



Knowledge Management System: Views from the Fuel Cycle Research and Development Program

International Workshop on Next Generation Knowledge Management System (KMS) for Geological Disposal of Radioactive Waste

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Introduction

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- **We are “new” to the KMS ara**
 - **The U.S. waste disposal program has changed over the past year**
 - Continues to operate the Waste Isolation Pilot Plant for the disposal of defense-related transuranic wastes
 - **The DOE’s Fiscal Year 2010 budget identified the Administration’s intent to terminate the Yucca Mountain Repository Project for disposal of Commercial SNF and defense-related HLW**
 - Includes funding to continue participating in NRC licensing activities continue, but there are indications it may be terminated in the next fiscal year
 - **“Blue Ribbon Commission” to evaluate alternatives for managing used nuclear fuel and high level nuclear waste**
 - Consider advances in science and technology



Fuel Cycle R&D Program Mission

The mission of the Fuel Cycle Research and Development Program is to develop options to the current commercial fuel cycle management strategy to enable the safe, secure, economic, and sustainable expansion of nuclear energy while reducing proliferation risks by conducting research and development focused on nuclear fuel recycling and waste management to meet U.S. needs.



- ***The Fuel Cycle R&D Program: Enabling a secure, sustainable energy future***



Fuel Cycle R&D Program Objectives

- **Develop options for used nuclear fuel management that reduce the long-term environmental burden**
- **Enhance overall nuclear fuel cycle proliferation resistance via improved technologies for used fuel management**
- **Enhance energy security by extracting energy recoverable in used fuel, thus extending uranium resources**
- **Improve the excellent safety performance and economics of the nuclear fuel cycle**

***Used Fuel and High Level Waste Management is
Fundamental in Meeting These Objectives***

Used Fuel Management Within the FCR&D Program

- **Used fuel and high level waste management has been an integral part of the advanced fuel cycle R&D program**
 - Waste Form Campaign: R&D on the production, characterization, and long-term performance of potential waste forms
 - Systems Analysis: Analyses of waste management within the context of the entire fuel cycle system. Established initial integrated waste management system
- **Did not consider a wide range of waste management options and potential solutions**
- **Current direction in the U.S. necessitated broader consideration of waste management alternatives, options, and possible solutions for managing wastes from an advanced fuel cycle**

Used Fuel Disposition Campaign Established in the Spring of 2008

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Used Fuel Disposition Campaign Mission

The mission of the Used Fuel Disposition Campaign is to identify alternatives and conduct scientific research and technology development to enable storage and disposal of used nuclear fuel and wastes generated by existing and future nuclear fuel cycles

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Knowledge Management on the Yucca Mountain Project

- **Actually, information management (explicit knowledge)**
- **Large number of systems – often not integrated**
 - Requirements Management System
 - Technical Information System – books, journals
 - Records Information System (calculations, analyses, field reports, scientific notebooks, etc.)
 - Technical Data Management System – model inputs and outputs
 - Software Management System – qualified models
 - Condition Management System – quality issues
- **And... the largest one: The Licensing Support Network**
- **Information types changed over the years**
 - Procedure evolution (Quality Assurance)
 - Electronic format
 - Document types and structure (technical reports → formal analyses/models)
- **Systems worked for that program, but...**
- **Can it be done better?**

Knowledge Management on the U.S. Fuel Cycle R&D Program

- **A KMS is being developed under the Fuel Cycle R&D Program**
 - Focus is on capturing historical information and tacit knowledge from aging workforce (EBR-II, TREAT, FCF)
 - Similar to efforts underway in the U.S. nuclear industry
 - Interviews underway and information being gathered
 - Prototype under development
- **Need for Knowledge Management for used fuel disposition and HLW management in future fuel cycles – the Boundary Conditions have changed**
 - Waste management broader than disposal – need to consider storage, LLW, ILW
 - Broad range of waste forms and radionuclide inventories
 - No specific site
 - No specific design
- **Here to learn and explore potential for collaboration**

Used Fuel Disposition Campaign Near-Term Objectives and On-Going Activities

- **Enhance international collaboration**
 - Tremendous amount of work done internationally necessary so as to not re-invent the wheel
- **Develop “databases” to support future analyses**
 - UNF, HLW, LLW
 - Waste forms, quantities, inventories
- **Inform decisions for used fuel management policy**
 - External interaction and rapid response activities
 - Lessons learned
 - Legal and regulatory framework
- **Document current technical basis for storage of used fuel and high-level waste, identify opportunities for long-term R&D**
 - Distributed, Regional, Centralized
 - Security
 - Long-term performance and behavior
- **Develop a long-term roadmap for storage options**
 - Integration of storage within a variety of fuel cycle alternatives

Used Fuel Disposition Campaign Near-Term Objectives and On-Going Activities

- **Document technical bases for disposal of used fuel, low level waste, and high level waste, identify opportunities for long-term R&D**
 - Focus on different disposal environments and disposal system designs
 - Develop technical bases cross-walking against Features, Events, and Processes
 - Internationally accepted approach
 - International results and collaboration
 - Identify technical gaps
- **Model development for generic disposal concepts**
 - Engineered and natural barrier behavior and long-term performance
 - Supports to advanced model development
 - Use performance assessment to inform the program and guide R&D efforts



Conclusion

- The Waste Form campaign is investigating different waste forms, integrated with advanced separations research
- The Systems Analysis campaign is considering waste management metrics when evaluating future fuel cycle alternatives

A Knowledge Management System would support both the dissemination of both historical and future knowledge pertaining to waste management in an advanced fuel cycle

Interested in international collaboration in this area