CRPPH Case Studies:
Design Criteria, Dose Constraints & Integration of Risk Management

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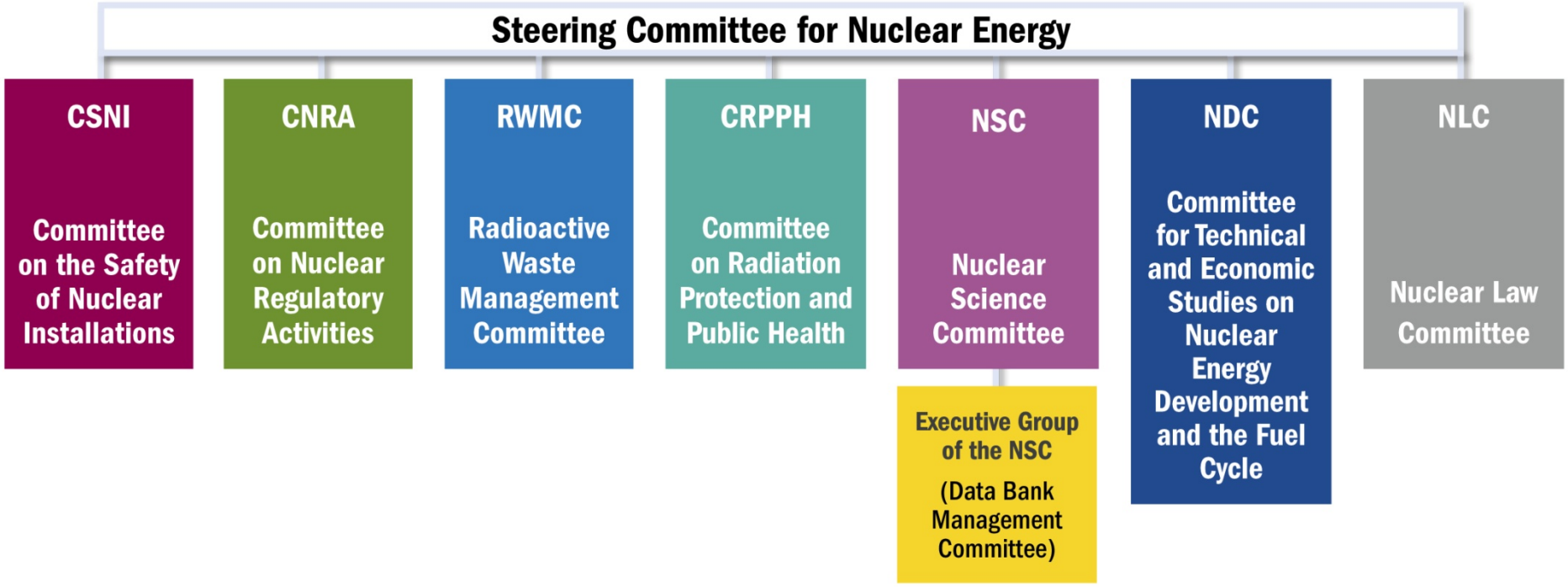
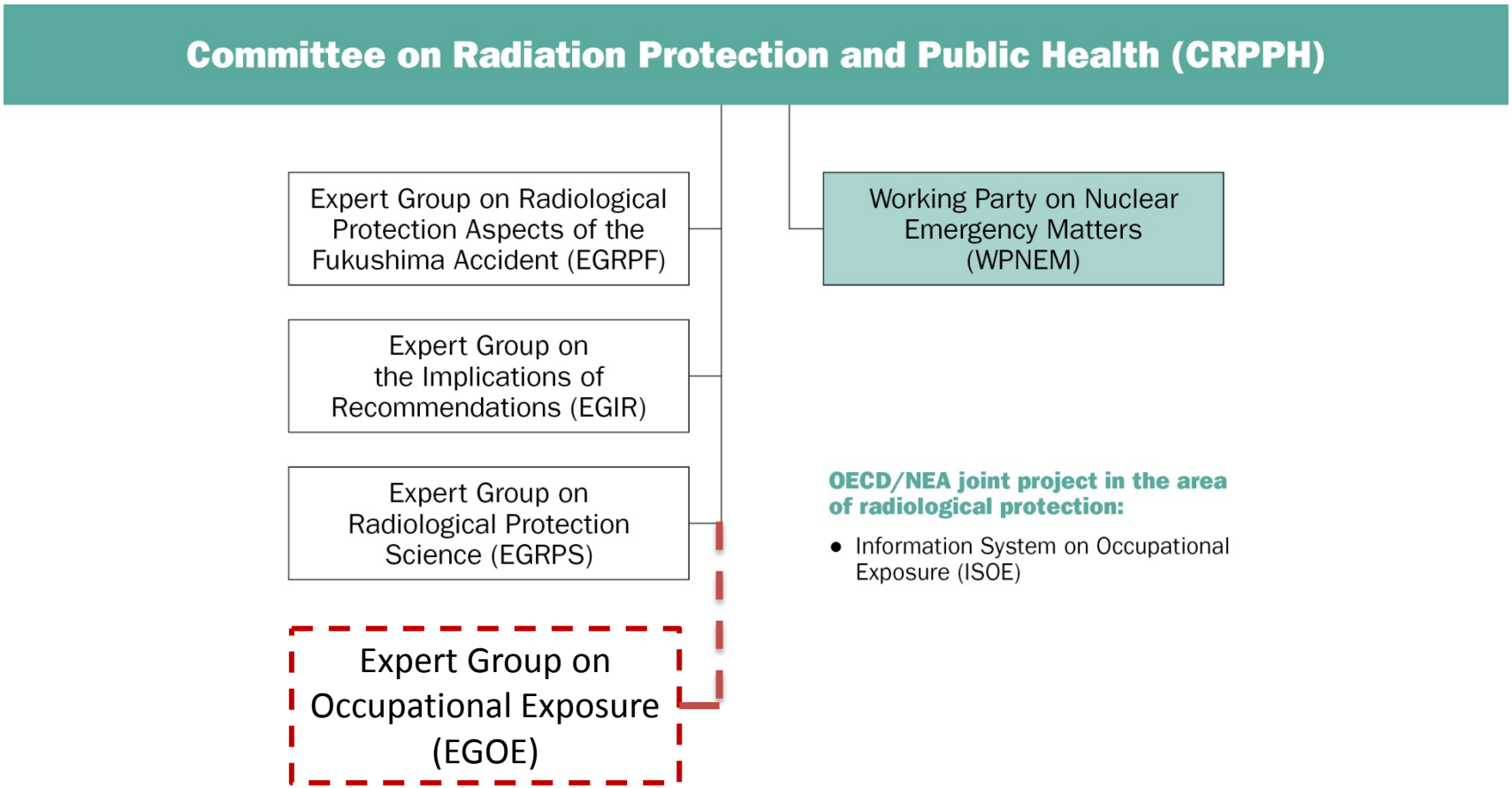
NEA committee structure




Committee on Radiation Protection and Public Health (CRPPH)
Expert Group on Radiological Protection Aspects of the Fukushima Accident (EGRPF)
Expert Group on the Implications of Recommendations (EGIR)
Expert Group on Radiological Protection Science (EGRPS)
Expert Group on Occupational Exposure (EGOE)
Working Party on Nuclear Emergency Matters (WPNEM)
OECD/NEA joint project in the area of radiological protection:
Information System on Occupational Exposure (ISOE)

CRPPH Expert Group on Occupational Exposure (EGOE)

- Seven subsequent years (2006/Jan 2007-May 2013)
- Close co-operation with the ISOE (utility involvement)
- App. 40 experts from the NEA countries
- Policy and strategic areas of ORP with a focus on the nuclear power sector

3 Case Studies

2010: Occupational radiation protection principles and criteria for designing new nuclear power plants

2011: Dose constraints in occupational radiation protection

2013: Information and Regulatory Issues for the Management of International Outside Workers and Integration of Risk Management at Nuclear Power Plants

CS 1 - ORP principles and criteria for designing new NPPs

- ORP for future generations of workers
- Integration of ORP in the design and conception phase
- Precaution for reduced exposures over NPP life cycle
  - Operation
  - Maintenance
  - Transport
  - Decommissioning
- Risk balanced optimization
  - other health hazards for workers
  - exposure of worker vs. public, environmental, regulatory needs
- Awareness of the pos./neg. side effects of ORP quality

CS 1 – Structure of the report

- ORP principles at the design stage
  - int. and nat. guidance; role of reg. authorities; structured approach to design
- Lessons learned, knowledge management, education and training
  - feedback and criteria from previous experience; networking; knowledge management; need for skilled personnel;
- Integrating ORP criteria at the design stage
  - compliance with ORP criteria; ALARA design checklist; examples
- Evaluation and integration of ORP cost
  - ORP cost assessment based on full life-cycle

CS 1 – General conclusions

- Need to consider full life-cycle at the design stage (e.g. through available feedback from maintenance and dismantling)
- Need to organize training and knowledge management through extended life-cycle (2-3 generations of workers)
- Importance of networking to enable information collection and exchange on ORP during design and over full life-cycle
- Integration of ORP into the design saves time, money and exposure

CS 2 - Dose Constraints in Occupational Radiation Protection: Regulations and Practices

Scope

- Aspects associated with the use of dose constraints in ORP, and:
  - to analyse experiences with interpretation and implementation
  - to discuss operational and regulatory issues
  - to provide suggestions regarding operational objectives and uses of dose constraints

Selected topics

- What are benefits from the use of dose constraints in an optimisation process?
- Are dose constraints used as a regulatory instrument?
- Dose constraints and other ORP criteria
- Setting of dose constraints
- Way of implementing and controlling of dose constraints
- Dose constraint as a new “standard of care” for workers?
- Reinforcement of individual dose constraints versus higher collective doses

CS 2 - Structure of the report

- Dose Constraints in Light of the ICRP Concept
- Dose Constraints in International and National Regulations
- Dose Constraints and Revision of the Basic Safety Standards
- Dose Constraints in Nuclear Power Plants - Operators' Practices and Experiences
- Analyses and Conclusions (suggestions and evaluations)
- Appendices (information from current practice)
  - ERPAN Survey on Dose Constraints in the Non-nuclear Energy Sector
  - ISOE Forum Answers on Use of Individual Dose Constraints or Constraint-Like Concepts in the Nuclear Energy Sector

CS 2 - Conclusions

- **Dose constraint concept in OECD:** well adopted (Europe), accepted with reservations (US), strictly rejected (Japan)
- **Current situation:** Implementation of dose constraints depends on co-operation between registrant, licensee and regulator
- **Need of dose constraints** – a controversial issue: Use of dose constraints limits the inequity of exposure vs. unequal individual exposure may sometimes be justified and radiation exposure is not always the only or predominant workplace risk
- **Setting of dose constraints:** individual approaches, often not only a single value, but a set of numerical criteria (e.g. individual dose, collective doses, ambient dose rate, etc. embedded in a decision flow chart)
- **Example of misuse:** many examples of dose constraints used as regulatory benchmark values for retrospective evaluation
- **Way forward:** Recognized need for comprehensive explanations and guidance by regulatory authorities.

CS 3: Policy and Practical Issues of ORP in NPPs

- Different structure from the previous CSs
- Two areas of particular concern

- **Management of international outside workers**
- **Integration of risk management at nuclear power plants**

CS 3: International Outside Workers

Information and Regulatory Issues for the Management of International Outside Workers

Problems and Questions

- Cross-border working outside workers are increasing.
- What records of foreign outside workers are acceptable to local undertakings?
- How to tackle different national dose limits and definitions?
- How get along with employers dose constraints set to resume radiation work in the home country?
- How to transmit the outside workers data between employers?

- No universally agreed upon methods on information recording of OWs
- Many national practices for the monitoring of OWs

CS 3: Activities of IOs & Survey

- European Council Directive 90/641/EURATOM and the new EU-BSS: requirements for the protection of outside workers
- HERCA WG1
  - Template of a harmonized European Radiation Passbook
  - Guidance document for the use of the European Radiation Passbook
  - Pilot project on electronic radiation passbook information system for data exchange between EU Member States
- IAEA
  - Technical Meeting on ORP for Itinerant Workers (Nov. 2011)
  - Updating a technical document on itinerant workers

EGOE Survey

- Survey on national practices (referring to workers who intend to work temporarily in a foreign country and return back)
- 12 completed responses (Canada, Belgium, Denmark, Finland, France, Germany, Poland, Romania, Spain, Sweden, Turkey, United States).

CS 3: International Outside Workers – Conclusions

- National regulations about radiation protection serve national needs and end at national borders.
- Regulations and monitoring practices often differ between countries, although there exist generally acknowledged ICRP recommendations.
- International outside workers work in a heterogenic legal environment and have to cope with conflicts from regulatory inconsistencies between the different countries involved.
- No formally established international arrangements in the near future (except information system in new EU BSS).
- Bi-lateral contractual agreements between the site and the outside workers' employer are important legal instruments to cover non-matching radiation protection regulations of different involved countries.

CS 3: International Outside Workers – Conclusions

Outside workers perspective

- The outside worker is the primary link to ensure that dose recording and reporting meets the needs of the worker when moving from country to country for temporary work.

- The outside worker should not rely solely on the care of employer, undertaking, and/or regulator for adequacy of dose recording and reporting.

- The outside worker should be aware of the self-responsibility for maintaining an up-to-date dose history, ensuring availability of relevant certificates of employability, and maintaining dose as low as reasonably achievable.

CS 3: Integration of Risk Management - Key issues

- ORP is not practiced in a vacuum
- Radiation is not always the one or overriding risk to workers
- Other legitimate goals such as industrial safety, nuclear safety, public and environmental safety, facility reliability must be considered
- Protection against all relevant risks to workers must be balanced

- In line with the International Action Plan (IAEA / ILO),
- Addressed previously (e.g. 4th EAN Workshop, Antwerp 2000, International Conference on ORP, Geneva 2002),
- In the view of ICRP, IAEA, ILO, WHO, NEA, EAN
  - Transfer of risks,
  - Education and safety culture,
  - Involvement of all the stakeholders.

CS 3: Integration of Risk Management - Safety Culture

- Safety starts from inception of the facility, through design, construction, operation, and finally decommissioning.
- Contributors to risk: radiological, industrial, chemical, and other hazards.
- Awareness of different types of risk during planning and execution.
- Balance between all risks.

CS 3: Risk Assessment and Mitigation

- Integration of risk management to the overall work management process
- Required management attention:
  - mutual understanding on relevant risks (operating and/or regulatory staff's),
  - bridging of any communication gaps that may arise in describing risks,
  - outlining potential risk mitigation techniques,
  - balanced risk decisions.
- Facility- and job-specific situations and the use of case-by-case approaches.
- Human-error-reduction techniques.
- Decision-making based on those analyses.

CS 3: Integration of Risk Management - Conclusions

- The simultaneous consideration of multiple contributors to risk to workers and the public is a complex undertaking.

- Development of flowcharts and/or procedures which address all of the relevant factors and quantify all of the elements of balanced decision-making is perhaps even more complex and is potentially impractical for some facilities and situations.

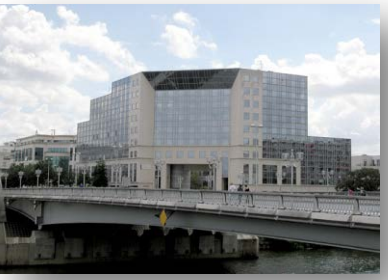
- Integrated risk management will always remain in development:
  - scientific understanding of risks and their interactions improve with time,
  - techniques for work performance evolve with time and technology,
  - society's perspectives on risk are dynamic.

CS 3: Integration of Risk Management – Conclusions (cont.)

Attributes of a Risk Management Programme

- Risk management as a part of the management information system (adequate attention of high-level managers to changes in the work management of risk).
- In plant design and operations phase
  - Systematic reviews of potential risks and means to address those risks,
  - Use of human error reduction techniques.
- "Case by case" approach to risk evaluation and mitigation to reflect facility- and job-specific situations.
- Risk optimization should utilize
  - objective, history-based policies and procedures,
  - views based on a strong safety culture and the value of professional individual and group insights to safe performance of a job.
- A training course should be developed wherever practicable, to provide the basics of integrated management of risks (practical examples and management's best judgment on adequate and desired elements of workplace and facility safety).

Nuclear Energy Agency



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.

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.

Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Luxembourg, Mexico, Netherlands, Norway, Poland, Portugal, Republic of Korea, Russian Federation, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States

Thank you for your attention

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