Radiation Protection Aspects of Water Chemistry and Source-Term Management with a view of an ISOE Expert Group

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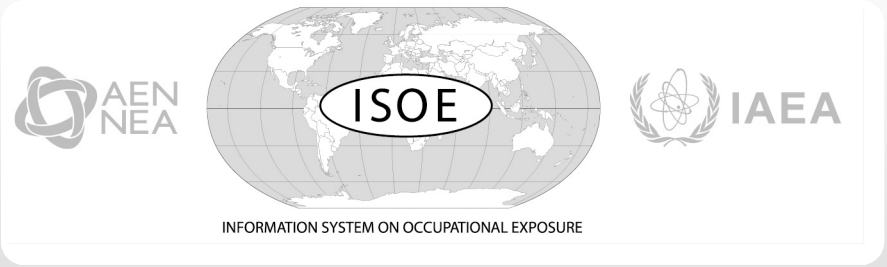
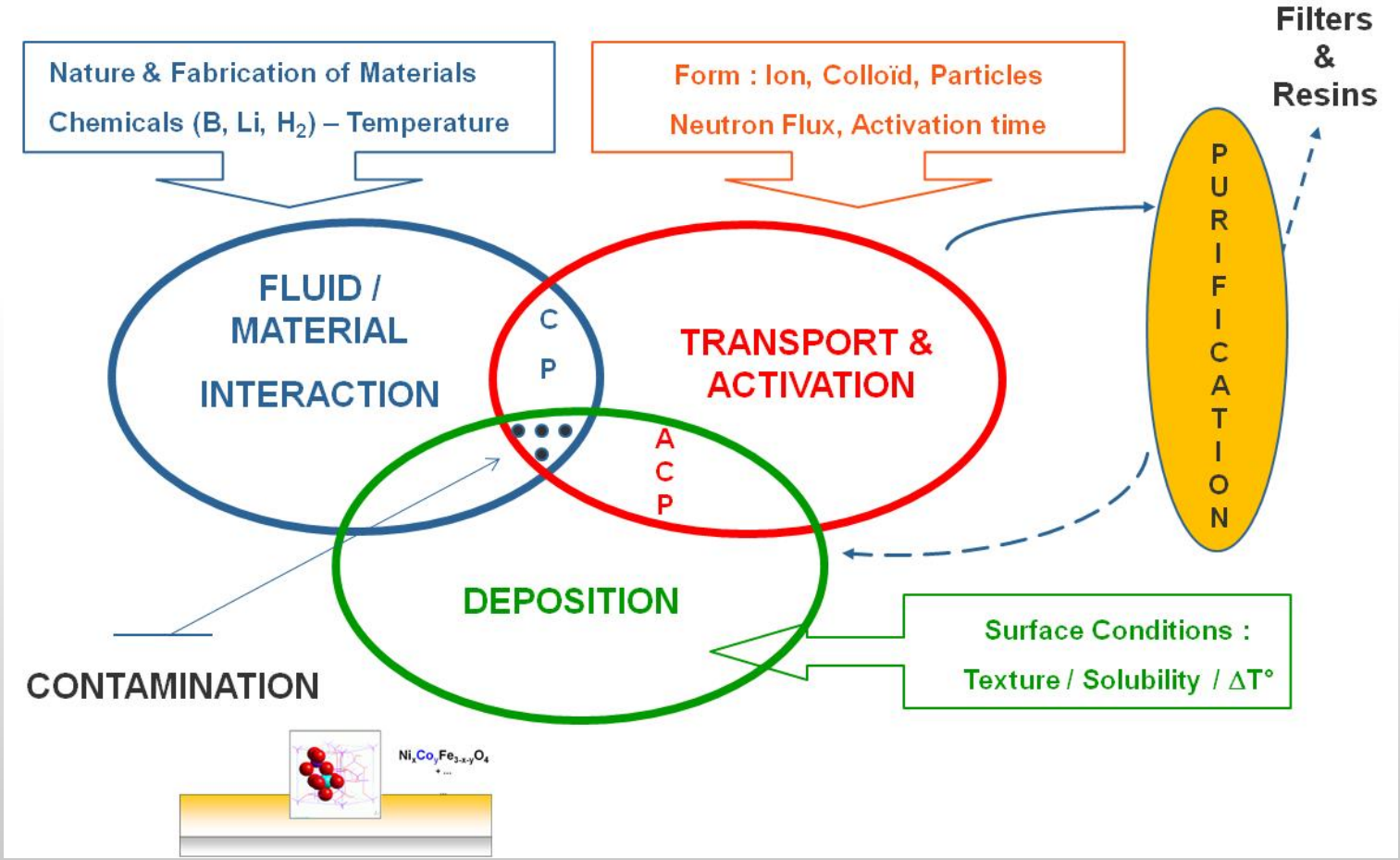


The Information System on Occupational Exposure (ISOE)

- A forum for radiation protection professionals from nuclear electricity utilities (70) and national regulatory authorities (27) worldwide:
  - RP management,
  - Operational experience,
  - ALARA improvement.
- A key organisation in developing safe, sustainable and socially acceptable strategies for emerging issues in the field of occupational radiation protection.
- A well-established and still growing global base of radiological protection information and experience:
  - Benchmarking comparisons,
  - Exchange of experience,
  - Networking of members.

Source term management: a complex but fundamental question for RP professional



Over-Contamination

Key parameters associated with source term management

- **Plant may use various strategies to improve its source term:**
  - pH control
  - Zinc injection programs
  - Use of specific resins
  - Removal of cobalt contribution components
  - …

- **This may contribute to an out-of-flux circuit dose rate reduction.**

- **For example, '**Recently the dose integrated during a refuel outage with full scale SG inspections was less than 300 mSv thanks to good source term management practice' (Exelon).

ISOE work in the field of source term management - MOU

- **Memorandum of Understanding (MOU) in an agreement between ISOE Management Board and EDF** (2011) on a win win basis:
  - EDF possesses knowledge and know-how in the **development and use of CZT Gamma Spectroscopy technology**
  - Interest in **facilitating the use of CZT measurement technology** and EDF protocols in other NPPs to permit the increase in the knowledge, data and understanding of methods to reduce the formation, transport and deposition of corrosion products.
  - EDF agrees to transfer previous results for CZT measurements and permit access to this information by utility members of ISOE.
  - ISOE and its technical centres agree to facilitate the transfer of NPP CZT measurement data.

ISOE work in the field of source term management - EGWC (1)

- **Objectives**:
  - **Review and analysis** of current knowledge, technology and experience on radiation protection aspects of primary water chemistry and source-term management,
  - **Develop a report** in order to reflect the current state of knowledge, technology and experience on source term management with a radiation protection perspective.

- What are the **key parameters, the good practices and their potential advantages (and drawbacks)**?
- Members are representatives from EDF (Fr), Vattenfall (Sw), EPRI (USA), CEPN (Fr), Exelon (USA), ENEL (Sk) and OCDE/NEA (Secretariat).

ISOE work in the field of source term management - EGWC (2)

- **To reach its objectives, the group is developing a report dealing with:**
  - **Strategies and techniques:**
    - Background information (radiation field generation, key radionuclides, etc.),
    - Material issues (SG, Co inventory, surface preconditioning, ...)
    - Chemical methods (pH control, zinc injection, purification, ...)
    - Remediation of contamination during outages (full and specific decontamination)
  - **Radiation field measurement techniques:**
    - What techniques to follow my source term evolution? (dose rate measurement, CZT, germanium detector, etc.)
    - Meaning of the results? - Advantages and drawbacks (effectiveness, cost, etc.)?

ISOE work in the field of source term management - EGWC (3)

- **To reach its objectives, the group is developing a report aiming at:**
  - **Measurement location and indices**
    - What measurement program are implemented by various operators / institutes to follow source term evolution?
      - » Measurement point locations - rationality, etc. -.
  - **Radiation protection outcomes**
    - What is achieved by various operators and what are the results from an RP perspective?
      - » Operational experience

- All topics are addressed for PWR, BWR, VVER and PHWR.

ISOE work in the field of source term management - EGWC (4)

- The report once drafted will be reviewed by RP experts to ensure its valuable input for the RP community among the ISOE network (expected time for publication: end of 2012).

- After approval by the management board of ISOE, the report will be **published by the OECD/NEA**, and made available for download on NEA and ISOE web sites.

Discussion

- **The EGWC illustrates how networking is important:**
  - **To develop a common understanding of current RP issues** for nuclear utilities - source term management, dismantling activities, preparation of accidental situation from a RP perspective (SAM Expert Group), etc.
  - **To share good practices** so as to bring operational answers to identified issues/weaknesses,
  - **To contribute to the development of a sustainable RP culture** among professionals when sustainability of skills is a major issue for the coming 5 to 10 years for most utilities.
- **ISOE: a key actor in that context.**