



ANSI-NIST
Nuclear Energy Standards
Coordination Collaborative

Meeting Report
Tuesday, July 17, 2012

ANSI
1899 L Street NW
11th Floor
Washington, DC 20036

Agenda Item 1 Opening Remarks and Introductions

Dr. Ambler Thompson opened the meeting by thanking all attendees for coming, and thanking ANSI for the meeting space. He introduced Ms. Anne Caldas, ANSI Senior Director of Procedures and Standards Administration, who attended the meeting in place of Ms. Frances Schrotter, ANSI Chief Operating Officer.

The NESCC sponsors (Department of Energy (DOE) and Nuclear Regulatory Commission (NRC)) working with the NESCC participants, modified the format and structure of this NESCC meeting, to: (1) focus primary on small modular reactors (SMR), and (2) to be a facilitated interactive meeting where the SMR vendors and Standards Development Organizations (SDO) would address questions that were provide prior to the meeting. Kurt Cozens, NRC, was the meeting facilitator. The DOE/NRC questions provided to the presenters are attached to the meeting minutes.

Mr. Cozens, NRC, made a verbal presentation that discussed the new interactive meeting format and the questions that the SMR vendors and SDO presenters were requested to answer. Mr. Cozens facilitated the following presentations and encouraged all meeting participants to be interactive during the subsequent presentations.

Agenda Item 2 Generation mPower SMR – Babcock and Wilcox – NESCC 12-064

Mr. Jeff Halfinger, B&W, offered the presentation contained in NESCC-12-064.

Following the presentation, attendees were encouraged to ask questions. Mr. Halfinger clarified that the four year fuel life mentioned in the presentation does mean a four year lifecycle for the fuel. Mr. Halfinger also informed attendees that the B&W is waiting for

OVER-ARCHING QUESTIONS FOR SMR VENDORS TO ADDRESS AT THE NESCC JULY 2012 MEETING

Policy issued directed by the Commission often result in new or revised regulations which are implemented using Regulatory Guidance with the specifics developed by the NRC staff or by incorporating by reference published consensus standards.

SECY-10-0034, Potential Policy, Licensing, and Key Technical Issues for Small Modular Nuclear Reactor Designs (March 28, 2010), identified a number of potential policy and licensing issues for which resolution might require the Commission consideration. SECY-11-0112, Staff Assessment of Selected Small Modular Reactor Issues Identified in SECY-10-0034 (August 12, 2012), documented the basis of removing several of the issued identified in the earlier SECY from further consideration.

Remaining on the list of potential policy and licensing issues are the following topics:

- License Structure for Multi-Module Facilities
- Manufacturing License Requirements for Future Reactors
- Implementation of the Defense-In-Depth Philosophy for Advanced Reactors
- Use of Probabilistic Risk Assessment in the Licensing Process for SMRs
- Appropriate Source Term, Dose Calculations, and Siting for SMRs
- Key Component and System Design Issues for SMRs
- Appropriate Requirements for Operator Staffing for Small or Multi-Module Facilities
- Security and Safeguards Requirements for SMRs
- Offsite Emergency Planning Requirements for SMRs
- Annual Fee for Multi-Module Facilities
- Insurance and Liability for SMRs
- Decommissioning Funding for SMRs

SMR Over-arching Questions	What did you hear?
<p>1. Are there consensus standards that SMR vendors believe would be beneficial to address any of these areas that would be helpful for the first of a design being licensed or constructed or for subsequent units being constructed?</p>	
<p>a. If there are, what are the topics that would be useful to have?</p>	
<p>b. When would such consensus standards be needed to be of value for the first or subsequent units and what content guidance can the SRM vendors provide?</p>	

FOCUSED QUESTIONS FOR SMR VENDORS TO ADDRESS AT THE NESCC JULY 2012 MEETING

SMR Focused Questions	What did you hear?
<p>1. Does your design employ steel-concrete composite wall construction techniques? If so, what industry consensus standards are referenced or used to support this design feature? What industry consensus standards are used for the civil structural design of your SMR?</p>	
<p>2. Many of the SMR designers have indicated intentions to design the SMR with major structures underground for increased security and aircraft impact protection.</p> <p>Is your SMR design locating the major plant buildings/structural components underground? If so, what current structural, concrete and seismic standards, codes or regulatory requirements/guidance are used for this design aspect? What exception do you plan to take from current design and regulatory/licensing guidance?</p>	
<p>3. Several of the SMR designs employ integral reactor designs in which the steam generators and the reactor coolant pumps are integrated within or on the reactor vessel. One SMR design employs helical steam generators and one design has a separate but directly connected steam generator. It is unclear how the reactor coolant pressure boundary is defined and how the ASME Section XI required steam generator tube inspections will be accomplished. Please define your SMR approach on the steam generator pressure boundary and tube inspections. What exceptions are you planning from current code and regulatory requirements regarding the frequency, scope and methods of steam</p>	

<p>generator inspections?</p> <p>If using helical coil steam generators, what are the ASME section III and XI equivalent design and periodic inspection standards used?</p>	
<p>4. The SMR designs plan to utilize digital instrumentation and control technology. What general industry consensus standards/regulatory guidance is used to guide the design features of your safety and non-safety instrument and control systems? Are you planning to employ multi-SMR module controls? Is so how is diversity, defense in depth and common mode failure protection planned? What industry standards are committed to for the design?</p>	
<p>5. Are there unique SMR design features in your design that conflict with or are not covered by industry consensus standards? Would it be helpful to your future efforts in updating and improving the design to have standards available supporting the SMR design features. (change in standards is easier than certification amendment).</p>	
<p>6. Appendix A to, 10 CFR Part 50, defines the General Design Criteria (GDC). Criterion 1 states in part:</p> <p>“Structures, systems, and components important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed. Where generally recognized codes and standards are used, they shall be identified and evaluated to determine their applicability, adequacy, and sufficiency and shall be supplemented or modified as necessary to assure a quality product in keeping with the</p>	

<p>required safety function.”</p> <p>Question: To what extent have generally recognized codes and standards been evaluated to determine their applicability, adequacy and sufficiency to address SMR designs?</p>	
<p>7. For ASME and IEEE Codes and ANS and ASTM Standards:</p> <ol style="list-style-type: none"> a. What codes and standards may be inadequate to support the SMR LWR designs? (ex. don't fit into their bounding conditions as they currently stand) b. Are the SMR vendors participating on these SDOs to make revisions to the consensus standards so that the standards can support the SMR designs? c. Do SMR vendors anticipate requesting exception to regulations or guidance, if the SMR design does not satisfy exiting consensus criterion cited in the referenced consensus standards? d. What SDO process changes would be needed to have SMR vendors more robustly participate in SDO consensus standard development activities? 	

QUESTIONS FOR SDOs TO ADDRESS AT THE NESCC JULY 2012 MEETING

Attachment 1 is a list of questions that SRM vendors are preparing responses to that will be discussed at the July NESCC meeting. SDO representatives are requested to prepared responses to the same questions from a SDO perspective prior to the NESCC meeting.

During the NESCC meeting, discussions will be conducted to engage both the SDO representatives and the SRM vendors concerning answers to the questions. It is the goal of the meeting, to develop action items from the mutual understanding resulting from these discussions.

Specific SDO Question

Development of consensus standards is a deliberate process which requires significant volunteer hours and resources to generate a new or revised standard. The NRC has heard comments that the timeliness of this process may not support the needs of industry as it relates to advanced reactors and the NRC regulatory process.

The American Nuclear Society documented the level of effort required to develop and publish a consensus standard in an April 2012, letter to the Office of Management and Budget, on Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities. In this letter, ANS proved the following statistics:

- Average length to develop a new standard and gain ANSI approval = 6.1 years
- The average length of time to revise a standard and gain ANSI approval = 5.8 years
- The cost, including the value of volunteer hours, to develop a standard over a six-year period is approximately \$750,000

SDO Questions	What did you hear?
<p>1. For your SDO how long does it take and what is the nominal cost to produce a new or revised consensus standard?</p>	
<p>2. While retaining the benefits of consensus standard, what could an SDO organization do to produce a quality consensus standard in a time frame more aligned with the schedule needs of advanced reactors?</p>	
<p>3. What changes would the NRC or advanced reactor vendors need to do to support this shorter time frame?</p>	

Nuclear Energy Standards Coordination Collaborative

17-Jul-12

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37) Tammy Way	INUL/DOE	tammy.way@nuclear. energy.gov

the publication of the consensus standards for steel concrete composites because these composites will be used in the construction of the nuclear island and used for both internal and external containment. Currently, B&W are interpreting the current composite codes but having difficulty getting a license. Mr. Halfinger expressed the desire of B&W that a supplement will be made to AISC N690-2011 that will include steel composite. The NRC encouraged B&W to inform them when modifications to current standards are required.

It was noted that the NRC endorsed version of AISC N690 is not the 2011 version. The NRC representatives at the meeting committed to working with the NRC representative to the AISC to understand where updated regulatory guide is in development. The NRC suggested that the AISC have an engineer review the current text and suggested supplement to ensure that the standard can be applied to a design and ensure that it will work. AISC agreed with the idea, but noted that finding volunteers to do that work is difficult.

Based on the discussions, the following actions were agreed to:

ACTION: B&W will investigate including steel concrete composites in AISC N690-2011 which is currently under revision. They will further formally inform the NRC they wish to use this code and have it reviewed.

ACTION: B&W will take the current draft of AISC 690-2011 and apply the document to its current SMR design to determine its applicability. It was suggested that all SMR vendors consider undertaking such an exercise.

Mr. Prasad Kadambi, ANS, brought up safety classifications. Currently, the NRC is using regulatory guide 1.26 which is based on existing Light Water Reactors, not the new SMRs. Mr. David Tereao supported this observation. The NRC agreed to investigate.

ACTION: The issue of to incorporate risk informed based approaches into standards will be investigated by ANS and the National Standards Prioritization Task Group.

Mr. Frank Schaff, ASME, informed attendees that the current draft under division 2 allows for a maximum inspection interval of 12 years, but that can be divided into a three, four or eight year intervals. It was agreed that if the inspections could take place during refueling every four years, the standard will work for SMRs and LWRs.

ACTION: B&W will develop a list of standards needs.

Agenda Item 3 NuScale Power SMR – NESCC 12-059

Mr. Ed Wallace, NuScale, offered the presentation contained in NESCC 12-059.

Mr. Wallace requested SDOs consider creating operational tests for control rods that go through a multiplicity of temperatures.

Following the discussion, the following action items were agreed to:

ACTION: NuScale will evaluate regulatory guides 1999 and E900 from ASTM to determine their applicability to NuScale designs.

ACTION: NuScale will develop a list of standards needs.

ACTION: SDOs will evaluate the new set of products being developed for SMRs and determine which current standards are applicable, and where standards are needed. The SDOs will also evaluate the current safety classifications for their applicability to the new products.

Agenda Item 4 Westinghouse SMR – NESCC 12-054

Mr. Alex Harkness, Westinghouse, offered the presentation contained in NESCC 12-054.

Following the presentation, Mr. Harkness informed attendees the plant is 15 acres in size and the power output is 800 megawatts thermal. Mr. Harkness was not able to pinpoint the exact standards Westinghouse needs to get the SMR built, but cautioned against developing standards that are too conservative. Conservative standards will drive up the cost of building the SMRs drastically.

The NRC inquired whether or not ASCE 4:1998, Seismic Analysis of Safety-Related Nuclear Structures, would provide adequate support for Westinghouse, given what has been learned from the Fukushima disaster. It was that while this document is endorsed by the NRC, it is not the most recent version of the standard. The latest version was published in 2010. It is published roughly every five years.

ACTION: The NRC will review ASCE 4:2010 for potential endorsement.

Mr. Harkness informed attendees that Westinghouse is using steel composite concrete for construction because it can be built quickly, is robust and meets various requirements, based on research conducted by Westinghouse.

ACTION: Westinghouse will share its test data on steel composite concrete with ASCE and AISC committees that are updating related standards.

The DOE inquired about the containment pool. Mr. Harkness explained that the pool and a vacuum are used for containment. Westinghouse is considering using the traditional leak test to ensure this method works to control spent fuel.

Agenda Item 5 SMR-160 – Holtec International – NESCC 12-053

Mr. Stefan Anton, Holtec International, offered the presentation contained in NESCC 12-053.

He informed attendees that the heat source for the super heat is the water from the primary load. Mr. Anton also noted that Holtec isn't sure what standards are missing for their design.

ACTION: Holtec will develop a list of standards needs.

Agenda Item 6 Standards Development Process/Overview

Agenda Item 6.1 ASTM – NESCC 12-049

Mr. Len Morrissey, ASTM, offered the presentation contained in NESCC 12-049.

He elaborated that ASTM is currently working on a standards roadmap and a database of all its nuclear standards. ASTM has also decided to send redline versions of their standards to the government to aid the endorsement process.

Mr. Morrissey encouraged NESCC members to become involved in ASTM as the organization is open to all and revisions of standards can come from anywhere.

ASTM is current evaluating their standards to see if any need to be modified to work for SMRs. ASTM believes that the E900, E2215, and E185 will accommodate the needs of SMRs, and this evaluation work will be concluded soon. Should these standards be deemed acceptable, their scopes will be modified to include SMRs.

Mr. Morrissey explained that ASTM can publish documents faster than other SDOs because they remove development barriers by utilizing many electronic tools like webinars and electronic balloting and because ASTM codes are focused on specifics as opposed to being comprehensive.

Agenda Item 6.2 ANS – NESCC 12-057

Mr. Donald Spellman, ANS, offered the presentation contained in NESCC 12-057.

Mr. Spellman explained that the NESCC National Standards Priority List Task Group has been working on a list of standards that are needed for SMRs and other areas of nuclear energy, and the list of gaps will be broken down by SDO. Ms. Caldas, ANSI, reminded the NESCC that assigning work to SDOs is not the purview of the NESCC.

ACTION: Once the National Standards Priority List Task Group has prepared the prioritization list, it will be distributed to the NESCC membership for review and comment. The hope is that once the priorities are identified, various SDOs will volunteer to develop the required standards.

Mr. Spellman's final point was to encourage SMR vendors to financially support the SDOs as they develop standards for their products.

Agenda Item 6.3 AISC – NESCC 12-050

Mr. Charlie Carter, AISC, offered the presentation contained in NESCC 12-050.

Agenda Item 6.4 ASME – NESCC 12-067

Mr. Kevin Ennis, ASME, offered the presentation contained in NESCC 12-067.

Mr. Ennis encourage the SMR vendors in attendance to get involved with ASME by coming to Code Week. He explained that a water, gas and metal working group was being developed by ASME and encouraged mPower to joining this work.

Agenda Item 6.5 NFPA – NESCC 12-051

Mr. Greg Cade, NFPA, offered the presentation contained in NESCC 12-051.

Mr. Cade explained that if there is a situation where a life threatening error or issue is identified in a code, an immediate revision can be undertaken. To date, this has only occurred twice. If the issue isn't life threatening, then the normal amendment process takes place and provisional requirement is developed. This requirement can remain provision for two years, but after two years must be incorporated to a revised version of a standard.

Agenda Item 6.6 ACI – NESCC 12-063

Mr. Douglas Sordyl, ACI, offered the presentation contained in NESCC 12-063.

Mr. Sordyl informed attendees of his intent to work closely with the NRC to ensure that the most recent version of ACI standards are endorsed. He also noted that the roadmap described in the Concrete Task Group was quite helpful to ACI in deciding what standards to work on next.

**Agenda Item 7 Emerging Codes and Standards Update – Advanced Nuclear
Technology Program (ANT) – NESCC 12-060**

Mr. Ken Barry, EPRI, offered the presentation contained in NESCC 12-060.

Mr. Barry cautioned against locking codes down during design certification as its quite costly to revise a design after its been certified.

Mr. Barry informed the NESCC that he would be proposing a new Task Group on Construction at the next meeting. This group will focus on new technologies for

decreasing construction time and costs, impacts on codes and standards and feedstock to research organizations.

Agenda Item 8 Task Group Reports

NOTE: Because time was limited, only the task groups listed below were able to give their reports.

Agenda Item 8.1 HDPE Piping Task Group – NESCC 12-065

Mr. Aaron Forster, NIST, offered the report contained in NESCC 12-065.

Mr. Forster reported that the HDPE report would be published in August 2012 and that a workshop would be held at NIST on 6 September 2012.

Agenda Item 8.2 Repair of Reinforced Concrete Task Group – NESCC 12-055

Ms. Clarissa Ferraris, NIST, offered the report contained in NESCC 12-055.

The NRC encouraged the Task Group to include solid reasoning as to why the NRC should endorse or incorporate the most recent version of standards in the report. It was noted that older standards are acceptable for endorsement because some working power plants were built to these specifications.

Agenda Item 8.3 Electrical Cables Task Group – NESCC 12-069

Ms. Stephanie Watson, NIST, offered the report contained in NESCC 12-069. Ms. Watson reported that the draft report will be available prior to the next meeting.

Agenda Item 9 Other Business

Agenda Item 9.1 ISO/TC 85/SC 5 – NESCC 12-061

Dr. Thompson reported that the US TAG to ISO/TC 85/SC 5 is looking for members. He encouraged NESCC members to consider participating in this work.

Agenda Item 9.2 Next Steps

The next NESCC meeting will take place at the ANSI office in Washington, DC on November 29, 2012.

The agenda for the next meeting will include the following items:

- An action plan for HDPE piping work
- Lessons learned
- A presentation on the NRC endorsement process
- A review of all action items

- The Welding, Standards Database, and National Standards Prioritization Task Groups will report
- A presentation on a proposed Task Group on Construction
- NRO presentation on design specific review plan
- Possibly a database demonstration

Agenda Item 10 Adjournment

The meeting was adjourned at 5:25 pm.

Attachment 1

**Action List from Flip Board
As Documented by Tammy Way**

1.) AISCN 690-2011 (Steel Composite Structure)

AISC, NRC and industry will coordinate on this work to have this standard endorsed. Further, industry experts are needed to work on the revision of this standard in AISC.

2.) Safety Classification

This is primarily an ANS issue, and the problem is how to incorporate risk informed based approaches into standards. The National Standards Priority List Task Group is also working on this.

3.) Current Codes and Standards – How do they relate to SMRs

4.) Define NRCs current process for endorsing industry codes, standards and updated codes and standards

5.) Design Specific Review Plan – SRP and Existing standards applicability

6.) Application of lessons learned in design process – EX: Westinghouse research on steel composite concrete

7.) Application of risk informed performance based approaches across SDOs for consistency

Attendees to the July 17, 2012 NESCC Meeting

Name	Organization	In-Person/Webinar
Stefan Anton	Holtec International	In-Person
Jim August	CORE Inc	Webinar
Kenneth Barry	EPRI	In-Person
Tom Boyce	U.S. Nuclear Regulatory Commission	In-Person
Steve Byrne	ASTM International	In-Person
Greg Cade	NFPA	In-Person
Anne Caldas	ANSI	In-Person
Charlie Carter	AISC	In-Person
Michael Case	U.S. Nuclear Regulatory Commission	In-Person
Bill Corwin	DoE	In-Person
Kurt Cozens	U.S. Nuclear Regulatory Commission	In-Person
Greg Cranston	NRC	In-Person
David Darwin	University of Kansas	In-Person
Jack Demitz	Bechtel Power	In-Person
Mike Edwards	Bechtel Power	In-Person
Kevin Ennis	ASME	In-Person
Clarissa Ferraris	NIST	In-Person
Aaron Forster	NIST	Webinar
David Gress	UNH	In-Person
Jeff Halfinger	B&W	In-Person
Alex Harkness	Westinghouse	In-Person
N. Prasad Kadambi	ANS	In-Person
Jack Lance	Longenecker & Associates	In-Person
Steve Lefler	Duke Energy	Webinar
Bill Maher	FPL	Webinar
Nancy McNabb	NIST	In-Person
Tom Miller	U.S. Dept. of Energy	In-Person
Len Morrissey	ASTM	In-Person
Craig Myler	Bechtel National Inc.	In-Person
Christopher Peterson	Dept. of Commerce – ITA	In-Person
Anthony Quinn	ASTM	In-Person
Neil Ray	NRS	In-Person
James Riley	NEI	In-Person
Michael Salmon	Los Alamos National Lab	Webinar
Frank Schaaf	Sterling Refrigeration	Webinar
Sally Seitz	ANSI	In-Person
Thomas Seiwert	NIST	Webinar
David Terao	NRC	In-Person
Ambler Thompson	NIST	In-Person

David Thompson	Manufacturers Standardization Society	Webinar
Stephanie Watson	NIST	In-Person
Tammy Way	U.S. Dept. of Energy	In-Person