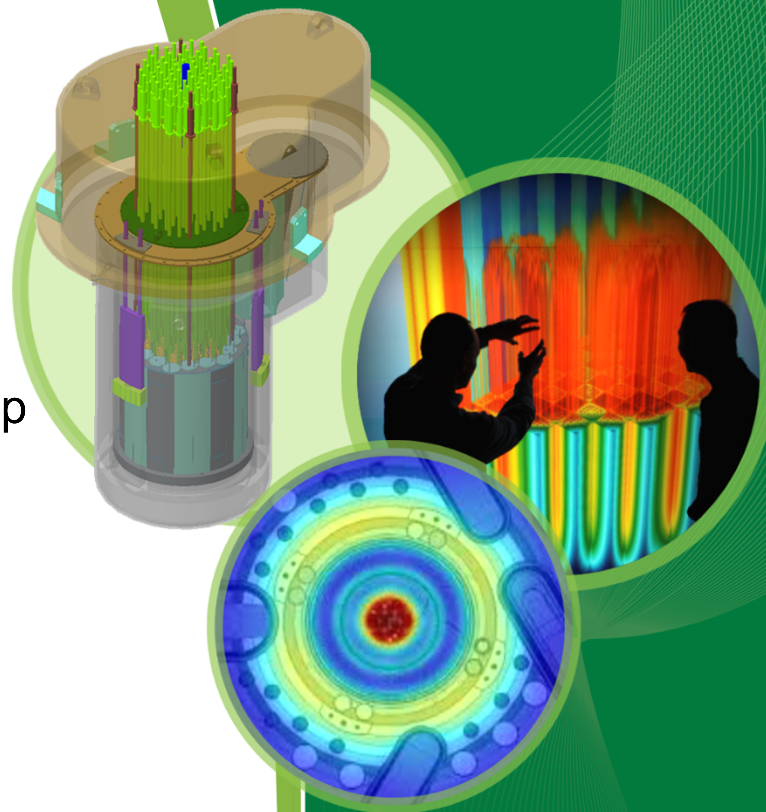
Reactor Technology Standards Support

Dr. George Flanagan

Dr. Michael Muhlheim

Advanced Reactor Systems and Safety Group
Reactor and Nuclear Systems Division
Oak Ridge National Laboratory



NRC-DOE Third Workshop on Advanced Reactors, Bethesda, MD

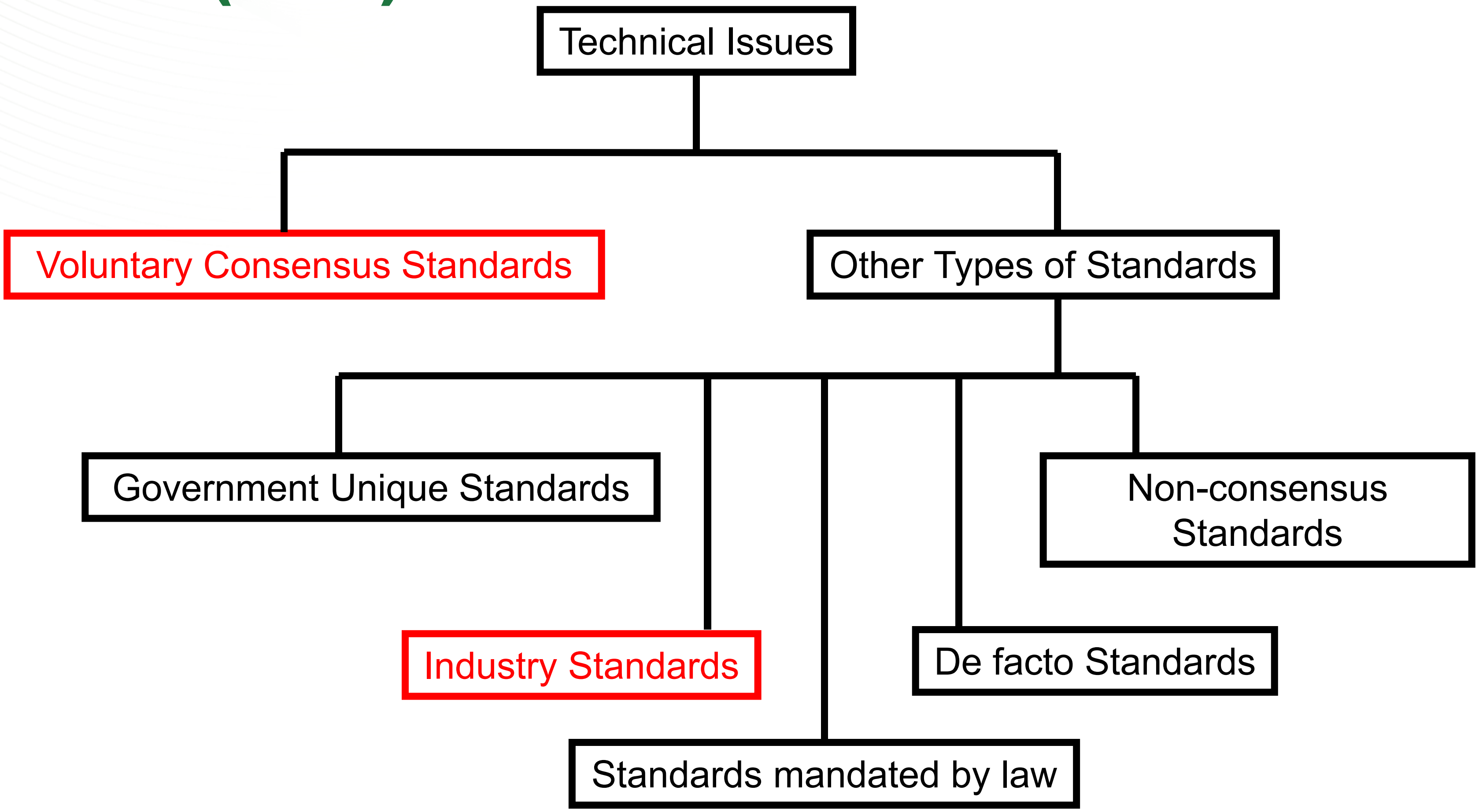
April 25-26, 2017

DOE Initiated a Scoping Study to Understand the Process, Scope, & Gaps of Developing Voluntary Consensus Standards for Advanced Reactors

1. Obtain a list of all standards cited in RGs
   - Standards include consensus standards and industry standards
2. From this list, select a few standards for an in-depth review to assess their potential application for non-LWR technologies
   - Down select the number of standards for review to **endorsed standards**
   - Assess the standards **applicability to a sodium fast reactor (SFR)** (i.e., technology specific or technology neutral)
   - Categorize the level of effort required to revise the standard for **applicability to an SFR**
   - For those standards used for the focused review, evaluate their relative applicability to less developed technologies at a high-level basis
3. Describe the process for developing, approving, and endorsing a consensus standard
   - Discuss and estimate the timelines for modifying a standard through the standards committees
   - Discuss the process of citing or endorsing a standard by the NRC

A report on the outcome of this scoping study will completed by the end of Sept 2017

DOE's Scoping Study is for Voluntary Consensus Standards and Industry Standards Endorsed by NRC Regulatory Guides (RGs)



OMB Circular A119, https://www.nist.gov/standardsgov/omba119

Number of Standards Assessed*

Standards	Std org	RGs	Coverage
865 citations		486	Division 1-10 RGs
817 citations		229	Division 1 RGs (Power Reactors)
	30	182	Division 1 RGs, Active RGs
111 citations	10	67	Division 1 RGs, Active RGs, Endorsed standards
71 citations	9	35	Division 1 RGs, Active RGs, Endorsed standards, no IEEE standards**
59 standards	9	35	Remove duplicate standards

as is	limited	extensive	unknown	N/A	new	Assess standards

*Database distributed by NRC at the Nuclear Energy Standards Coordinating Collaborative (NESCC) circa 2012 (unpublished)

**IEEE standards are typically technology neutral

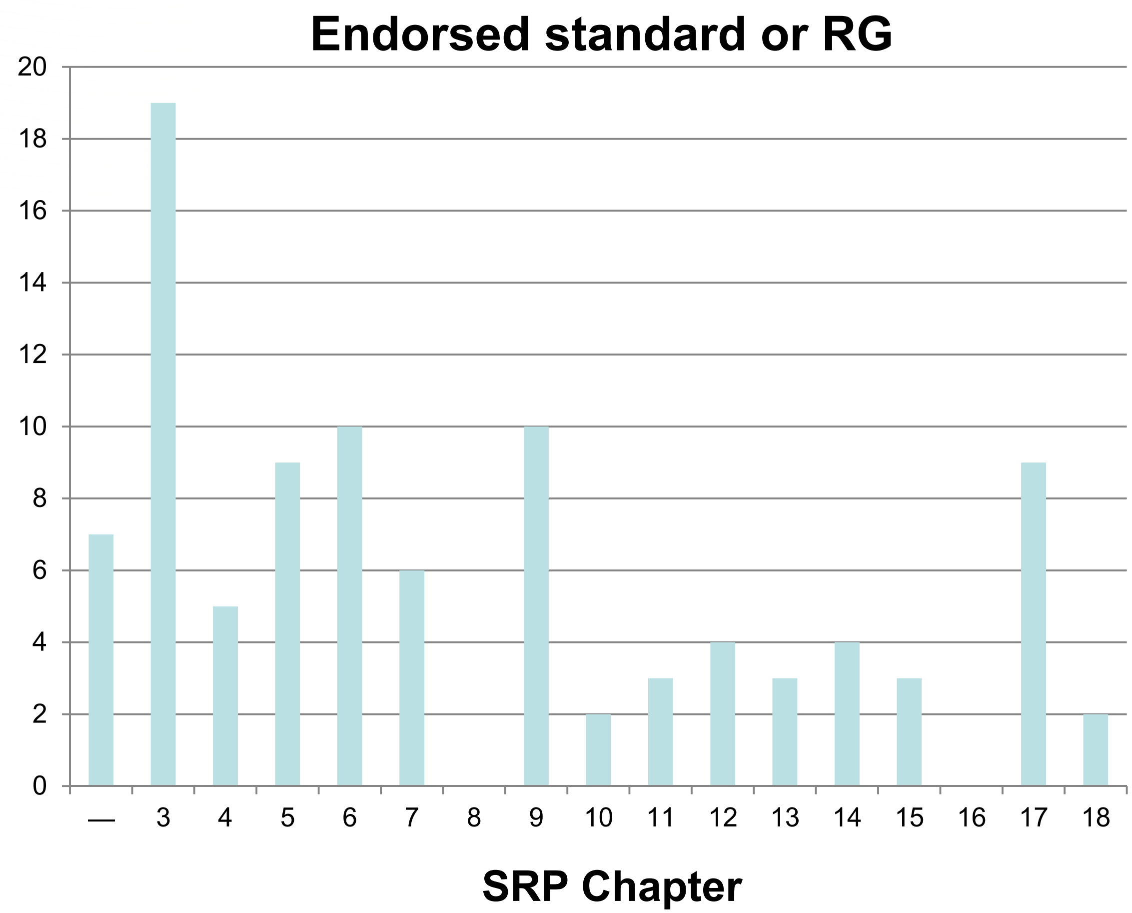
59 Standards Endorsed in 35 RGs
– 7 SDOs, 45 standards
– 2 industry groups, 14 standards

SDO	No. endorsed standards
ACI	2
ANS	7
ANSI	1
ASME	10
ASTM	21
ISA	2
NFPA	2
TOTAL	45

Industry standard	No. endorsed standards
EPRI	2
NEI	12
TOTAL	14

59 Unique Standards for SFR Pilot (Consensus and Industry)

The SRP may cite the RG, standard, both RG and standard, or neither



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Evaluation Categories Noting Changes Needed for Standard to be Applicable to Advanced Reactors

1 = none

- e.g., grades of fuel oil

2 = limited changes

- e.g., although applicable to all types of NPPs, specifically cites LWRs

3 = substantive changes needed

- e.g., transients for simulator training for BWRs and PWRs

4 = insufficient design info

- e.g., qualification of active mechanical equipment

5 = not applicable (N/A)

- e.g., EDG fuel oil and storage system

6 = new design-specific requirement

- e.g., code cases for materials (e.g., HT9)

Preliminary Results of Reviews

- 14 of 45 voluntary consensus standards reviewed
  1. No changes – 1
  2. Limited changes – 2
  3. Substantive changes – 3
     - Simulators
     - Protective coatings
     - Test methods for protective coatings
  4. Insufficient design info – 1
  5. Not applicable – 1
  6. New requirement needed – 1

  2, 4. Limited, insufficient design info – 2

  3, 4. Substantive, insufficient design info – 3
     - Qualification of active mechanical equipment
     - Concrete radiation shielding
     - Pressure and level measurements

Notes from Reviews

- Temperatures in SFRs may exceed concrete and steel limits in standards
- Types of steel, concrete, and source terms may differ greatly for SFRs compared to LWRs
- Those components required to function during a DBA will be different for SFRs and will require modification to some standards (e.g., seismic, dynamic qualifications)
- Fuel storage and handling differences noted
- Source terms for steel need to be developed

Developing and Approving a Voluntary Consensus Standard is a Long and Involved Process

— The example below is provided by the ANS Standards Committee —

Voluntary Consensus Standards Development Process
American Nuclear Society Standards Committee