

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)

M. Nutt / N. Saraeva

Argonne National Laboratory, USA

R. Stoll / J. Voss / J. Greeves

Predicus LLC, USA

A. Keizur / A. Neir

Golder Associates Inc., USA

Vienna, Austria June 18, 2015





NFST – Laying the Groundwork for Implementing Interim Storage

Nuclear Energy



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



JANUARY 2013





Questions Related to Implementation of Interim Storage

Nuclear Energy

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

Nuclear Energy







Execution Strategy Analysis (ESA) Complements Traditional Project Management Tools

Nuclear Energy

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

Nuclear Energy

- 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

Nuclear Energy

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







Nuclear Energy

ESA - Key Outputs Support Analysis of Implementation Scenarios

Sensitivity Analysis: Milestone Completion Date



Annual Expenditure Rate





Analysis of the Likelihood a Milestone is on the Critical Path

Nuclear Energy

Programmatic	Licensing, NEPA,	Siting and Coordination	Reactor Infrastructure for Transport
M1a 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	M6.1a* 0	M5.1* 0.738 M5.1 0.738	M10.1* 0
Conceptual Design	M6.1b* 0	M5.1a 0.998	M10.2 0.008
M2.1* 0.196	M6.1b 0	M5.2a 0.998	M10.3 0 M10.4 0
M2.1 0.196 M2.2 0.196 M2.2	M6.3 0.456	M5.3 0.998	M10.5 0
M2.3 0	M6.4 0.456 M6.5 0.71	M5.3b 0.284	Transportation Operations
M2.5 0	M6.6 0.71	M5.3c 0.396	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	M13.4b 0.014
M3.3* 0	M6.14 0.064	Transporation Hardware	M13.4 0.014
M3.4 0.002	M6.15 0.986 M6.16 0.8	M8.1* 0	
M3.5 0.002 M3.6 0	M6.17 0	M8.1 0 M8.3 0 M8.3	
M3.7 0.8	M6.20 0	M8.3a 0	
Pilot ISF Construction	_ Transporation Planning	M8.6 0	
M11.1 0.986	M9.1* 0 M9.1 0	M8.7 0 M8.8 0	





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)

M. Nutt / N. Saraeva

Argonne National Laboratory, USA

R. Stoll / J. Voss / J. Greeves

Predicus LLC, USA

A. Keizur / A. Neir

Golder Associates Inc., USA

Vienna, Austria June 18, 2015

