Licensing International Standardized Reactor Designs



Middle East & North Africa

Vienna 29th Sept 2010



Michael Micklinghoff Chairman Cordel Group World Nuclear Association



World Nuclear Association



180 members in 40 nations

Representing the Enterprises of the Global Nuclear Energy Industry





The WNA CORDEL Group

WNA's Cooperation in Reactor Design Evaluation and Licensing (CORDEL) Group

- Founded in January 2007
- Membership: all major vendors and many utilities interested in new build

Companies: AECL, AREVA NP, British Energy, EDF, ENDESA, NNEGC Energoatom, E.ON, Exelon, EXCEL Services Corp., GE-Hitachi, KHNP, Mitsubishi Heavy Industries, NOK/Resun, OPG, Rosenergoatom, RWE Power, FEPC, TVO, Westinghouse, etc. also FORATOM/ENISS, EUR, EPRI, ISO



CORDEL's aims and activities

- Aim: to promote mutual acceptance of design reviews, and (in the long term) international certification of designs
- Cooperation with MDEP and other relevant international initiatives
- Participation in IAEA safety standard revision process
- Promotion of harmonization of standards and codes relevant to new build



International standardization of reactor designs

 International standardization means that each vendor's design can be built by a vendor, and ordered by a utility, in every country without obligatory adaptation to specific national regulations

International standardization will

- help deliver large-scale worldwide new build
- bring benefits for safety



Standardization as a benefit for safety

- Fleets of standardized designs offer a broad basis for construction and operation experience feedback
- Design improvements could be implemented across the fleet

•Note: Cordel does not promote a single design

Standardized advanced plants will bring additional safety layers for design, construction, operation and decommissioning



Standardization as a benefit for the industry and regulators

Standardization will

- reduce strain on resources
- reduce investment risks, time and cost in licensing and construction
- foster joint supplier oversight
- enable project neutral manufacturing of components for standardized designs
- improve transparency of regulatory practices
- gain public confidence
- facilitate establishment of nuclear power programmes in emerging countries in safest and efficient manner









Benefits Gained through

Nuclear Safety Standards for

Reactor Designs

Vorld Iclear ociation

International Harmonization of

www.world-nuclear.org/reference/reports.html

Paper "Benefits Gained through International Harmonization of Nuclear Safety Standards for Reactor Designs". Published in 2008



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Design approval as part of the overall regulatory process



Existing regulatory/legal situation

- Each NPP is licensed by an independent regulatory body within
 - specific national licensing process, which vary from country to country
 - specific national safety requirements, which vary considerably in details
- A design approval in one country is irrelevant for others
- This is an obstacle to deployment of standardized designs across a range of countries



What challenges have to be kept in mind

- Sovereignty of each country's regulator has to be respected
- Regulators are bound by law to apply their national safety requirements and licensing procedures
- Regulators need to build up knowledge of the design



Harmonization of regulatory regimes

- Absolutely necessary for standardization!
- Differences are even more difficult to justify in public eyes (why should regulation in one country be "safer" than in others....)
- However, combination and "piling up" of the strictest requirements to be avoided
- IAEA Safety Standards a good initial model for harmonisation
- Newcomer countries should start right away with regulations based on international consensus



Multinational Design Evaluation Programme (MDEP)

- 10 regulators who are/will be undertaking review of new NPP designs: Canada, China, Finland, France, Japan, Russia, South Africa, South Korea, UK, US
- Fully operable since 2008
- Aims of MDEP:
 - enhance cooperation between regulators
 - establish reference regulatory practices
 - achieve convergence of codes, standards, and safety goals in the long-term
- However: no harmonization of safety requirements, no commonly valid design acceptance



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Role of Regulators and Governments

- Standardization as such must be delivered by industry...
- ...but industry needs to be enabled to do so by starting new approaches within harmonized national and international regulatory frameworks
- Three main targets to tackle the situation :
 - design approvals becoming international
 - harmonization of safety requirements
 - alignment in licensing processes
- CORDEL Proposal: three steps



http://www.worldnuclear.org/uploadedFiles/org/reference/pdf/ CORDELreport2010.pdf



Main Conclusions of CORDEL Report

CORDEL proposes 3 Phases to achieve international standardization of reactor designs:

1. Sharing design reviews and assessments

2. Validating and accepting design approvals

3. Issuing international design certification

Urgent need for international harmonization of

- » national licensing processes
- » and safety requirements



Phase 1: Share design assessments/reviews





Phase 1: Share design reviews/assessments

- During safety reviews, regulators could make use of:
 - Assessment work done by their peers, e.g. by reusing calculations or modelling of event sequences
 - Assessments done by industry (EUR, US URD)
- Regulators may join efforts in reviewing the same design by creating a collaborative network
- This would reduce the strain on regulators' resources
- This would in no way infringe the right and the duty of regulators to take the final decision to issue a licence
- CORDEL encourages MDEP progress towards shared assessmented work

Phase 2: Validate & accept design approvals

Not "automatic" but through a "validation". Examples: transport casks for waste, aviation industry's Type Certification





Phase 2: Validation and acceptance of design approvals (2)

Example: Italy's new Act on Energy Companies, Act no. 99 of 23 July 2009, Art. 25, 2 i):

[Government is empowered to issue] a provision that licences relating to technical requirements and specifications for reactor designs which have been licenced in the past 10 years by the competent authorities in member states of OECD-NEA, or in states linked to Italy by bilateral agreements ... in the nuclear sector, will be considered to be valid in Italy after approval by the Nuclear Safety Agency



Phase 3: International Design Certification



Phase 3: International Design Certification

- Multinational Design Certification/Approval issued by a team of all concerned regulators or by an international organisation
- <u>Multinational certification is owned by the vendor</u> and is valid for entire design life
- Operator is "intelligent customer", but vendor is responsible for the detailed design knowledge
- Network of vendors, operators and regulators is required to address post-certification design changes and to maintain the lifetime validity of Multinational Design Certification

Phase 3: International Design Certification



Alignment of licensing processes

- Licensing processes and documents should be aligned so that the design approval of one country would fit into the licensing sequence of another country
- Best solution: <u>separate design approval (e.g.design</u> <u>certificate)</u>
- Legal implications of design approval: period of validity, binding character, "ownership", etc.
- Examples:
 - US: Design Certification
 - UK: Generic Design Assessment (GDA)
 - France: ASN monitoring of compliance on design safety, parallel to construction

International licensing of aircrafts shows parallels to today's nuclear world



Role of all stakeholders

- Industry:
 - operators and vendors: Owners' Groups, information exchange, implementation of design improvements, Design Authorities, experience feedback, codes and standards, training
 - Role of WNA Cordel within industry and liaison with regulators (MDEP)
- Regulators:
 - National regulators can already achieve greater convergence and facilitate mutual acceptance of design reviews
 - Enhanced role of MDEP in promoting harmonization and mutual acceptance
- Governments:
 - Some changes in national legislation may be required to facilitate standardization
 - Longer term goal creation of legal framework for international certification
- International organizations:
 - IAEA and OECD-NEA, EU institutions to take a proactive part in standardization and harmonization



CORDEL - commitment from industry

13 April 2010, 11 Leading Nuclear Companies CEOs published a letter of support for CORDEL:

- John Ritch, DG, WNA
- Anne Lauvergeon, CEO, Areva
- Hugh MacDiarmid, CEO, Atomic Energy of Canada Ltd.
- Henri Proglio, CEO, Electricité de France
- Wulf H Bernotat, CEO, Eon
- Christopher Crane, President, Exelon
- Jack Fuller, CEO, GE-Hitachi Nuclear Energy
- Masaharu Hanyu, President, Hitachi-GE Nuclear Energy
- Akira Sawa, Director, Nuclear Systems, Mitsubishi Heavy Industries
- Ichiro Takekuro, Chief Nuclear Officer, Tokyo Electric Power Co
- Yashuharu Igarashi, CEO, Power Systems Toshiba
- Aris Candris, CEO, Westinghouse



CORDEL - commitment from industry

13 April 2010, 11 Leading Nuclear Companies CEOs published a letter of support for CORDEL:

Recipients:

- Yukiya Amano, DG, IAEA
- André-Claude Lacoste, Chairman, Multinational Design Evaluation Program (MDEP)
- Luis Echávarri, DG, Nuclear Energy Agency of the OECD
- Andrej Stritar, Chairman, European Nuclear Safety Regulator Group
- cc: Laurent Stricker, Chairman, World Association of Nuclear Operators (WANO)



CORDEL's near-term activities

- The group encourages international cooperation in design reviews, mutual acceptance of design approvals and (in the long term) international certification of designs
- Cooperation with MDEP and other relevant regulatory initiatives
- Participation in IAEA safety standard revision process
- Promotion of harmonization of standards and codes (complementary to the MDEP work, compile existing comparisons of codes and conduct additional comparisons of mechanical, electrical, civil, fire protection etc. codes with the view of producing industry reference document)
- Design Change Management develop institutional mechanisms in the industry which would enable compliance with standardization throughout standard fleet's lifetime
- Develop model licensing regime and focus on support to newcomer countries and SMR licensing



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We strongly favor standardization ! Dibek

Background information



Can we learn from international licensing of aircrafts?

Commendable aspects of civil aviation industry

- Licensing of aircraft designs: a design licence (type certificate) is needed in every country where an airline runs the specific design but an international framework (Chicago Convention, ICAO, bilateral agreements) facilitates takeover of the original design licence by other countries
- There is a set of binding minimum safety standards worldwide
- In Europe, we even have a supranational licensing agency (EASA)
- **Enhancing safety of existing designs:** based on international framework, there is a sophisticated system of reporting and of implementation of design changes, linking designers, airlines and the authorities of all countries concerned

All of this is to a large extent due to pressure of industry, which is characterised by few international vendors (Boeing) and multinational consortia (e. g. Concorde, Airbus)

 \rightarrow Parallels to today's nuclear world



Comparison of type certificate, production cerificate and airworthiness certificate

	What attests the certificate?	Who is a holder of certificate?	Who is issuing authority?
Type certificate	compliance of aircraft design with requirements for aircraft safety ("airworthiness codes")	manufacturer	first National Aviation Authority of the state of design and then by the NAAs of all countries where the aircraft of design will be registered
Production certificate	that aircraft has been produced exactly in the same way as it was put in its design	manufacturer	National Aviation Authority of the state of production
Airworthiness certificate	that <u>individual</u> aircraft is able to fly	Airline	National Aviation Authority of the state of registry
Air Operator Certificates/ Operating License	Airline is capable to oparete (operating organization)	Airline	National Aviation Authority

Trans-national Certification Procedure

Example: Lufthansa has ordered an A 787 from Boeing

	Issuing Authorities	Holder of certificate
Type certificate:	1. Federal Aviation Administration2. EASA	Boeing
Airworthiness certificate:	Luftfahrt-Bundesamt (NAA)	
Air Operator Certificate:	Luftfahrt-Bundesamt (NAA)	Lufthansa



International issuing of Type certificate (1)

- The Aviation Authority of the country of design issues the first Type Certificate after full assessment.
- Other Aviation Authorities will not do a full assessment, based on the following:
- A set of international agreements (the 1944 Chicago convention and the annexes created by the International Civil Aviation Organization ICAO) provides a general framework for minimum safety standards and for regulatory cooperation.
- Authorities wishing to collaborate in type certification conclude a special bilateral agreement. A prerequisite for this is that the participating authorities perform an evaluation of each other and come to the conclusion that the other party is a trustworthy and experienced regulator with well-established procedures.



International issuing of Type certificate (2)

- When performing its design review, the aviation authority of the country of origin involves the aviation authorities of the major other countries, whose experts are embedded in the review team. As a result, the type certificates of these other authorities will be issued shortly (ideally, a day) after the original certificate. Authorities which do their review later will also closely cooperate with the authority of the country of origin.
- When performing their review, the authorities of the other countries will not re-do the assessment done by the authority of the country of origin to its own standards. Instead, they will accept this review and instead concentrate on reviewing the design against such requirements of their own national framework which deviate from those of the country of origin (the so-called "national delta"), which of course the first authority could not have possibly taken into account.



International Civil Aviation Organisation

I. BASIC INFORMATION:

- CREATION: 1944
- SEAT: Montreal
- ORGANISATION TYPE: United Nations agency
- LEGAL BASE: Chicago Convention
- CONTRACTING STATES: 190



II. AIMS AND OBJECTIVES:

To develope the principles and techniques of international air navigation and to foster the planning and development of international air transport

> Art. 44 of Chicago Convention



International licensing of aircrafts shows parallels to today's nuclear world



New structure as per ToR approved in April 2010

WNA Board - Board Mentor

report

CORDEL Group

Chairman, Vice Chairman, WNA members •Establishes and agrees upon the main policy directions

Steering Committee

Chairman, Vice Chairman, Director,

12-15 Representatives of member companies

- Identifies CORDEL strategy and means for its implementation;
- Selects topics of Task Forces and defines their mandates;
- Approves any common position produced by the Group prior to its issue or publication;
- Defines a communications strategy and means for engagement with other stakeholders,

WNA Secretariat

Director

Secretary and Technical support

- •Coordination and management of Task Forces •
- Communications
- Publications
- Presentations
- WNU Courses
- Relationship with other organizations
- Other lobbying activities

Task Forces

Experts from the WNA member companies

•Design Change Management

•Model Licensing Regime

•IAEA Safety Standards revision

Codes & Standards

Etc.

CORDEL activities April-September 2010

- Steering Technical Committee representatives:
 - AREVA NP
 - Atomic Energy of Canada Limited
 - EDF
 - E.ON Kernkraft GmbH
 - EXCEL Services Corporation
 - Exelon
 - GE Hitachi
 - Hitachi-GE
 - MHI
 - TEPCO
 - Toshiba
 - Westinghouse Electric Company
 - Waiting for responses from : KHNP (or KERCO, Nuclear Rosenergoatom (or Gidropress).

CORDEL activities April-September 2010

- CORDEL Director joined the WNA team Bernard Fourest
- Design Change Management Task Force created. First meeting 14 September 2010.
- CORDEL Task Force to interact with IAEA NUSSC created, but interactions with NUSSC committee (observer status) has been going on since 2008.
- Model Licensing Regime Task Force joint with the WNA Nuclear Law and Contracting WG, chaired by Joe Huse (Freshfields Bruckhaus Deringer LLP), first conference call - 6 September.



CORDEL's near-term Action Plan

- The group encourages international cooperation in design reviews, mutual acceptance of design approvals and (in the long term) international certification of designs
- Cooperation with MDEP and other relevant regulatory initiatives
- > Continuous participation in IAEA safety standard revision process
- Promotion of harmonization of standards and codes (complementary to the MDEP work, compile existing comparisons of codes and conduct additional comparisons of mechanical, electrical, civil, fire protection etc. codes with the view of producing industry reference document)
- Design Change Management develop institutional mechanisms in the industry which would enable compliance with standardization throughout standard fleet's lifetime
- Develop model licensing regime and focus on support to emerging markets

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

- Founded in January 2007
- Main aim Licensing of international standardized reactor designs
- Membership:

-all major vendors: AECL, AREVA NP, GE-Hitachi, Hitachi-GE, MHI, Toshiba, Westinghouse...

-utilities interested in new build: CEZ, EDF, ENDESA, Energoatom, E.ON, Exelon, KHNP, NOK/Resun, OPG, Rosenergoatom, RWE, FEPC (TEPCo), TVO, Vattenfall, Visagino AE,...

-service companies: EXCEL Services Corp., Rolls-Royce, AMEC, CH2M Hill,...

-observers from int'l organisations: FORATOM/ENISS, EUR, EPRI, ISO, IAEA DNE, WANO, NEI...

World Nuclear Association (WNA)

- The WNA an international trade association that supports the global nuclear industry
- The basic premise the interests of the nuclear industry in <u>national</u> contexts are often best advanced in the <u>international</u> arena
- The compelling reason Globalization (Fuel market; operating experience; EPCs; regulatory processes; public/political acceptability; manpower development)



WNA: Aims and Activities

WNA Membership:

- Virtually all uranium mining, conversion, enrichment and fuel fabrication
- Almost all reactor vendors
- Major nuclear engineering, construction and waste management companies
- Operators generating some 90% of world nuclear generation
- Transport, legal, financial, insurance and brokerage companies



WNA: Aims and Activities

Four major areas of activity:

- Strengthening Industry Capabilities
 Working Groups, Conferences
- Representation in Key International Forums
 - > A unified voice of the industry in IAEA, NEA-OECD, IPRC, UN agencies, other international intergovernmental org's.
- > Nuclear Fuel & Supply Chain
 - > WNA is famous for its front-end fuel market analysis
- Public Information & News
 WNN and our website
- > WNA is a founding member of the World Nuclear University

