Knowledge Preservation for Nuclear Power Plants

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Source: Krsko NPP
Knowledge Management Review Criteria
1. Documentation (includes technical documentation, plant procedures, work control documents, engineering and technical documents, and reports)
2. Training and Qualification
3. Teamwork and Communication
4. Human Resource Management (including career development, workforce planning, job rotation, ..)
5. Operating Experience
6. Corrective Action and Change Management Programmes
7. Meetings
8. Work Control
9. Accountability
10. Human Performance

Knowledge Management for NPP Operating Organizations

• IAEA Technical Document – to be completed in the end of 2005
• The purpose: to share with NPP operating organizations the lessons learned regarding knowledge management, both by organizations inside the nuclear industry, and, where they are judged to be relevant, also those outside the industry.
Contents

1. Needs for and Benefits of Applying Knowledge Management
2. KM Policies and Strategies in NPP operating organizations
3. Managing Nuclear Knowledge (Fundamental elements of KM)
4. Knowledge Preservation Methods and Techniques
5. IT Solutions Supporting Knowledge Preservation
6. Lessons learned
7. Conclusions and Recommendations
8. Country reports/Good practices
9. CD with sample materials and demos

Technical Meeting
to
Develop a Guidance Document on the Preservation (and Enhancement) of Nuclear Knowledge for Nuclear Power Plant Operating Organizations
28 November - 2 December 2005, Vienna, Austria

The meeting with a participation of experts from different Member States will review a draft document on the subject and provide a forum for information exchange and benchmarking on KM for NPP operating organizations.
IAEA Fast Reactor Knowledge Preservation Initiative

Objective
Develop Knowledge Base into which existing KP Systems will fit, and which will complement and integrate future Member States’ efforts to preserve fast reactor data and knowledge

Outcome
Widely used international Knowledge Base through Portal established and maintained by IAEA

IAEA’s Contributions

Member States’ Contributions
IAEA’s Contributions

• Own fast reactor data & knowledge: 35 + years of activities within the frame of the IWG-FR/TWG-FR
• Creation of FRKP network
• Support and coordination of FRKP in MS through and with the help of the TWG-FR:
  ✓ Mobilization of MS to take concrete action (e.g., IAEA fact finding missions)
  ✓ Support experts (SSA),
  ✓ CRPs, and coordination meetings
• Development of fast reactor taxonomies, creation and maintenance of the Knowledge Portal

Member States’ Contributions

• Identification of fast reactor development, operation, and decommissioning data & knowledge location
• Assessment of data and information quality and completeness, and degree to which it is endangered
• Conversion into a robust and secure electronic form
• Development of interpretive documents (define final state of affairs and its rationale)
• Preparation of bibliographical records, including index/key words in close cooperation with INIS
• Facilitation of the provision of access to the information (not necessarily open release if commercial) within the international Knowledge Base to be administered and preserved by the IAEA
Status of IAEA Contributions

• Support for retrieval and archiving (using INIS capabilities) of data and information related to the German experimental fast reactor KNK-II (presently being dismantled)
  ➢ Information retrieved, evaluated, preserved in electronic form (sources: FZK, Siemens/FRAM ANP)
  ➢ Records created based on adapted INIS thesaurus
  ➢ CD ROM created as preliminary step

• Work started on Knowledge Portal
  ➢ Specifications
  ➢ Indexing, hierarchies, taxonomies

Full text CD-ROM prepared by the IAEA Knowledge Preservation Group
Coordinated Research Project

Analyses of, and Lessons Learned from the Operational Experience with Fast Reactor Equipment and Systems

CRP Objectives

- Preserve the feedback from commissioning, operation, and decommissioning experience of experimental and power sodium cooled fast reactors
- Enable easy access to the information from this feedback
- Produce lessons-learned/synthesis reports of lessons learned from the commissioning, operation, and decommissioning of experimental and power sodium cooled fast reactors
CRP Activities

• First stage
  - Retrieval, assessment and archiving of all the relevant documentation and information
  - Conversion of the documents in electronic form
  - Preparation of electronic databases organized along scientific/technical topics and reactors

• Second stage
  - Critical review, assessment, and systematization of the available data
  - Publication of synthesis reports, including the appropriate recommendations from the “lessons learned”

Implementation Plan

• 2005:
  - Preparatory Technical Meeting (this mtg.)
  - Setting up CRP team
  - Kick-off research coordination meeting (RCM): agree upon the list of reactors to be considered and upon the topics to be covered by the CRP, identify lead organisations among the CRP participants for the various topics/work packages, produce an agreed upon definition of detailed tasks as well as work plans and deadlines, identify responsibilities for competing tasks, and establish an outline and responsibilities for completion of the final IAEA TECDOC(s) …
Implementation Plan, cont’d

• 2006 and 2007:
  ➢ Convene 2\textsuperscript{nd} and 3\textsuperscript{rd} RCM, respectively: review progress to technical work and TECDOC development, identify improvements and/or modifications to the tasks and/or work plans

• 2008:
  ➢ Convene 4\textsuperscript{th} RCM: review the status of the technical work, perform an overall review of the CRP results, provide the final input to the TECDOC(s) and finalize the draft of the TECDOC, identify open issues and actions to resolve them, and outline the road ahead and the Agency’s role

The Structure of the IAEA FRKP System
(The First Level)

Basic Principles

R & D

Design, Analysis, Licensing

Manufacturing & Construction

Fuel cycle

Operation

Decommissioning
### The Structure of the IAEA FRKP System
(The second Level) - 1

| Basic Principles | Fast fission  
|                 | Basic design and variations  
|                 | Safety principles and philosophy  |
| R & D           | Reactor physics  
|                 | Fuel and materials  
|                 | Heat transfer and transport systems  
|                 | Pipe integrity  
|                 | Seismic analysis  
|                 | Accident analysis  
|                 | Sodium fire  
|                 | BDB events  
|                 | Control materials  
|                 | Shielding  |

### The Structure of the IAEA FRKP System
(The second Level) - 2

| Design, Analysis, Licensing | General system criteria  
|                            | Codes and standards  
|                            | Core design  
|                            | Dynamic analysis  
|                            | Environmental impact  
|                            | System design description  
|                            | Demonstration of safety  
|                            | Project cost analysis (economics)  
|                            | Control systems  
|                            | Failed fuel detection  
|                            | Shielding  |
| Manufacturing & Construction | Site development  
|                            | Components manufacturing  
|                            | Plant assembly  
|                            | Balance of plant  
|                            | Inspection  
|                            | Codes & standards  |
The Structure of the IAEA FRKP System
(The second Level) - 3

Fuel cycle
- Fuel fabrication
- Waste management
- Transport

Operation
- Cold start up
- Low power commissioning
- Full power operation
- Environmental impact
- Maintenance
- Off-normal & emergency operation
- Failed fuel detection
- Fuel handling
- Training of personnel

Decommissioning
- Planning
- Experience

Relations between the Various Components of the FR Knowledge Base (1)

DATA/INFO
KNOW-HOW
+ links to other DBs

IAEA
JAPAN
USA
GERMANY
FRANCE
RUSSIA
UK

IAEA (also provider)

REALITY

USER

General Principles:
- Listing of documents
- Electronic Copy
- Can maintain confidentiality

Trieste - 2005
Relations between the Various Components of the FR Knowledge Base (2)

WHAT THE USER SEES

DATA/INFO KNOW-HOW -> IAEA (also provider) <-> USER

Common System