



Advanced Reactors A Paradigm Shift

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SECY-18-0060: Achieving Modern Risk-Informed Regulation

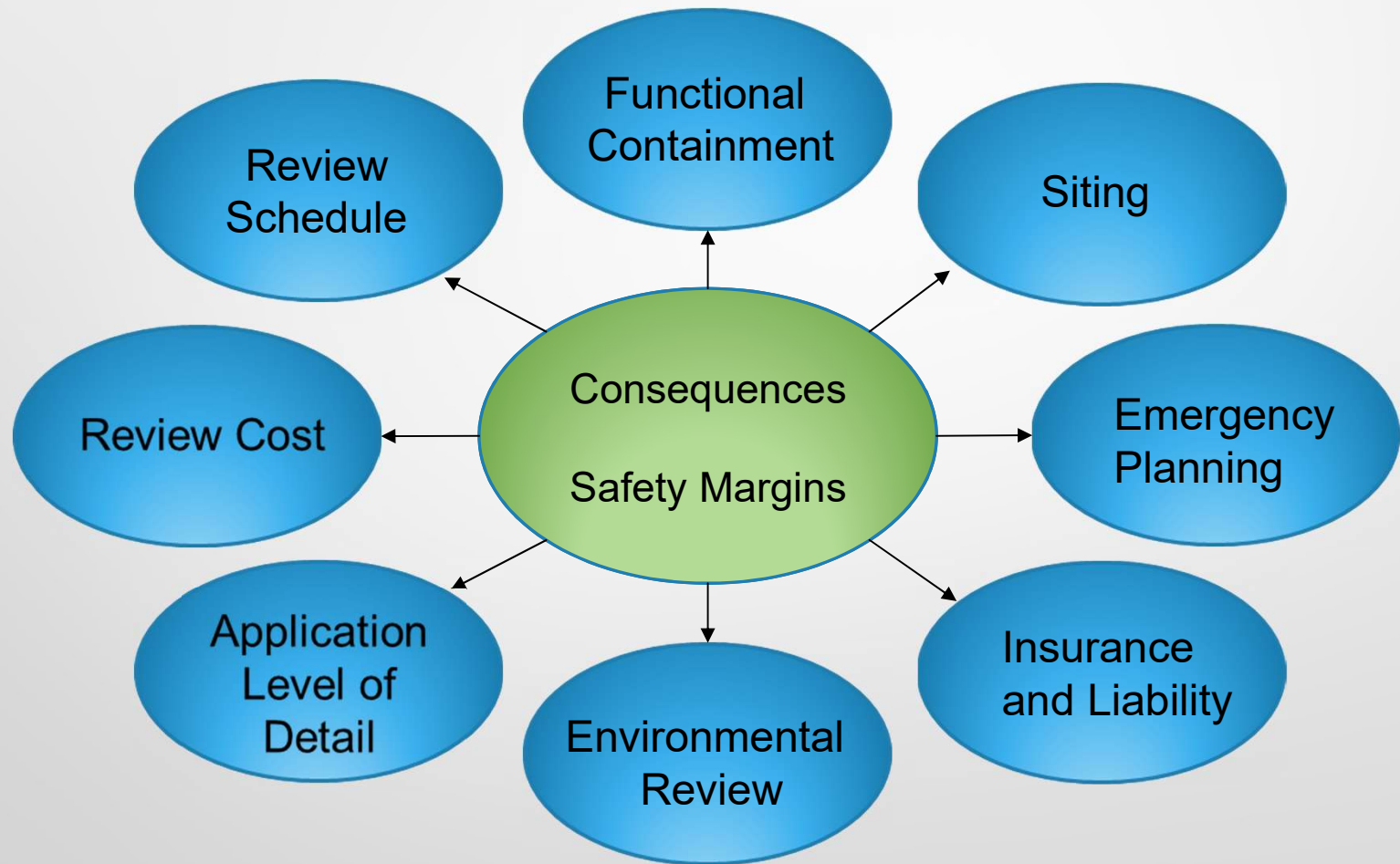
“An overarching theme that emerged from internal and external stakeholder outreach is the need for systematic and expanded use of risk and safety insights in decisionmaking. Out of this theme, the Team identified the need to appropriately scale the scope of review and level of detail needed from an applicant to enable the staff to make licensing decisions, consistent with the standard of reasonable assurance of adequate protection of public health and safety.”

How are we going to get there?

Paradigm shift is necessary:

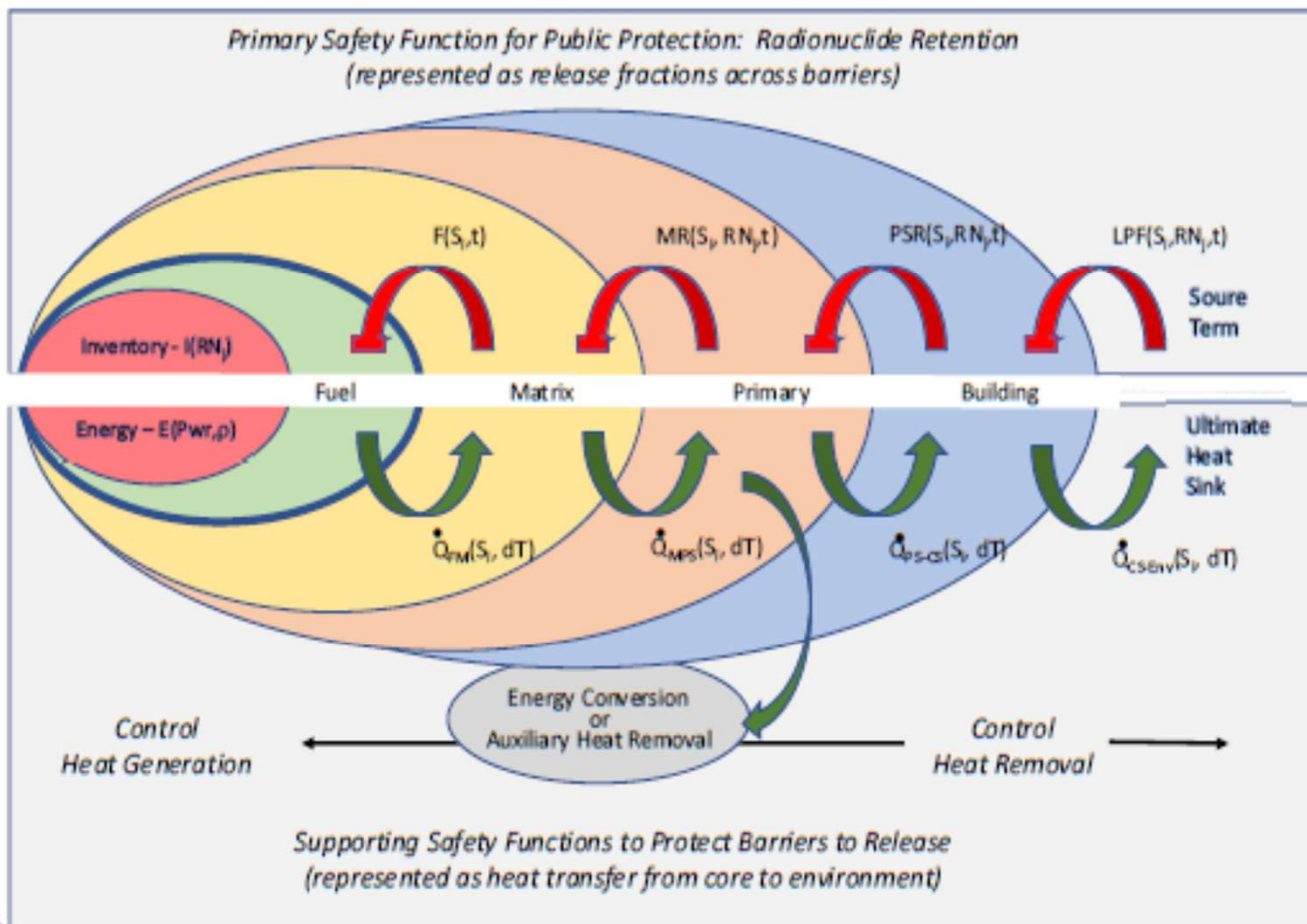
- Current Regulations and Guidance are LWR-centric
- Technology-Inclusive, Risk-informed and Performance Based Licensing Approach needed
- Consideration of Inherent Safety Characteristics, Source Term, Safety Margins
- Innovative Thinking
- International Cooperation

Risk Informed Reviews



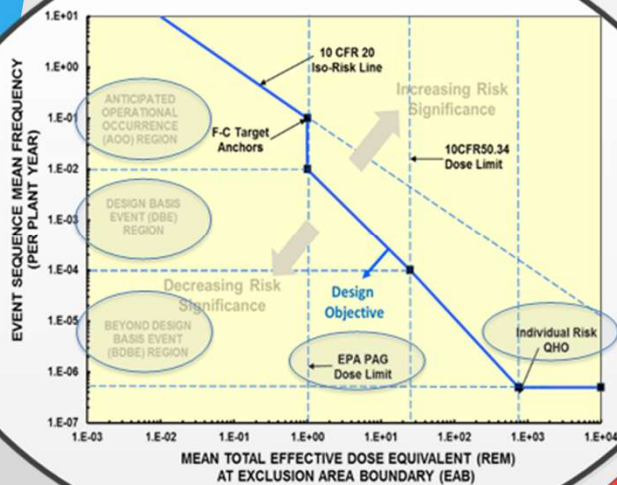
Focus on First Principles

Fundamental Safety Functions and Mechanistic Source Term



$I(RN_j)$	Inventory
RN_j	Radionuclide Groups (j)
E	Heat Energy
Pwr	Power Level
ρ	Reactivity
F	Fuel Release Fraction
MR	Matrix Release Fraction
PSR	Primary System Release Fraction
LPF	Building Leak Path Factor
S_i	Event Sequences (i)
t	Time
\dot{Q}	Heat Transfer
FM	Fuel to Matrix
MPS	Matrix to Primary System
$PS-CS$	Primary System to Cooling System
$CS-Env$	Cooling System to Environment
dT	Temperature difference

Risk Informing the Application Content and Staff Review



Non-Light Water Reactor



LMP

DBA

AOO

DBE

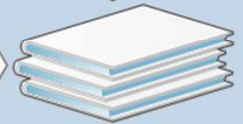
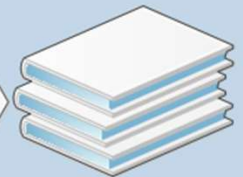
BDBE

Safety-Related SSCs

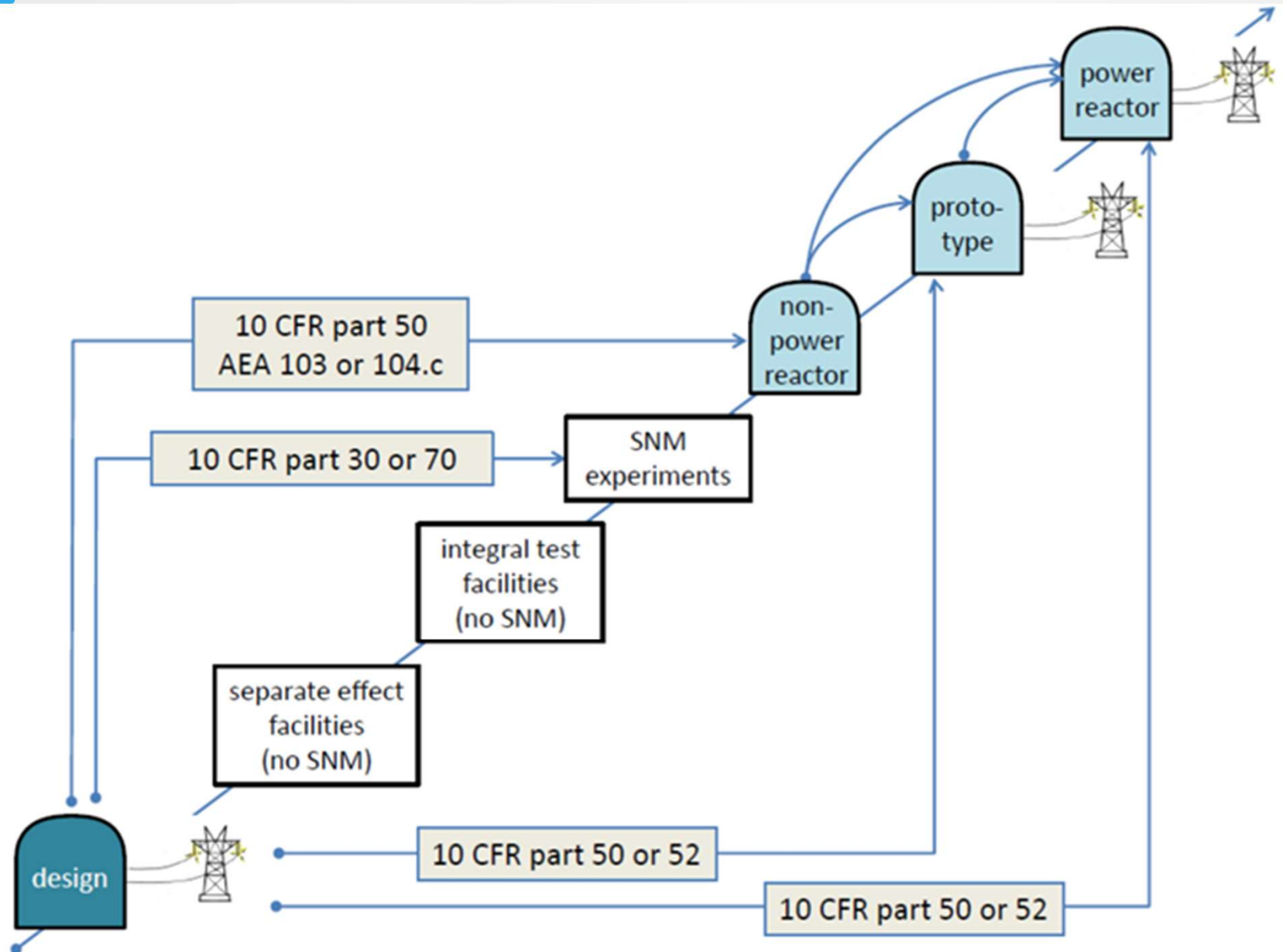
Non-Safety-Related SSCs
Risk Significant

Non-Safety-Related SSCs
Non-Risk Significant

Application



Pathways to Innovation:



Conclusions

- Prioritize Technology-Inclusive, Risk-Informed, and Performance-Based Approaches
- Maintain Focus on Fundamental Safety Functions
- Provide Flexible and Staged processes to support innovation
- Leverage Opportunities for International Cooperation and Harmonization