

Nuclear Fuels Storage & Transportation Planning Project
Office of Fuel Cycle Technologies

Nuclear Energy

Development of an Execution Strategy Analysis (ESA) Capability and Tool for Storage of Used Nuclear Fuel (UNF)

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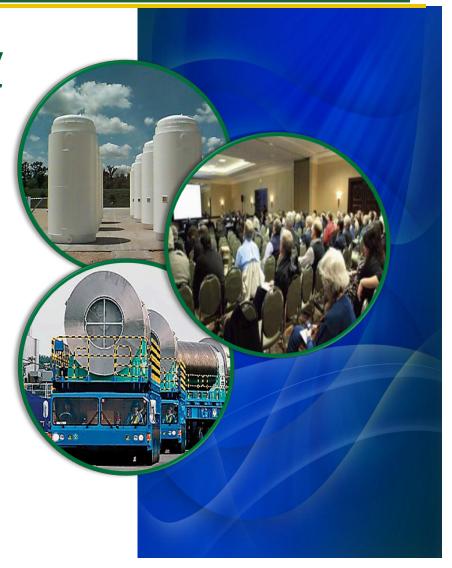
R. Stoll / J. Voss / J. Greeves

Predicus LLC, USA

A. Keizur / A. Neir

Golder Associates Inc., USA

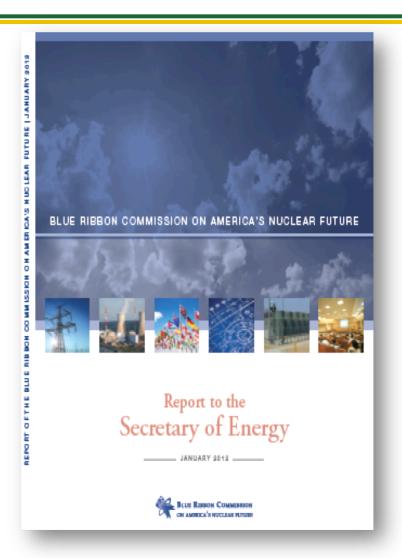
Vienna, Austria June 18, 2015





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NFST – Laying the Groundwork for Implementing Interim Storage



STRATEGY
FOR THE MANAGEMENT
AND DISPOSAL
OF USED NUCLEAR FUEL AND
HIGH-LEVEL RADIOACTIVE WASTE



JANUARY 2013





Questions Related to Implementation of Interim Storage

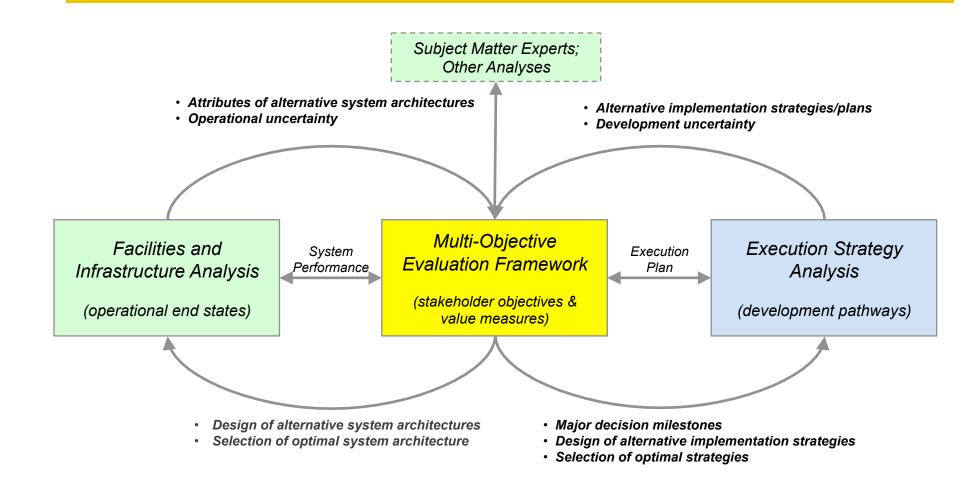
What are

- Implementation approaches for meeting the Strategy's goals?
- The critical path milestones and activities?
- The interdependencies across program elements?
- Key program risks and potential mitigation strategies?
- Impacts of various policies and potential legislation?
- The long lead time activities?
- Near term activities that provide schedule benefit and reduce risks?
- Cannot answer one without thinking about all "integrated thinking is key"





ESA – A Key Part of NFST Integrated Waste Management System Analysis







Execution Strategy Analysis (ESA) Complements Traditional Project Management Tools

- The ESA approach builds on traditional project management tools (i.e., Gantt Charts, WBS) and provides additional insight
 - Integrates all key project elements
 - Explicitly models uncertainty and its impacts
 - Traditionally cost and schedule other important metrics can be included (i.e., jobs)
 - Explicitly models risks and opportunities
 - Technical and non-technical
 - Associated uncertainties
 - Allows for the assessment of alternative scenarios to provide information on potential impacts and benefits of alternative implementation strategies





Execution Strategy Analysis Approach – NFST Example

- Identified all milestones and activities required to start a Pilot ISF (and expansion to a Larger ISF)
- Sequenced them, identifying all interdependencies
- Quantified duration and cost; and uncertainty
- Identified and quantified risks
 - Technical and programmatic
 - "Controllable" and "non-controllable" risks
- Implemented into a dynamic probabilistic simulation tool to evaluate different scenarios and strategies
- Analyzed results to gain insight

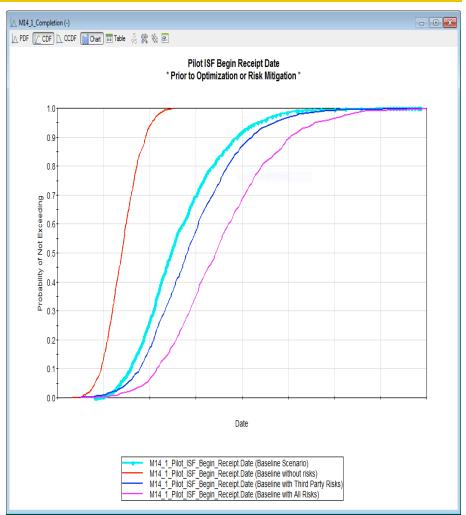
Subject matter experts used during all steps





ESA – Performance Assessment of Alternate Implementation Strategies

- **■** Explicitly model and assess impacts
 - Uncertainties
 - Activity duration/cost
 - Funding
 - Constraints
 - Policy (i.e., need for legislation)
 - Legislation
 - Regulatory
 - Risks (strategy/cost/schedule)
 - Technical and non-technical
 - Policy
 - Regulatory change
- Identify and evaluate alternative strategies and approaches
 - Mitigation
 - Optimization





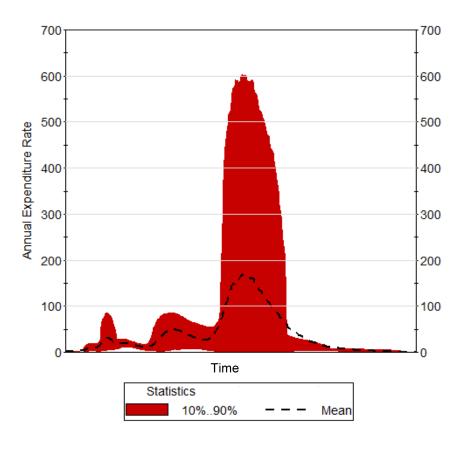


ESA - Key Outputs Support Analysis of Implementation Scenarios

Sensitivity Analysis: Milestone Completion Date

Time Independent Variables

Annual Expenditure Rate







Analysis of the Likelihood a Milestone is on the Critical Path

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Programmatic	Licensing, NEPA, Permitting for Pilot ISF	Siting and Coordination —	Reactor Infrastructure for Transport
M1a 0	M6.1a* 0 M6.1a	M5.1* 0.738 M5.1 0.738	M10.1* 0 M10.1
Conceptual Design	M6.1b* 0	M5.1a 0.998	M10.2 0.008 M10.3 0
M2.1* 0.196 M2.1 0.196	M6.1b 0 M6.2 0	M5.2a 0.998	M10.4 0
M2.1 0.196 M2.2 0.196	M6.3 0.456	M5.3 0.998 M5.3a 0.284	M10.5 0
M2.3 0 M2.4 0	M6.4 0.456 M6.5 0.71	M5.3b 0.284	Transportation Operations
M2.4 0 M2.5 0	M6.6 0.71 M6.7 0.994	M5.3c 0.396 M5.4 0.736	M13.1 0 M13.2 0
Pilot ISF Design	M6.8 0.34	M15.1* 0.056	M13.3 0
M3.1 0 M3.2 0.986	M6.9 0.922 M6.10 0.922	M15.1 0.056 M15.2 0.066	M13.4a 0 0.014 0.014
M3.3* 0	M6.14 0.064	Transporation Hardware	M13.4 0.014
M3.3 0 M3.4 0.002	M6.15 0.986 M6.16 0.8	M8.1* 0	
M3.5 0.002	M6.17 0	M8.1 0 M8.3 0	
M3.6 0 M3.7 0.8	M6.18 0 M6.20 0	M8.3a 0	
Pilot ISF Construction	Transporation Planning	M8.5 0 M8.6 0	
M11.0 0.186 M11.1 0.986	M9.1* 0	M8.7 0	
0.386	M9.1 0	M8.8 0	NECT



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