instrumentation and controls.

The working group will continue to engage digital instrumentation and controls vendors and utilities to share experience and insights on a broad spectrum of inputs.

5.6 Safety Goals

Highlights

The subcommittee is developing a framework paper, based on the Defence-in-Depth concept and probabilistic considerations. This framework can be useful for development of safety goals and support of safety decisions by safety authorities and the designers.

Background:

One of the original ten recommendations of the MDEP Pilot Project was to compare how top level safety goals are derived, expressed, and achievement is judged among the participating countries, and to determine the extent to which they can be considered equivalent. MDEP has recognised that the route to harmonisation of safety goals must start with high level, mainly qualitative goals, which will be not dependent on the reactor technology considered. This understanding is expected to enhance co-operation in using other regulators' assessments and the understanding of how decisions have been reached.

This issue is being addressed through a small subcommittee consisting of STC members or their representatives with technical expertise in the safety goals arena. The objective of the subcommittee is to determine: 1) how various countries describe the desired level of safety to protect public health and safety and the environment, 2) the role of deterministic and probabilistic considerations, and 3) other groups and organisations that are involved in similar or related work. The subcommittee has held discussions with other groups including CSNI/WGRisk, WENRA RHWG, and Gen IV Risk and Safety Working Group. Significant input was received from relevant developments in the IAEA's International Safety Group (INSAG).

Accomplishments

One of the major outcomes of the subcommittee's work is increased understanding of the origin of the safety goals in several countries. The subcommittee is developing a framework paper, based on the Defence-in-Depth concept and probabilistic considerations. This framework can be useful for development of safety goals and support of safety decisions by safety authorities and the designers. The following have been identified as key issues in the evaluation of safety goals:

- Optimisation as well as balancing of requirements;
- Traceability from the low level goals to the top level goals;
- Top level goals can be probabilistic, deterministic, or qualitative;
- Goals should cover the entire set from normal operation, abnormal operation and accidents;
- Derivation of the safety goals and how they are used to determine lower level goals.

The subcommittee has identified work that is already on-going in the safety goal and severe accident areas by other groups such as WENRA, NEA/CSNI/WGRisk and IAEA. The subcommittee noted that WENRA appears to be working on a similar task and the MDEP subgroup will interact with WENRA and other selected organisations involved in probabilistic safety goals and applications. This approach offers the potential to achieve harmonisation beyond the WENRA countries with minimal potential for duplication of effort.

Next Steps

After the framework paper is finalised, MDEP plans to meet with other organisations and finalise its recommendations for high level safety goals in a position paper. The subcommittee's work with be complete upon issuance of the position paper (scheduled for fall 2010). MDEP's recommendations related to high level safety goals will form the basis for MDEP contributions to the work being performed in this area by WENRA, NEA/CNRA, and IAEA.

6. INTERIM RESULTS

In March 2009, the MDEP Policy Group agreed that the programme must continue beyond the original two-year mandate to fully achieve the established goals. Therefore, MDEP is considered a long term programme with interim results. Interim results are those products that document agreement by the MDEP member countries and are necessary steps in working towards increased co-operation and convergence. The interim results for 2009 include:

- Developing technical expert subgroup technical reports that identify and document similarities and differences among designs, regulatory safety review approaches and resulting evaluations;
- Maintaining a listing of EPR Technical Issues that are currently being evaluated by each of the participating regulators, including a synopsis of the issues, the status within each technical body, and links to relevant documents;
- Establishing a preliminary set of technical considerations to be used for novel civil engineering construction (such as modular steel composite structures) and technical guidelines for the design, qualification, and in-service inspection/ testing of explosive-actuated valves;
- Maintaining a Vendor Inspection Planning Table with a list of scheduled vendor inspections to assist the member regulators in identifying opportunities to observe an inspection, or obtain the results of an inspection carried out by another member;
- Publishing an MDEP Vendor Inspection Protocol document with guidelines for witnessed and joint inspections to facilitate inspections that are observed and attended by multiple regulators;
- Completing 13 witnessed inspections, in which one regulator performs an inspection to its criteria, observed by representatives of other MDEP countries;
- Completing an evaluation of the quality assurance requirements used in the oversight of vendors including those areas where the various regulators have common regulatory frameworks;
- Completing a comparison table of the ASME Boiler and Pressure Vessel Code, AFCEN's RCCM Code, JSME S NC1, and KEPIC code for Class 1 pressure vessels;
- Reaching an agreement whereby the SDOs work together to reduce additional divergence of the codes;
- Drafting six common positions in the area of digital instrumentation and controls: software common cause failure, software tools, independent verification and validation, data communication, simplicity in design, and complex electronics;
- Establishing a formal process to generate and process inquiries from member countries to promote an efficient and structured information exchange;
- Issuing a paper on the "Structure and Application of High Level Safety Goals".

7. NEXT STEPS – FUTURE OF THE PROGRAMME

MDEP has begun to consider the addition of new topics and how they could be addressed by the program. The criteria that will be used in evaluating whether an activity should be undertaken as part of MDEP include:

- Determining whether the activity is of generic interest and of safety significance to the licensing of new reactors in MDEP member countries;
- Determining whether the approach followed by the MDEP regulators is not completely similar;
- Determining whether the successful completion of the activity is likely to result in increased harmonisation/convergence in regulatory practices or increased co-operation within a reasonable timeframe and resource expenditures;
- Ensuring that any new MDEP activity does not duplicate similar efforts that are already ongoing or are planned to be undertaken by other more appropriate organisations such as the CNRA/WGRNR (or other NEA Working Groups), IAEA, GIF, WENRA, etc. except where MDEP

could contribute to the ongoing work of these groups;

- Each new activity should have a lead country willing to take an active leadership role, and a defined product.

In addition, a number of topics have been identified in which MDEP can play a significant, positive role by co-operating with current efforts in other organisations. This includes the topics of severe accidents and safety goals as discussed earlier. Therefore, the MDEP STC will search out areas where it can act as a catalyst for enhanced regulatory co-operation and convergence in other forums. MDEP is in a unique position to effect positive change because it includes the regulatory authorities of over three quarters of the reactors world-wide and represents those agencies at the highest levels. MDEP is using its influence to initiate change and will contribute to the success of other initiatives including those of IAEA, NEA, and WENRA.

Advanced Reactor Activities

At its meeting in March 2009, the MDEP Policy Group discussed a potential new issue-specific working group on high temperature gas-cooled reactors. The STC developed a discussion paper on this subject that provided the technical and regulatory issues to be addressed as well as a proposed plan of work. The proposed justification for MDEP taking on this issue is that (1) there are currently limited multinational programs or forums for regulatory bodies to share information on HTGR designs, and (2) this effort would support MDEP's goal of harmonisation on approaches to design reviews for Generation IV reactors.

Through MDEP, the member regulators would share information on policies and positions on the licensing issues and establish areas of co-operation in terms of regulatory research and development. Regulators would co-operate on evaluations of specific technical issues related to HTGR and other advanced reactor technologies with a goal of maximising interactions and co-operation on various reactor design reviews among experts to make technical analysis more robust, and to optimise the resources needed to perform national assessments. MDEP would provide regulatory authorities with a common regulatory point-of-contact for non-regulatory groups working on HTGR and on other advanced reactor technologies, such as GIF (through the GIF Risk and Safety Working Group) and IAEA/INPRO.

In the absence of broader interest, the representatives from the United States and South Africa are developing a program plan to continue to co-operate on technical and regulatory issues in anticipation of reviewing applications to license HTGRs and other advanced reactors. The United Kingdom has offered to share their experience with gas-cooled reactor technologies with this group. This co-operation may eventually be formalised in an MDEP working group if a broader level of interest develops. This would support the MDEP goal to co-operate on licensing issues for Generation IV reactors, and provide a formal mechanism for interfacing with the Generation IV International Forum.

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The OECD is a unique forum where the governments of 31 democracies work together to address the economic, social and environmental challenges of globalisation. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

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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 friendly and economical use of nuclear energy for peaceful purposes, as well as
- 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 policy analyses in areas such as energy and sustainable development.

Specific areas of competence of the NEA include safety and regulation of nuclear activities, radioactive waste management, 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. In these and related tasks, the NEA works in close collaboration with the International Atomic Energy Agency in Vienna, with which it has a Co-operation Agreement, as well as with other international organisations in the nuclear field.

Corrigenda to OECD publications may be found on line at: *www.oecd.org/publishing/corrigenda*.

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