

**WNA Report**

**Cooperation in Reactor  
Design Evaluation and  
Licensing (CORDEL)  
Working Group**

Annual Report  
2011-2012



World  
Nuclear  
Association

# Contents

I. Introduction	3
A. Background	3
B. On the road towards international standardization	4
C. Organisation of CORDEL activities	5
2. Key Activities in the past year (April 2011 - April 2012)	6
3. CORDEL plans for the upcoming year (April 2012 - April 2013)	8
4. Summary	10
Appendix 1: CORDEL Task Force Details	11
A. Codes & Standards Task Force (CSTF)	11
B. Design Change Management Task Force (DCM TF)	13
C. Licensing and Permitting Task Force	15
D. IAEA Safety Standards Task Force	17
E. Probabilistic Safety Goals Task Force (PSG TF)	19
Appendix 2: CORDEL Terms of Reference	20
Appendix 3: CORDEL Leadership	23

# 1

## Introduction

### A. BACKGROUND

Created in 2007, WNA's Working Group on Cooperation in Reactor Design Evaluation and Licensing (CORDEL) is an industry sponsored Group that promotes the achievement of a worldwide regulatory and industry environment where internationally accepted standardized reactor designs can be widely deployed without major design changes except those dictated by site specific and minor local necessities. CORDEL believes that increased harmonization leading to standard designs operating in many countries will enhance nuclear safety worldwide.

CORDEL facilitates dialogue among industry, regulators and governments on the benefits of international standardization of nuclear reactor designs, and means of achieving a worldwide convergence of reactor design requirements, rules, codes and safety standards.

To support this dialogue, CORDEL has analysed the benefits of internationally accepted standards for Generation III and III+ reactors. This could lay the foundations for developing standards for future Generation IV reactors. The CORDEL group's first product is a paper entitled "*Benefits Gained through International Harmonization of Nuclear Safety Standards for Reactor Designs*".

In 2010, CORDEL published a Roadmap Report "*International Standardization of Nuclear Reactor Designs*", which outlined a three-phase approach to achieving international standardization in parallel with efficient, transparent regulatory procedures and harmonized worldwide standards of nuclear safety.

Through the CORDEL group, the nuclear industry seeks to contribute to all relevant forums, including the Multinational Design Evaluation Programme (MDEP), various industry Standards Development Organizations, the OECD's Nuclear Energy Agency, and the International Atomic Energy Agency. CORDEL shares its collective industry experience and expertise with regulators in order to facilitate progress in the harmonization of regulatory reactor design requirements and in greater cooperation of regulators in licensing of reactor designs.

The Group brings together experts in reactor design, licensing, nuclear law, safety and engineering from a wide range of WNA member companies and observers from international organizations. Appendix 2 presents CORDEL's Terms of Reference and Appendix 3 lists CORDEL's membership and leadership.

Published CORDEL Papers:

- 1) International Standardization of Nuclear Reactor Designs. January 2010 (PDF)
- 2) Benefits Gained through International Harmonization of Nuclear Safety Standards for Reactor Designs Safety Standards for Reactor Designs. 2008 (PDF)

## B. ON THE ROAD TOWARDS INTERNATIONAL STANDARDIZATION

In its Roadmap Report, CORDEL outlined a set of actions to be taken by industry, governments and regulators that build on current activities to move towards the goal of standardization. The three phases defined in the report are:

- 1) **Share design assessment.** Once a design is licensed in one country, the approving regulator should share information with other national regulators, conveying its full experience in the safety assessment of the design, and receiving regulators should draw upon this experience. This activity has occurred in the past.

If several regulators are concurrently reviewing the same design, they should form a collaborative network and discuss their assessment methodology (including criteria) and share their assessment results as the work proceeds. This sharing process, which can be undertaken without any change in existing regulatory frameworks, should itself foster tendencies toward harmonization of licensing standards and procedures. MDEP is doing this now to a degree.

- 2) **Validate and accept design approval.** Once a design is licensed in certain countries, the design approval could be taken by other countries' authorities, after validation, as sufficient for licensing there. Although using this simplified validation procedure would heighten efficiency for industry and regulators, it may require some adjustments in existing national regulatory and legislative frameworks.
- 3) **Issue international design certification.** By international agreement between selected national regulators, a process could be created whereby a design could be certified by a team of national regulators (from countries with a direct interest in the design). Under the agreement, participating countries would accept this certification. The aircraft industry has a similar process in place now. Alternatively, such international certification could be facilitated by a designated international organization. Of course, national regulators would remain responsible for assessing the adaptation of the internationally certified design to local circumstances and for the supervision of construction, commissioning and operation.

These three phases, representing a steadily increasing level of international cooperation among national regulators and governments, would serve the combined goals of increased safety and regulatory and industrial efficiency.

Expanding regulatory harmonization has to be simultaneously facilitated by **alignment of licensing processes** and by **harmonization of national safety requirements**, which currently vary significantly from country to country.

## C. ORGANISATION OF CORDEL ACTIVITIES

In the Roadmap report, CORDEL identified several actions that the nuclear industry itself should undertake to make standardization possible. In response to these actions and in pursuit of the goals and objectives delineated in the Roadmap Report, CORDEL reorganized itself in September 2010 into a Steering Committee, supported by five task forces, shown in Figure 1.

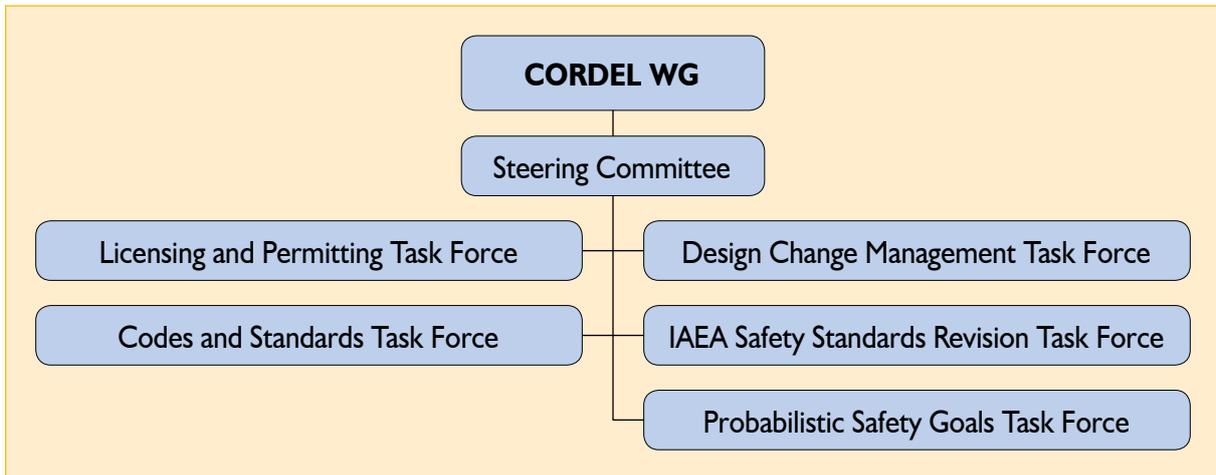


Figure 1: Structure of the WNA Working Group on Cooperation in Reactor Design Evaluation and Licensing (CORDEL WG)

CORDEL's main activities are currently:

1. Actively support the activities of the Regulator's Multinational Design Evaluation Programme (MDEP) and act as industry's voice vis-à-vis MDEP and other regulatory initiatives.
2. Maintain active participation in the IAEA's Nuclear Safety Standards Committee (NUSSC). CORDEL provides industry comments on the ongoing IAEA Safety Standards revision process and on specific draft standards.
3. Analyse and develop mechanisms which would enable standardization to be maintained throughout a standard fleet's lifetime through the Design Change Management Task Force.
4. Promote harmonization of probabilistic values and methodologies in the industry through the Probabilistic Safety Goals Task Force.
5. Develop guidance and best practices on licensing and permitting, notably in support of emerging markets, through the Licensing and Permitting Task Force (set up jointly with the WNA's Nuclear Law & Contracting WG).
6. Investigate divergences in the areas of Qualifications of Personnel in Non-Destructive Examination (NDE) and Design Methodologies for pressure vessels using two expert groups within the Codes and Standards Task Force.
7. Monitor developments in the field of nuclear regulation and standards at the IAEA, the European Union, at the national level and at various code and standard development organizations, and pay close attention to nuclear new-build policies at the national level.
8. Encourage international cooperation in design reviews, mutual acceptance of design approvals, and (in the longer term) international certification of designs. Continue to promote the "harmonization" concept at international and national conferences and forums.

# 2 Key Activities in the past year (April 2011 - April 2012)

The main activities of the Task Forces are summarized below and detailed in Appendix I. In general, during the past year, CORDEL and its Task Forces met in conjunction with the WNA general Working Group meetings:

18-19 April 2011 in Chicago, the USA.

12-14 September 2011 in London, the UK.

9-10 January 2012 in London, the UK.

16-17 April 2012 in Helsinki, Finland.

Ad-hoc meetings of various drafting groups and specific meetings with relevant stakeholders are also conducted when necessary.

During the past year, CORDEL has achieved tangible progress in the following areas:

- ▶ The Codes and Standards Task Force has identified two areas of convergence in the qualification process for NDT practitioners: 1) mutual acceptance of the major third party NDE/T (non-destructive examination/testing) personnel certification standard (ASME ANDE and ISO EN 9712) leading to a possible recognition of equivalence by a number of nuclear design codes and regulators, and 2) an industry best practice proposal that could be issued as a WNA CORDEL CSTF document or as a non-mandatory appendix to a range of codes.
- ▶ The Codes and Standards Task Force is working on several areas of convergence in mechanical design: 1) harmonizing the finite element techniques employed to assess strength, shakedown and fatigue; 2) standardizing definitions and terms used in stress classifications; 3) harmonizing the definition of events and load combinations; 4) Stress and strain limits; and 5) Analysis and assessment of extreme dynamic events.
- ▶ The Design Change Management Task Force has finalized a report to be published mid 2012 which provides recommendations to the nuclear community on the establishment of institutional mechanisms for effective design change management across a fleet of similar plants in many countries. The aim is to maintain the original standardized design throughout the fleet's lifetime. The recommendations envisage enhanced international cooperation within industry and between regulators. The full report is available on CORDEL's website.
- ▶ The Licensing and Permitting Task Force has issued a members' survey, which focuses on the interaction between regulatory processes and industry's commercial activities, such as scheduling, procurement, contracting, and finance. The intent is to identify best practices that deal with the interface between licensing regimes and new build project activities. The results have been collected and analysed, and a report of the survey's findings is in preparation.
- ▶ The main focus of the Task Force on the IAEA Safety Standards has been to comment on and amend draft safety guide DS367 on the safety classification of systems, structures and components important to safety. A core group of CORDEL, European Nuclear Industry Safety Standards initiative of Foratom (ENISS) and European Utility Requirements (EUR) members prepared an industry proposal for the new safety classification methodology in August 2011. This industry proposal was submitted to the IAEA

and the essentials were also presented at the MDEP Conference, 15-16 September 2011. CORDEL continues to support the IAEA to finalise this safety guide. Several reactor vendor companies from CORDEL's membership have been testing the applicability of the proposed methodology to their reactor designs.

- ▶ CORDEL gave four presentations on its work to the Second Multinational Design Evaluation Programme (MDEP) Conference in Paris in September 2011. The four presentations to the MDEP regulators were on Codes and Standards (N.Prinja); Licensing and Permitting (C.Raetzke); Industry response to the draft IAEA Safety Classification guide (T.Froehmel); and an overall review of CORDEL's vision and actions (R.Zemdegs). CORDEL's chair, Michael Micklinghoff chaired a session on MDEP's interactions with the industry. In December 2011, CORDEL provided feedback to MDEP on the Conference at MDEP's request. MDEP plans to enhance stakeholder engagement, and CORDEL's feedback provided a good opportunity to develop a constructive commentary on MDEP's work and suggestions for improvement.
- ▶ As part of CORDEL's communication plan, members of the group have presented the "roadmap" and disseminated CORDEL's messages at a number of other events and meetings. The following deserve to be mentioned:
  - a number of Standards Development Organisation meetings, including meetings of the MDEP Codes and Standards Working Group;
  - the WNA's India International Symposium on 21 February 2012 in New Delhi;
  - a number of IAEA meetings and seminars organized by both the Department of Safety and Security and the Department of Nuclear Energy;
  - a large number of stakeholder meetings with individual representatives of regulatory bodies;
  - the ENSREG Conference in Brussels in June 2011, and in May 2011, at the ICAPP Conference in Nice;
- ▶ In September 2011, CORDEL Group organized a Small and Modular Reactor forum, which attracted a large group of interested participants. It was further decided that SMR deployment should be dealt by a stand-alone group within the WNA (not under the auspices of CORDEL Group), due to the larger scope of SMR issues which have to be covered. Another SMR forum might be conducted during the WNA September 2012 meetings, subject to members' interest.
- ▶ 2011 also saw several changes in terms of CORDEL organizational structure as several full- and part-time members of staff joined the secretariat (see Appendix 3).

# 3

## CORDEL plans for the upcoming year (April 2012 - April 2013)

- ▶ The Codes and Standards Task Force will continue to work to promote international convergence in two technical areas: 1) Qualification of Personnel in Non-Destructive Examination and 2) Analysis Methodologies and Limits. The areas were chosen from informal discussions and meetings with WNA members, Standards Developing Organizations (SDOs) and MDEP's Codes and Standards Working Group (MDEP-CSWG). Further areas for harmonization will be identified by a Prioritization Survey, which is being conducted among CORDEL members and other stakeholders.
- ▶ The Design Change Management Task Force will be promoting recommendations of its report (available from the CORDEL website) and will continue discussions with Owners' Groups and the utilities, designers and regulators to develop recommendations on the implementation of the Design Authority concept.
- ▶ The Licensing and Permitting Task Force will publish a Report with findings from its Survey conducted in autumn 2011. The findings will then be discussed with stakeholders at various seminars and meetings.
- ▶ The Task Force on Safety Standards will continue to assist the IAEA to develop a pragmatic standard for the Safety Classification for Systems, Structures and Components (DS 367).
- ▶ IAEA is currently identifying those of its standards that should be revised in the light of Fukushima. CORDEL will use the result of this activity to identify other standards which would benefit from industry input. Other draft IAEA standards of relevance to CORDEL will be also considered for revision by industry through CORDEL.
- ▶ The Safety Goals Task Force will continue to provide input to IAEA activities in production of a new TECDOC on Safety Goals, (following INSAG 12 revision) and a new TECDOC on Integrated Risk Informed Decision Making (following publication of INSAG 25).
- ▶ CORDEL plans to continue to work closely with MDEP and its Codes and Standards Working Group (CSWG), where convergence of international standards will assist regulators to come to common decisions.
- ▶ CORDEL plans to provide industry input to the OECD-NEA's Committee on Nuclear Regulatory Activities (CNRA) Working Group on the Regulation of New Reactors (WGRNR). A workshop is to be held in October 2012. The intent is to assist the Working Group to find common licensing ground between countries.
- ▶ CORDEL is examining how best to work with existing standards developing organizations (SDOs) to increase the degree of convergence between standards published by different SDO's, or increase the degree of equivalency between standards in the same field. MDEP has recently published a code comparison report on pressure vessel codes which is expected to assist this activity.
- ▶ A meeting of chairmen of ENISS, EUR and CORDEL will take place in September in London during the WNA Working Group meetings in order to enhance cooperation among these organizations.
- ▶ Communications with regulators from emerging nuclear countries will be sought.
- ▶ Parallels between the regulation of the aircraft industry, and how they achieve high reliability in an international business, and the regulation of the nuclear industry are being investigated in order to learn from those aircraft practices which would be of value in the nuclear business. A report with recommendations will be published by the end of 2012 or early 2013.

- ▶ There are likely to be new activities emerging as a response to suggestions from MDEP and from post-Fukushima regulatory reviews. For example, the methodologies for calculating the effects of external hazards such as earthquakes on new reactor designs may have to be revisited with international harmonization in mind. MDEP has recently made a number of suggestions for new CORDEL activities in the areas of seismic analysis and software reliability which are being considered very carefully.
- ▶ CORDEL will continue to monitor developments of emerging regulatory requirements and industry best practices. Where necessary, CORDEL will produce industry position statements on the need to harmonize existing or create new standards.
- ▶ CORDEL will continue to disseminate its Roadmap and to promote international standardization on all aspects covered by the Group. A number of abstracts have been submitted to conferences such as ICAPP2012, ENC2012, and various codes conferences and events.
- ▶ The Roadmap report will be revised to further develop the three Phases, and in particular, to add more substance to the concept of Validation (Phase 2).
- ▶ CORDEL plans to organize an International Standardization Seminar/Workshop/Conference for the next 12 months to be held in one of the countries where new nuclear build is underway.

More detailed description of future plans can be found in Appendix I.



# 4 Summary

CORDEL will continue to press for increased cooperation in the licensing evaluation of reactor designs across the world. The ability to offer and purchase a reactor design that is essentially the same in every country, with only site characteristics producing significant differences, results in significantly lower costs to build and reduced financial risks everywhere. CORDEL firmly believes that these gains are of benefit to society at large.

Standardised designs also lead to improved safety, as sharing of operating experience across a fleet is rendered simpler, and is able to be done at a far more detailed level than is feasible today. The major contribution to accidents in all high reliability industries arise from failures in the organisation of institutions to learn from experience - and those institutions can be operators, designers and regulators. Standardised design provides an opportunity to reduce that contribution. In CORDEL's view, it is therefore in the interests of national regulators worldwide to seek common positions on design features through increased international cooperation.

CORDEL's activities are split between the activities of its Task Forces which are developing proposals for change over the longer term, and seeking opportunities in the shorter term to assist other agencies to reduce divergence in their activities. A number of these opportunities have arisen and are being planned for this year. Others will arise, and are actively being sought. The rationale for this is that early successes, though small, encourage tackling the larger, longer term ones recommended in the road map that have to be addressed if harmonisation is to be achieved.

CORDEL activities are supported by the very active engagement of many representatives from the nuclear industry.

# Appendix I

## CORDEL Task Force Details

### A. CODES & STANDARDS TASK FORCE (CSTF)

**Chairman:** Nawal Prinja, AMEC /HCC

**WNA Secretariat:** Andrew Wasylyk

**Key Stakeholders:** member companies of the WNA, MDEP-CSWG, Convergence Board of SDOs.

#### Background

The Codes and Standards Task Force of the CORDEL Working Group (WNA CORDEL CSTF) was set up in 2010 to collaborate with the Standards Developing Organizations (SDOs) and the MDEP's Codes and Standards Working Group (CSWG) on the international harmonization of national mechanical codes and standards, related to the design and quality of nuclear power plant's components important to safety. In September 2011, the CORDEL CSTF Pilot Project was launched to investigate divergences and to promote international convergence in two technical areas: 1) Qualifications of Non-destructive Examination (NDE) Personnel and 2) Analysis Methodologies and Limits. The areas were chosen from informal discussions and meetings with WNA members, SDOs and MDEP-CSWG.

Communication with the Regulators and the Standard Development Organizations was identified as a priority. CORDEL CSTF regularly meets with SDO Convergence Board and MDEP-CSWG. Furthermore, the MDEP-CSWG and the SDO Convergence Board have provided direct points of contact with CORDEL CSTF.

#### Supporting documents produced in 2011-2012

In order to support the convergence of mechanical codes within the scope of the Pilot Project, the CSTF has prepared a series of documents:

- ▶ A Harmonization Prioritization Survey was initiated at a request of the group of SDOs (the SDO Convergence Board) and MDEP-CSWG to investigate which areas should be considered as a priority for future harmonization work beyond the two chosen topics in the CORDEL CSTF Pilot Project. The identified priority topics will create a basis for future harmonization projects to be undertaken by members of the WNA CORDEL CSTF and other stakeholders.
- ▶ In conjunction with the Prioritization Survey, a support document synthesizing conclusions from the MDEP-CSWG Code comparison document was drafted. This document includes highlights from the MDEP report and an analysis of the areas of differences in a tabulated format.

#### NDE Qualification Expert Group

The NDE Qualification Expert Group was set up in January 2012. It is concentrating on the convergence of certification requirements of NDE personnel for manufacturing of nuclear components. The work might be extended to include requirements for Pre-Service-Inspection (PSI) and In-Service-Inspection (ISI) at a later stage of the project.

Two avenues of convergence have been identified: 1) mutual acceptance of the major third party NDE/T (non-destructive examination/testing) personnel certification standard (ASME ANDE and ISO EN 9712) leading to a possible recognition of equivalence by a number of nuclear design codes and regulators, and 2) an industry best practice proposal that could be issued as a WNA CORDEL CSTF document or as a non-mandatory appendix to a range of codes.

To date, the CSTF NDE Qualification Expert Group has published a NDE/T Qualification Problem Statement. A Questionnaire was also sent out to collect information on NDE certification processes used by the nuclear industry throughout the world and the additional training required for personnel to conduct NDE procedures on components. The data collected will be used as a basis for discussions with SDOs on the convergence of the NDE certification standards and a best practice paper that will be drafted by WNA CORDEL CSTF.

The CORDEL CSTF will work in collaboration with SDOs to promote the ANDE compatibility with ISO EN 9712 through active discussion with all SDOs and participation to the code development meetings. The discussions will be supported by the development of a draft code section, which will propose to include the third party certification into ASME Section V. A comparison document between ISO EN 9712 and ANDE is also planned.

## Design Methodology and Limits Expert Group

The Design Methodology and Limits Expert Group is concentrating on the convergence of five issues related to the mechanical design of power plants: 1) *Plastic analysis*, harmonizing the finite element techniques employed to assess strength (*limit load analysis*), shakedown (*direct shakedown prediction*) and fatigue (*ratcheting and strain-based fatigue analysis*) methodologies used internationally; 2) *Stress Classification*, concentrating on the standardization of definitions and terms used in stress classifications; 3) *Definition of events, loads and load combinations*, concentrating on harmonization of definition of events and methodologies of load combinations; 4) *Stress and strain limits*; and 5) *Analysis and assessment of extreme dynamic events*.

The first stage of the convergence effort will be the drafting of tabulated comparisons of ASME, JSME, RCC-M, RCC-MRx, KEPIC and NIKIET on the subjects of *Plastic Analysis*, *Stress Classification* and *Definition of events, loads and load combinations*. These documents will be drafted by September 2012 and will form the basis for best practice recommendations and discussions with MDEP-CSWG and the SDO Convergence Board.

## Communication plan

Five avenues of communication have been identified: the MDEP/SDO meetings, the WNA CORDEL meetings, information on the WNA CORDEL member webpage, through a wiki webpage that project members can contribute to and, finally, through published reports. The aim of the communication plan is 1) to promote transparency for the reasons for code divergence, and 2) to promote industrial support for code harmonization. Industrial support is particularly important, as our industrial partners can promote code harmonization at the SDO code development committees.



## B. DESIGN CHANGE MANAGEMENT TASK FORCE (DCM TF)

**Chairman:** Richard Swinburn, Rolls-Royce

**WNA Secretariat:** Irina Borysova

**Key Stakeholders:** CORDEL member companies, Owners Groups, MDEP regulators, INSAG, IAEA, WANO, Aerospace industry, other nuclear vendors and utilities outside CORDEL membership.

### Task Force mandate

The DCM TF mandate is to analyse and determine potential enhancements to international institutional mechanisms in the industry in order to maintain standardization throughout a standard fleet's lifetime. The enhancements should also reduce the potential for divergence in the design of the current fleets of reactors that were originally of common design.

### Background and work done to date

The first meeting of the Task Force took place in September 2010. Following the second meeting in January 2011, roles of designers, operators, regulators, TSOs and international organizations were analysed in a background paper ("DCM issues paper", February 2011).

The third meeting of the Task Force took place in September 2011. In the summer of 2011, the Task Force reviewed Design Change mechanisms to maintain a safe design and the benefits of standardization by surveying the practices of a sample of operators, vendors and Owners' Groups. A questionnaire was developed and sent to the following Owners' Groups:

- ▶ FROG (Framatome Owners Group)
- ▶ OKB Hidropress (Russian NSSS vendor)
- ▶ COG (Candu Owners Group)
- ▶ PWR Owners Group (USA and International)
- ▶ JPOG (Japan PWR Owners Group)
- ▶ BWROG (Boiling Water Reactors Owners Group)

Between September 2011 and the fourth DCM TF meeting in January 2012, the Task Force conducted a questionnaire on how the Design Authority (DA) role is discharged in different countries. Case studies of the DA practices from the UK, France (by EDF), South Korea, the USA and Canada were collected in response to a Design Authority Problem Statement written by Raidis Zemdegs which provided a starting basis for discussion. The task force members communicated via emails and a number of conference calls.

In December 2011, John Waddington prepared a paper about Design Change Management issues in the Fukushima accident, which he discussed in Vienna on 11 January 2012 with IAEA staff that support the NUSSC initiative on Lessons Learned from Fukushima.

Between the January and April meetings, the Task Force completed the analysis of the two questionnaires (Owners' Groups and Design Authority) and prepared a report outlining recommendations for the improvement of international institutional mechanism to enhance standardization during a fleet's lifetime.

On 9 January 2012, the Task Force met in London. The Task Force also met with aerospace industry representatives to learn what could be taken as best practice from the experiences of aerospace industry and its regulatory practices. A separate report will be written on the lessons that can be learned from the aerospace industry that are specifically relevant to the nuclear industry and its unique regulatory environment.

On 16 April the Task Force met in Helsinki, Finland to continue discussion on the final draft of the report and several suggestions for modifications were made.

## Objectives and Plan of Actions in the forthcoming months

- a. The DCM Report entitled 'Design Change Management in Regulation of Nuclear Fleets' is to be issued in the summer of 2012 following a round of consultations with stakeholders (available on the CORDEL website). An explanatory letter will be prepared to accompany the distribution of the Report.
- b. The next DCM TF meeting to be conducted on 10 or 11 September 2012 in London will explore the following areas:
  - In order to continue an investigation of the Design Authority concept, the task force will invite representatives of vendor companies to its September meeting to talk about their technology knowledge transfer to utilities during commissioning and handover of plants and the content of the design knowledge package. This is intended to establish the scope and extent of the design knowledge which would be considered sufficient for the operator to run a plant safely and efficiently. The subsequent level of involvement of vendors in design decision making post handover will also be discussed.
  - Representatives of Owners' Groups will also be invited. The aim is to discuss with OGs the practicalities of implementation of the DCM Report's recommendations directed at possibly enhancing the role of Owners' Groups in the control of design changes of standardized fleets.
- c. The Task Force will draft a report on lessons to be learned by the nuclear industry from the aerospace industry's model of standardization and maintenance of the design throughout an aircraft type's lifetime. A tentative timescale for the production of this report is the end of 2012 – early 2013.

## Communication plan

- a. ICAPP conference, 24-28 June 2012, Chicago.
- b. A round of consultations with stakeholders to be conducted in the period between April and September CORDEL meetings. The report to be sent to the WNA Board and to various stakeholders by email and by post, where necessary.
- c. A meeting with Owners Groups and a discussion on the Design Authority concept to take place in September 10-11 in London.
- d. The subsequent meetings of the Task Force are envisaged for 13-14 January 2013 in London and in April 2013 possibly in Singapore (to be confirmed).

## Active members and their roles

The DCM Task Force relies on the expertise of CORDEL members who are in a position to attract all necessary resources for relevant projects. The CORDEL Steering Committee members have been of greatest support, bringing their colleagues from either Owners Groups (Candu Energy, GE-Hitachi, MHI, AREVA, Westinghouse, etc.), Design Authority (GE-Hitachi, EDF, KEPCO E&C, AMEC/HCC) or to contribute with the knowledge on the aerospace industry lessons (Rolls-Royce, E.On, GE). Many other CORDEL members contributed to the drafting of the Design Change Management Report with Richard Swinburn, the DCM TF Chairman, Rolls-Royce, supported by the Group's Secretary, effectively managing and leading the production of the Report.

## C. LICENSING AND PERMITTING TASK FORCE

**Chairmen:** Paul Bowden, Freshfields Bruckhaus Deringer  
Christian Raetzke, WNA Director of Licensing

**WNA Secretariat:** Virginie Ryan-Taix

### Background

The Task Force was set up jointly by the Nuclear Law and Contracting Working Group (NLC WG) and CORDEL Working Group in 2011, with the initial objective to identify best practises in licensing and permitting for nuclear new build.

The Task Force has identified this issue as a potential area of interest for WNA members to look into, and has decided as a first task to collect the views of the nuclear industry on the relationship between the development of nuclear new build projects and nuclear licensing and permitting processes.

This has been done though a survey sent out in December 2011 to all WNA member companies.

### The Licensing Survey

#### *Introduction*

The survey focused on the interaction between regulatory processes and the industry's commercial activities, such as scheduling, procurement, contracting, and finance.

This special focus fills a gap in the existing set of documents produced by international bodies such as the IAEA and the OECD-NEA on the topic of nuclear new build programmes. These documents concentrate on the structure of the regulatory and licensing regime, and the Task Force believes it is important to supplement these with the experience of the nuclear industry on how to cope with the interfaces between new build project activities and regulatory milestones.

Taking proper care of these interfaces is essential for reducing the licensing risk, which may be one of the major obstacles to invest in new nuclear power.

It has been agreed that all answers to this survey would remain confidential, the WNA Secretariat acting as a single point for their collection, collation and review, and the final Report would not mention any individual respondent or specific answer.



## *Objective of the Survey*

The Survey had the following objectives:

1. Provide governments (particularly those who are developing or updating nuclear regulatory regimes) and regulators, with industry's views on how regulatory regimes can best facilitate investment decisions and reduce project risk.
2. Give support and guidance to the nuclear industry members involved in nuclear new build when they:
  - a. engage with government during the development and review of nuclear regulatory processes, or
  - b. manage the licensing/project development interface and strategies to mitigate risk in existing licensing and permitting regimes.
3. Demonstrate the importance of an international (multinational) approach to some aspects of the licensing procedure.

## *Areas of focus of the Survey*

The survey covered the following areas:

- ▶ Licensing and permitting
- ▶ Financing
- ▶ Contracting
- ▶ Vendor selection
- ▶ Design development
- ▶ Subcontractors, supply chain, manufacturing, documentation
- ▶ Involvement of stakeholders
- ▶ Support for international standardization

## **Objectives and Plan of Actions for 2012**

The objective for 2012 is to draft a report based on the findings of the survey identifying best practices, and outlining industry proposals for making current or future licensing regimes best interact with commercial activities. Depending on the Survey results, one objective this year is also to share the results with concerned stakeholders, essentially regulators.

### **2012 timeline**

**January 2012:** Deadline for receiving the responses to the survey was 31 January 2012. 15 surveys were received: 10 from utilities, 4 from vendors and one from an architect engineer. In terms of geography, 8 answers came from Europe, 4 from North America, 2 from Asia and one from Africa.

**April 2012:** First consolidated data of the responses is shared with survey respondents and Task Force participants. The summary is presented at the task Force meeting on 17 April and discussed amongst participants. A writing committee is set up.

**September 2012:** Final draft of the report is to be issued in advance of the September meeting for comments.

**October 2012:** A meeting with stakeholders to discuss the report's findings is to take place. Participation in the CNRA Working Group for the Regulation of New Reactor (WGRNR) workshop is envisaged in October.

## D. IAEA SAFETY STANDARDS TASK FORCE

**Chairman:** Thomas Froehmel, E.On

**WNA Secretariat:** François Perchet

**Key Stakeholders:** CORDEL member companies, IAEA, INSAG, MDEP, IEC, ISO.

### The case for CORDEL getting involved

IAEA is currently engaged in a large-scale revision of most of its safety related documentation. By nature IAEA documents cannot be fully prescriptive, as Member States remain sovereign. However, IAEA Safety Standards are widely considered by IAEA Member States as the reference upon which national regulations are drafted, and therefore, they constitute the basis for all emerging states. By capitalizing on the experience and best practices, these documents also act as a Knowledge Data Base to which every member of the nuclear industry and national organizations can refer to.

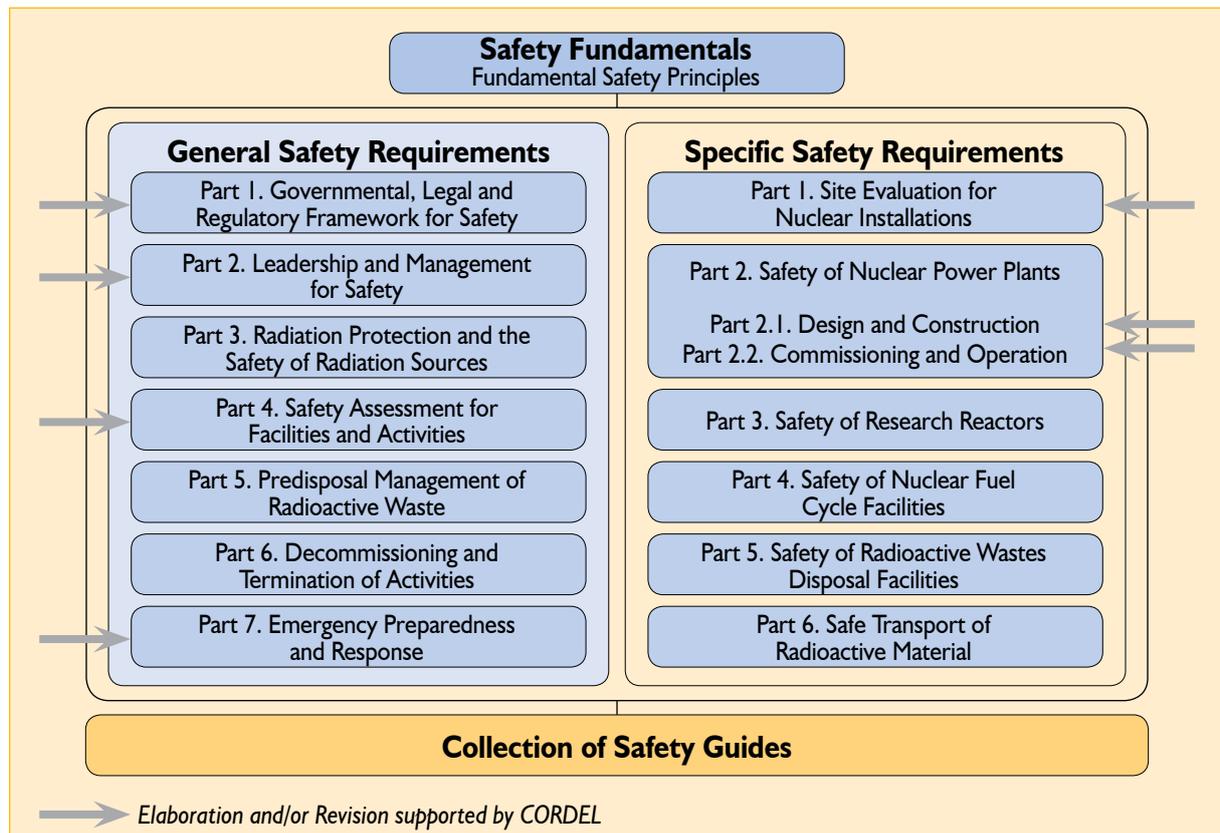
The new structure of Safety Standards retains the principles of the established hierarchy of standards, and now consists of one unified “Safety Fundamentals” (SF1), one “General Safety Requirements” (GSR) in seven parts applicable to all facilities and activities with a graded approach (Refer to the IAEA website for explicit details). The structure is illustrated in the figure below.

The roadmap for the long term restructuring of safety standards was approved by the Commission of Safety Standards in 2008. The whole transition process to complete the entire set of safety standards is expected to be finished by 2015.

Globalization and harmonization imply greater use of the IAEA Safety Standards and the development of more effective IAEA Safety Standards. For the standards to be successful, a much greater input from industry is needed than has occurred in the past. The standards that CORDEL believes should have significant industry input are marked with blue arrows.

CORDEL has sought to be the main recognized Industry stakeholder vis-à-vis the IAEA by providing a unique exchange and networking platform for the industry; vendors and utilities alike.

### Long-term set of IAEA Safety Standards



## Task Force's mandate and objectives

The aim of the Task Force during the drafting of the IAEA Safety Standards (TF IAEA-SS) is to support IAEA efforts to develop and establish an internationally well-accepted and widely-applied set of nuclear regulations and safety standards.

This support is mainly focused on new reactor designs and includes all safety-related requirements and recommendations on reactor design, manufacturing, construction, operation, site evaluation and safety management as well as licensing processes and regulatory infrastructure development.

The TF IAEA-SS has the mandate to represent WNA membership in the responsible Committee for Nuclear Safety Standards (NUSSC) and to actively contribute to the safety standard setting programme by providing worldwide nuclear industry expertise and best practices.

## Work achieved in 2008-2011 and ongoing for 2012

CORDEL has represented the WNA membership in the Committee for Nuclear Safety Standards (NUSSC) since early 2008. Representatives of CORDEL's TF IAEA-SS (usually the TF chairman with a member of WNA secretariat) have attended NUSSC meetings and elaborated industry proposals and comments into drafted documents through all the relevant drafting stages.

In some cases, CORDEL coordinates "applicability tests" of the draft standards to new reactor designs, which have been run by vendors and utilities of CORDEL membership in order to identify potential difficulties and functional applicability of the standards at the drafting process.

The following drafts of documents were discussed and comprehensively commented by the TF IAEA-SS during the year 2011:

- ▶ DS 367 – Classification of Systems, Structures and Components in Nuclear Power Plants,
- ▶ DS 441 – Construction of Nuclear Installations,
- ▶ DS 433 – Safety Aspects in Siting for Nuclear Installations,
- ▶ DS 446 – Commissioning for NPP.

This will continue in 2012 until the end of the review process in 2013.

Interactions with other industry or governmental organizations are also part of the whole process. The Task Force has conducted consultations with the IEC (International Electrotechnical Commission) and ISO, and has exchanged views with MDEP and WENRA to try and alleviate problems during the drafting process in a timely manner.

## E. PROBABILISTIC SAFETY GOALS TASK FORCE (PSG TF)

**Task force coordinator:** Nigel Buttery, EDF Energy (UK)

**WNA Secretariat:** François Perchet

**Key Stakeholders:** CORDEL member companies, MDEP regulators, IAEA, INSAG, WANO, other nuclear vendors and utilities outside CORDEL membership.

### Background

In October 2010, CORDEL decided to become involved in the work of IAEA and other organizations like OECD/NEA-CNRA, MDEP and WENRA to identify and establish an internationally agreed basis for the use of quantitative objectives in the delivery of nuclear safety.

Harmonization of quantitative probabilistic safety goals, or risk criteria, provides for an essential review scale for design standardization and safety demonstrations. A number of countries emphasize the need for the establishment of internationally harmonized quantitative criteria in international documents such as the IAEA safety standards to help develop their own national safety regulations.

Therefore, CORDEL established the Probabilistic Safety Goals Task Force (PSG TF) to monitor the developments in the area of probabilistic safety assessments internationally, with an objective to collect information as the first stage and to promote the establishment of international industry practices in the future.

### 2010-2011 main areas of work

The Task Force met several times and the background and the position on the use of numerical Safety Goals were established.

Nigel Buttery, the TF Coordinator, attended the IAEA Technical Meetings on “Safety Goals” and updated the TF members and the Steering Committee on recent activities of IAEA, MDEP and WENRA. INSAG-25 report drew the specific attention of the Task Force, as it promotes the basis for the Integrated Risk Informed Decision Making Process. This process integrates deterministic AND probabilistic approaches to safety. Each of the approaches provides specific inputs to the final decision on the adequacy of safety provisions and risk reduction.

### Plan for 2012

The PSG TF will be regularly updated on new developments in the nuclear community (IAEA, MDEP, WENRA and the industry). This will consist mainly of contributing to the IAEA activities on the subject, attending upcoming Technical Meetings, and reporting to the Task Force and the Steering Committee as needed. The Technical Meetings should promote harmonization, supported by the publication of international reference materials, such as IAEA TECDOCs on these matters.

Other aspects, directly inspired by the Fukushima accident, are also part of the ongoing work: how to apply safety goals to multi-unit nuclear sites? How to include all potential hazard sources of a given site (spent fuel pools for example)? How to integrate natural hazards? How to better integrate Safety and Security aspects?

Noteworthy is the IAEA Technical Meeting on Level 3 PSA, to take place in July 2012, to which CORDEL will send a delegate from one of its industry members.

In summary, CORDEL Probabilistic Safety Goals Task Force will therefore provide input to the following IAEA activities:

- ▶ New TECDOC on Safety Goals (as the INSAG-12 revision);
- ▶ New TECDOC on Integrated Risk Informed Decision Making (following INSAG-25 publication), a technical meeting to be held in March 2013.

# Appendix 2

## CORDEL Terms of Reference

### I. MISSION

The CORDEL Working Group's Mission is to promote the standardization of nuclear reactor designs. This can be completely achieved only by the development of a worldwide nuclear regulatory environment, where internationally accepted standardized reactor designs, certified and approved by a recognized competent authority in the country of origin, can be widely deployed without major design changes due to national regulations. In practice, this would mean that generic design certification and safety evaluations approved by a recognized competent authority in the country of origin would be acceptable without duplicating the design certification in each country planning to deploy the reactor design in question. Such a standardized design approval process and standardized worldwide nuclear power plant designs would:

- ▶ boost investment attractiveness and predictability of the nuclear new build worldwide, both in established nuclear countries and in emerging nuclear countries;
- ▶ improve nuclear power plant safety, since it will allow more efficient sharing of operating experience, enable more efficient licensing and safety analyses, and provide for more efficient nuclear plant safety monitoring.

To this end, the CORDEL Working Group will dedicate its resources and efforts to:

- ▶ Share the world nuclear industry's expertise on these topics with intergovernmental organizations, such as the International Atomic Energy Agency (IAEA), and in support of international regulatory initiatives, primarily the Multinational Design Evaluation Programme (MDEP), and seek through these and other means to encourage international cooperation among national regulators in their efforts to converge and harmonize their national regulatory regimes;
- ▶ Facilitate cooperation within the global nuclear industry – particularly among reactor vendors and utilities – in all stages of nuclear new-build: design evaluation, certification, licensing, construction and commissioning;
- ▶ Support and cooperate in a structured way and on a regular basis with other organizations with similar focus to help 'harmonize' industrial codes and standards;
- ▶ Focus on delivering specific tasks covering various technical and institutional issues as defined by the Working Group.

The list of CORDEL activities evolves and changes depending on the changing priorities agreed by the Group.

### 2. MEMBERSHIP

Membership of CORDEL presupposes a commitment from WNA member companies to devote adequate resources to ensure that the Group's Mission can be fully accomplished.

Companies and Organizations eligible for membership include:

- ▶ all nuclear new build vendors, including architect engineering companies, key supply chain vendors
- ▶ all utilities with actual or projected new build projects
- ▶ technical support and consulting services or any other company/organization in a relevant field.

Individual members of the Group are appointed by WNA member companies. The following can be invited to participate as observers:

- ▶ representatives from the major Codes and Standard organizations (e.g., ISO, ASME, etc)
- ▶ international organizations involved or directly interested in nuclear power plant licensing for new nuclear build.

Overall, CORDEL's membership represents a broad range of industry specialists in nuclear power plant licensing, nuclear law and nuclear power plant safety engineering.

### 3. ADMINISTRATIVE STRUCTURE

The CORDEL WG establishes and agrees upon the main policy directions. The underlying basis of these policies is set out in the CORDEL “Roadmap”\*. CORDEL meets 3 times a year in conjunction with the regular schedule of WNA meetings.

CORDEL WG’s structure consists of the following administrative levels:

#### Chairman and Vice Chairman

CORDEL WG has a Chairman and a Vice-Chairman (or two vice-chairmen) appointed by the WNA Board of Management for terms of two years. One represents a reactor vendor company and the other a utility company.

#### Steering Committee

Membership of CORDEL’s Steering Committee is restricted to about a dozen representatives of those WNA member companies and relevant stakeholders who are prepared to demonstrate an active commitment to contributing to the Group’s successful operation.

Individuals from the CORDEL Group are invited to join the Steering Committee by the Group’s Chairman and Vice Chairman and are approved by the Group. Membership of the Steering Committee is reviewed annually to ensure rotation of the CORDEL members within the Steering Committee. The Steering Committee meets regularly throughout the year either in person or by conducting telephone conferences in order to:

- ▶ select and prioritize top issues to be dealt by CORDEL Task Forces and to define their mandates;
- ▶ identify and communicate goals and metrics suitable for follow up;
- ▶ identify means for structured engagement with other stakeholders and their initiatives, including other industry associations, regulators and international organizations;
- ▶ approve any common position produced by the Group prior to its issue or publication;
- ▶ define a communications strategy and identify the means for its implementation.

#### WNA Board Mentor

Like all WNA Working Groups, CORDEL has a Mentor – a member of the WNA Board of Management who monitors developments within the Group and voices to the Group any relevant guidance from the Board.

#### Task Forces

Task Forces are sub-groups of experts established to address specific technical or institutional issues identified by CORDEL. Task Forces draw up status reports and present their developments during CORDEL meetings on a regular basis. CORDEL’s members commit to provide appropriate individual experts for the Task Forces. The Task Forces may also include invited experts from relevant stakeholders. The Task Forces are organized and supported by the Secretariat.

#### Staff Leadership

The CORDEL Working Group (“CORDEL”) receives staff support through the joint efforts of: (1) a Staff Director, assigned by the WNA Director General from the WNA secretariat, charged with delivering the success of the project and (2) Advisors, employed as consultants by WNA for the specific purpose of providing CORDEL with expert advice and leadership. The Staff Director and Advisors function as partners so as to combine the Advisor’s expertise with the resources and expertise of the WNA secretariat.

▶ **Staff Director and WNA Secretariat**

CORDEL and any topic-based task forces receive administrative, managerial and technical support through the Staff Director as instructed by the WNA Director General. The Staff Director organizes meetings, including the preparation of agendas and the drafting of meeting minutes; handles communications with CORDEL members and externally; coordinates input from members; undertakes key research activities and initial drafting and editing of reports and their subsequent publication; liaises with relevant stakeholder groups; and takes responsibility for implementing CORDEL's communication strategy, including taking the lead in explaining CORDEL's work at nuclear conferences.

▶ **Advisors**

Advisors are appointed by the WNA on the basis of a recommendation by the Steering Committee and are ultimately responsible to the WNA Director General. The Advisors are permanent members of CORDEL's Steering Committee and work with the WNA Secretariat to ensure the successful operation of the overall project. The Advisors and the Staff Director cooperate in representing CORDEL vis-à-vis external bodies, with the Advisors taking the lead in high-level meetings where seniority is a special attribute.

▶ **Working Arrangement**

The Staff Director and the Advisors develop and maintain a rolling 6 month schedule of CORDEL activities, including staff travel and meeting attendance. This schedule will (1) allocate responsibilities as between the Staff Director and the Advisors so as to make maximum feasible use of their skills and experience and (2) project anticipated expenses for all scheduled activities. This schedule, regularly updated to maintain the desired time horizon, will be agreed by the CORDEL Chairman and transmitted to the WNA Director General, Deputy Director General and Director of Administration.

## 4. COSTS

Each CORDEL WG member commits itself to ensuring active participation in implementing the CORDEL WG Goals set out each year, and undertakes to second its Experts as needed and fund all related costs (meetings, expenses, man-hours) for their contribution to the WG.

## 5. IP RIGHTS AND CONFIDENTIALITY

WNA membership rules apply. Each CORDEL WG member shall make sure that the documents produced within the framework of CORDEL membership (draft texts, comments, minutes of meetings, specific reports, presentation material, etc.) are considered as "restricted access" information by both its own staff and its consultants and contractors involved in CORDEL WG, and are not passed to third parties.

## 6. BACKGROUND NOTE

The WNA created CORDEL in January 2007 to stimulate a dialogue among the nuclear industry, national nuclear regulators and relevant inter-governmental agencies on ways to achieve a worldwide convergence of reactor design safety standards and licensing practices so as to promote the deployment of internationally standardized designs. CORDEL serves as a discussion forum and as a voice representing the global nuclear industry.

The CORDEL Working Group began its work in 2007 by analysing and articulating the benefits that could be realized from internationally accepted safety standards for Generation III and III+ reactors, and which would lay the foundations for standards governing future Generation IV reactors. The CORDEL paper entitled "Benefits Gained through International Harmonization of Nuclear Safety Standards for Reactor Designs" is available on the WNA website.

\* In January 2010 the WG published a 'road-map' report "International Standardization of Nuclear Reactor Designs" which outlines a three-phase approach to achieving the international standardization of reactor designs, which can be certified in efficient, transparent procedures to harmonized worldwide standards of nuclear safety.

## Appendix 3

### CORDEL Leadership

The rules of nominations for CORDEL's leadership are defined in the Terms of Reference (Appendix 2).

The table below presents the chairmen and vice-chairmen of CORDEL since the establishment of the Group in 2007.

September 2011 – now	Chairman	Jerry Head	GE-Hitachi
	Vice-Chairman	Hae Ryong Hwang	KEPCO E&C
	Vice-Chairman	Xavier Pouget-Abadie	EDF
September 2008 – September 2011	Chairman	Michael Micklinghoff	E.On
	Vice-Chairman	Francois Bouteille	AREVA
January 2007 – September 2008	Chairman	Robert Brown	GE
	Vice-Chairman	Michael Micklinghoff	E.On

### Current Chairmen of Task Forces

Codes and Standards TF: Nawal Prinja, AMEC/HCC (Nawal.Prinja@amec.com)

Design Change Management TF: Richard Swinburn, Rolls Royce (Richard.Swinburn@Rolls-Royce.com)

IAEA Safety Standards TF: Thomas Froehmel, E.On (Thomas.Froehmel@eon.com)

Safety Goals TF: Nigel Buttery, EDF Energy (UK) (nigel.buttery@edf-energy.com)

Licensing & Permitting TF (joint TF with the Nuclear Law and Contracting WG): Paul Bowden, Freshfields, and Christian Raetzke, WNA (paul.bowden@freshfields.com and christian.raetzke@conlar.de)

### CORDEL Secretariat

Strategic advice to the group and the WNA Secretariat is provided by the CORDEL Director of Strategy, John Waddington (johnwadd@magma.ca), who is employed by the WNA as a Senior Adviser on a part-time basis.

Staff Director to the Steering Committee and the Design Change Management Task Force: Irina Borysova (borysova@world-nuclear.org)

CORDEL/NLC Director of Licensing (part-time adviser to WNA): Christian Raetzke (christian.raetzke@conlar.de)

Staff Director to CORDEL/NLC Licensing and Permitting Task Force: Virginie Ryan-Taïx (ryantaix@world-nuclear.org)

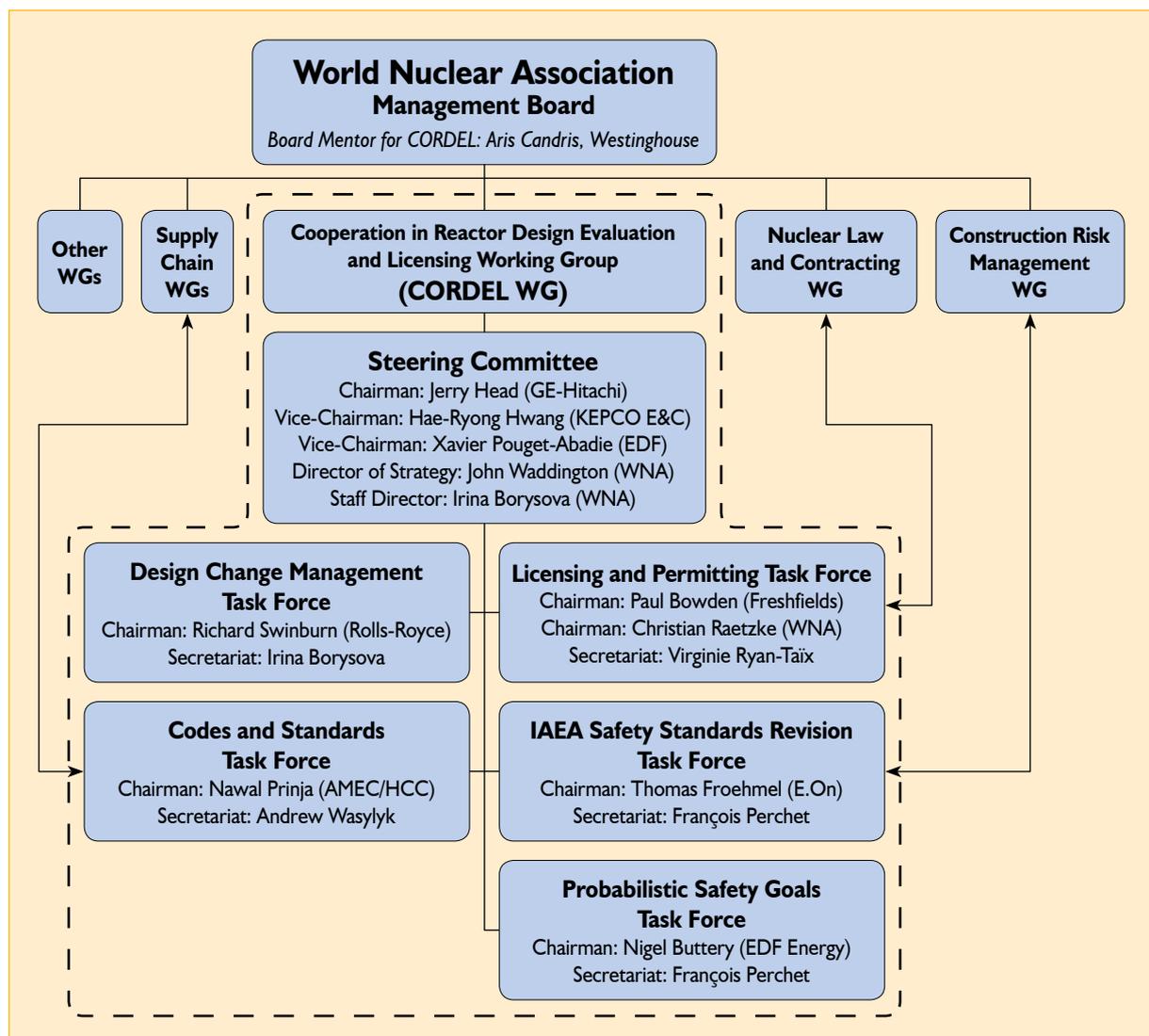
Staff Director to CORDEL Codes and Standards Task Force: Andrew Wasyluk (wasyluk@world-nuclear.org)

Staff Director to CORDEL IAEA Safety Standards and Safety Goals Task Force: François Perchet (perchet@world-nuclear.org)

## Members of the Steering Committee as per February 2012

Jerald Head	GE-Hitachi	jerald.head@ge.com
Xavier Pouget-Abadie	EDF	xavier.pouget-abadie@edf.fr
Hae Ryong Hwang	KEPCO-E&C	hae@kepco-enc.com
Willibald Kohlpaintner	E.On	willibald.kohlpaintner@eon-energie.com
Francois Bouteille	AREVA NP	francois.bouteille@areva.com
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Iva Kubanova	CEZ	iva.kubanova@cez.cz

In the addition, over 50 companies and organizations are involved in CORDEL activities and Task Forces, with the total number of individuals reaching 200.



**The World Nuclear Association** is the international private-sector organization **supporting the people, technology, and enterprises** that comprise the global nuclear energy industry.

**WNA members include the full range of enterprises involved in producing nuclear power** – from uranium miners to equipment suppliers to generators of electricity.

With a secretariat headquartered in London, the **WNA serves as a global forum** for industry experts and as an authoritative information resource on nuclear energy worldwide.



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