Main conclusions from previous day
DAY 1
HOF BASICS AND BENEFITS

• What are they? Misconceptions and examples
  • Task-related (procedures, tools, instruction…); Organizational (Coordination, teamwork, priorities…); Environmental (heat, noise, lighting, housekeeping…); Individual (motivation, skill, competence, fitness…); Equipment and system (Interface, accessibility, complexity…)

• HOF are related to, but different from organizational culture

• HOF play an important, often dominant, role in incidents and accidents

• The science supporting HOF application is substantial and applicable

• HOF is holistic; Importance of relationships between individual factors

• Regulatory oversight of HOF can contribute to improve safety

• Questions: Fukushima impact, RB capabilities & responsibilities, systemic

“Nobody wakes up in the morning thinking: “Oh today I will make a mistake”

“Ultimately, human factors are involved in all incidents and accidents”
The importance of HOF is mentioned at fundamental level.

IAEA safety standards provide a sound basis to oversee HOF:
- What for, What and how to look at

All regulatory functions provide opportunities to oversee HOF, e.g.,
- Inspections to collect data and information on HOF
- Integrated safety review to identify trends and conclusions

Constructive and professional relation with its licensee to foster mutual understanding and therefore to positively influence licensees in this area.
Oversight of licensees’ HOF in Bulgaria

- National context: NPP programme, NRA,
- Legal and regulatory requirements cover HOF issues for design and operation of NPP
  - Organizational structure; resources; competence; analysis of events
  - Internal procedures, e.g., for inspections: HOF and SC data collection
- Oversight based on Review & assessment, and inspection
  - Checking compliance with regulatory requirements
  - Collecting information on HOF
  - Event analysis
  - Clear objectives set for the licensing process: Recruitment and competence management; organization…
- Future plans
  - Development of additional requirements on HOF
  - Resource and competence development
  - Establishment of an integrated HOF oversight process…
Experience in the use of HF engineering for ANGRA 1-3

• The regulatory body has adopted USNRC and IAEA documents to verify human factors and organizational factors of ANGRA 1, 2 and 3 NPP
  • The inclusion of a chapter 18 (HFE) in the FSAR was done 1998
• The implementation of acceptance criteria of these documents (USNRC-NUREGS, IAEA safety guides, etc.) are being monitored in the ten years periodic safety review evaluation for ANGRA-1 and ANGRA-2
• The proposal of design and procedures modifications are dependent on the acceptance of licensee’s PSA in level two
• Regulatory body intends to adapt NRC oversight program to evaluate licensee’s safety culture
Human engineering for NPP – DS492

• Why HFE safety guide? Developed considering Fukushima
  • Intended to address: SSR-2/1 Req. 32, 65 and 66 considering also SSR-2/2; GS-R-3; GSR part 4… and interfacing with IEC, NUREG, IEEE

• Topics: Operation and maintenance; Accident conditions; Design of control and display navigators; Equipment layout

• Guidance for new plants and modernization of existing plants

• The tentative DS492 content was presented
  • HFE program management
  • Analysis
  • Human system interface design
  • Human factors verification and validation
  • Design implementation
  • Human performance monitoring

• Expected to be endorsed by the CSS in November 2017
The current situation of Japan on regulatory oversight of the licensee’s HOF activities

• After Fukushima Daiichi Accident: Japan re-structured its nuclear safety regulatory system: Establishment of NRA
• In regulations, the focus has been on the erroneous operation prevention related to Man-Machine-Interface and the requirement for person responsible for operation
• First consideration of safety culture in 1994 (1st white paper). In 2014, NRA started evaluating safety culture fostering activities of the licensee. In 2015 NRA Commission issued “Statement on Nuclear Safety Culture“
  • To raise awareness of the importance of safety culture among key stakeholders
• To reflect the lessons learned from Mihama NPS Unit 3 accident, regulatory body evaluates “licensee’s root cause analysis report” and “licensee’s safety culture fostering activities” based on quality assurance activities
• NRA recommended MEXT to select another organizations to operate MONJU instead of JAE given the significant and continuous problems,
Regulatory oversight of HOF at Hungarian nuclear facilities

- National NPP context: 4 Reactors, Research Reactors
- HAEA is the safety regulatory body (for radiation too from 1/1/2016)
- Organization change is covered by a legal requirement
- Safety guideline for HOF, several inspection guidelines
- New inspection planning process (IRRS) – Better consideration of HOF
- HOF specific inspections
  - Managerial briefing before work
  - Near miss and low importance event investigation
- Annual Review and Assessment of facilities
  - Use of a safety indicator system, those related to safety culture
  - Intention to develop new set of indicators (coloured code) which can be used for COM
- Event assessment: “Regulatory oversight should focus on HOF”
DAY 2
IAEA’s Strategy to oversee HOF

- Socio-technical systems: organization, operator, working environment; materials and technical systems
  - Experience feedback
  - Safety policy, improvement process, leadership…
- Variability of context: need for continuous worker adaptation
- Performance based on high level of human cost is a source of significant risk
- Oversight (Little regulations in France)
  - Inspections: Topics include competence, qualifications, OEX, safety management practices – Observe: work situations
  - Review and assessment: IRSN, Advisory 7 HOF steering committees
- High concern for ASN
- Difficulties to control HOF wide and diverse oversights
- Encourage licensee to work in this area and to have competence
Regulatory oversight activities and issues on HOF in Korea

- After TMI, established legal basis on HOF focussing on Human Factors engineering design in SAR and PSR: qualification, training, activities, management of HOF
- R&A to ensure HOF considered in construction and operation; modification of HMI; and PSR
- Chapter 18 of SAR but also considered under chapter 7 (instrumentation) and others
  - Several regulatory standards and guides on HFE, Conduct of operation
- PSR, used of SSG 25, HOF related issues are assessed
- KINS uses different types of inspections: pre-operational, periodic and special
- During the Stress-test, HOF aspects were covered
- National mid-term plan to foster Safety Culture
- Integrated approach for covering H, O and T Factors
CNSC's regulatory oversight of HOF, current approaches and future vision

- CNSC organization, regulatory framework content related to HOF
- Safety and control area (SCA) framework for oversight, set of technical topics enables and integrated approach for collecting, managing and presenting information - Regulatory documents structure links with SCA
- Current approaches: Cross-cutting domain, apply across the SCA framework; Use of HOF specialists; Multidisciplinary reviews and inspections
- Vision for human performance: Discussion paper on Human performance in progress; integrated nature of HOF; human centred and systemic considerations
- License Human Performance Programmes
- Good practices
  - Consideration of human performance as it is actually carried out by individual workers
  - Providing appropriate resources to support human performance
  - Continual system improvement through considering and managing the broad range of HOF
  - Considering the roles of all levels and all departments
  - ensuring that human error is considered as a potential symptom of deeper issues
  - Identifying human performance problem sources using a variety of methods, and correcting them
  - Continually striving to improve organizational system that governs, manages and guides human performance

Human factors are those factors that influence human performance
Regulatory oversight of HOF in Germany

- Regulatory framework: principle on Safety-Oriented HTO; maintaining and enhancing safety culture; responsibility of leadership
- NPP oversight: at Federal and lander level
- Regulatory strategy to oversee HOF: ITO + external factors (RB, public…) – systemic analysis and oversight, focus on IMS and SC, influence of regulatory oversight; focus on senior management
- Regulatory functions: Inspections, KOMFORT, control of self-assessment of Licensee; annual inspection evaluation; annual meeting
- KOMFORT (SC assessment): based on Schein concept – Integrate in regular inspection: SC indicators (Artefact level): workload, quality…
- RB organization: HTO group, IMS, intensive communication, psychologists
- Regulator is part of the safety culture system
Regulatory oversight of HOF in Finland

- Decree on the NPP Safety 717/2013: 6 Management of human factors; 24 Operational experience feedback and safety research; 28 Safety Culture; 29 Safety and Quality Management; 30 Lines of management, responsibilities and expertise
- Reg. Requirement – 25 YVL Guides:
  - A.1 Regulatory oversight of safety in the use of nuclear energy
  - A.3 on MS for a nuclear facility: Management of human and organisational factors
- STUK’s oversight activities: Inspection, Review & Ass., OEX…
- HAKE Database: integrate different observations in a systemic way
  - Non Conformances and incidents
  - Communication
  - Management and leadership
  - Quality Management
  - Resource planning and competences
  - Project management

Oversight Process

- Oversight findings
- Analysis and decision on action
- Requirement letter
- Management meeting with licensee
- Independent evaluation
- Investigation
- Follow up and evaluation of effects

TM on Regulatory Oversight of HOF

December 2015
BS 1: Concept and areas for oversight on HOF

• 4 groups were tasked to further develop a common understanding on HOF and the importance to deal with HOF
DAY 3
BS 1: Concept and areas for oversight on HOF

• 4 groups were tasked to further develop a common understanding on HOF and the importance to deal with HOF

• Definition
• How to identify Gaps and Deficiencies, how to address them
• Not all HOF are intangible
The Human and Organizational part of Nuclear Safety

- Safety paradigm
  - Technical factors are advance and robust
  - There are systemic weaknesses related to HO constraints
  - H, O and Culture weaknesses consistently identified as cross contributors to significant events: Complacency (the worst enemy; normalisation of abnormal conditions or deviations, etc.)
  - Fukushima Accident Report (9/15), chapter 2 Why this happened
  - Systemic Approach to Safety (SF principle 3): Safety culture embraces this integration (HTO)
- Examples of Organizational, Technical, and Human Factors
- Licensees HOF/SC Areas
- Need for specialists
Regulatory framework and practices for the oversight of HOF in nuclear installations in Romania

- Requirements are fairly general but sufficient to oversee HOF; examples regarding organizational aspects were provided

- Regulatory oversight covers:
  - Design, based on IEEE Standards 1023-2004; Safety analysis of DSA and PSA
  - Procedures for normal and emergency situations (design, storage, control…)
  - Operational performance - Control rooms, Event analysis, training programmes…
  - Emergency planning and preparedness
  - Organizational structure and staffing; Management system and its processes…

- Description of Safety Culture Oversight Process (SCOP) used in Romania

- Description of content of regulations related to organizational factors
Mexican nuclear regulatory framework on HOF

• Remind: importance of HOF and difficulty to oversee
• Organizational structure guides human behaviour
• Description of Technical requirements on
  • Organization structure, training and qualification
    • Qualification, a combination of education, experience and training
  • Training programme are reviewed by the RB, staff selection process
• Human and Organizational Factors
  • Education, knowledge and ability to communicate
  • Fitness for duty programme is required to maintain capabilities and skills needed to perform tasks safely and efficiently
Practice of HOF regulatory oversight in Russia

- Human and organizational factors are taken into account
  - according to national legislation and safety requirements
  - during both licensing and inspections activities
- Provided an overview of the legal and regulatory requirements
  - Training, competence and qualifications of licensee staff...
- Regulatory body carried out different types of inspections: planned and unplanned; complex inspection; dedicated inspections for licensing
- Inspection programme addressed HOF: e.g.,
- Regulatory body issues permits for key individuals (DG, DDG…) to ensure efficient nuclear management
- Regulatory oversight of human factor, including quality and training of personnel is a key factor for safety culture
- Oversight of organizational factors should be of importance for regulatory body during organizational changes in nuclear industry
BS 2: Regulatory Strategy and Oversight Programme

• 4 groups were tasked to discuss and identify good practices to oversight HOF: Regulatory Strategy, Content of a Regulatory Programme and possibly Key Regulatory Requirements
BS 2: Regulatory Strategy and Oversight Programme

- 4 groups were tasked to discuss and identify good practices to oversight HOF: Regulatory Strategy, Content of a Regulatory Programme and possibly Key Regulatory Requirements
  - Finalize the definition of HOF
  - Need for categorization
Supporting of the regulatory activities in the area of HOF in Ukraine

• Assessment / analysis of operational events are opportunity to identify HOF-related issues, an actual root causes

• Use of safety indicators to supervise the HOF for: Organization; operational safety; Radiation safety and RAW management
  - Indicators (SC, Quality…) ➔ Evaluation (Trends) ➔ Actions

• SNRIU (Ukraine Regulatory Body) actions to oversee HOF supported by relevant SSTC NRS activities: Examples of regulatory actions (Request for NPP Standing committee, HOF-related directions of inspections

• SNRIU Board (Permanent advisory body) held a meeting last October on Effectiveness of Operating Experience Feedback (Investigation of NPP Operational Events)"

• SNRIU has approaches/methods to oversee HOF and planned for:
  - Use of multiple tools to ensure validity of data to support review on HOF
  - Training courses, specifically designed for senior management
  - New Regulations and guides to address HOF
Current practices in the area of HOF regulatory oversight on the Belarusian NPP

• Described Legal and Regulatory system in Belarus
• GOSATOMNADZOR oversee nuclear safety at all stage of the lifetime of NPP; explained different types of inspection
• Underlined the importance of Quality Assurance for safety
• Current challenges are: Managing the significant staff growth in very short time; establishing an IMS
• The education programme is supported by IAEA, Russian Federation, and EU support through Training courses, on-job training and expert missions aims at
  • Transferring Methodology and knowledge
  • Enhancing Competence
  • Supporting Belarusian Regulatory Body growth
Regulatory oversight of HOF during different stages of Indian NPPs

- Described the legal and regulatory system in India including the regulatory body AERB and its major functions
  - Licensing process: siting, construction…
  - General requirements on HOF applicable at all licensing stages: Organization, responsibilities, authorities, interfaces, managing organization changes, competence and safety culture
  - Specific requirements for each stage
- Lessons learned:
  - Introduce regulatory requirements on HOF for submission on significant event reports; on outsourcing services; unambiguous organizational structure; communication; stress management…
  - Need for regulatory oversight on emergency management aspects whose success depends on human performance, etc.
  - AERB is enhancing its competence in the HOF areas
Slovak Regulatory Oversight of HOF

- National, legal and regulatory infrastructure for safety
- Existing regulatory requirements:
  - quality management system: Quality policy, documentation
  - Job position identification: work positions, competences
  - Training and fitness and mentally competent
  - Modification changes important to safety are under RB approval
- Inspection Guides & Procedures: one on staff qualification and training, one internal guides on Mistakes or Misunderstanding (Use of wrong procedures, time pressure, workload…)
- Oversight of Integrated Management System (IMS), HOF
- Oversight / Monitor HOF: job-site review, questioning attitude, adherence to procedure, communication, pre-job briefing
- Challenge: Preparation of new Atomic act and associated regulations
Panel Discussion: Opportunities and challenges to Change

- 5 Panellists: Alice, Eszter, Madalina, Marco, Ram
- Issues discussed
  - Prerequisites
  - Constraints, Opportunities, Possibilities
  - Difficulties and challenges
  - Strategy
  - Support needed

OPPORTUNITIES AND CHALLENGES TO CHANGE
“Developing and strengthening a regulatory oversight programme”
THANK YOU

j.jubin@iaea.org