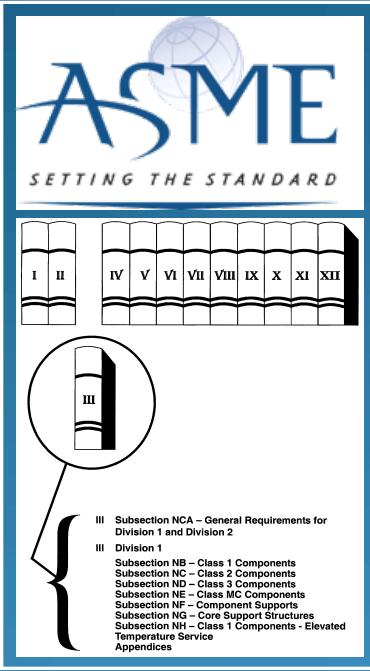
Research Seminar

ASME Codes and Standards: History, Content, Development, and Endorsement

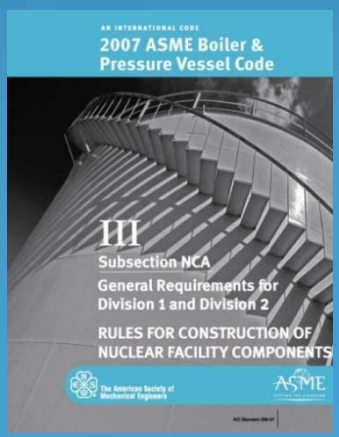
Wednesday, October 20, 2010
10:00 – 11:30 am
TWFN Auditorium



The ASME Code is a consensus standard that provides a set of technical definitions and guidelines developed so that items can be manufactured uniformly and provide for safety and interchangeability. Sections III and XI of the Code have become the U.S. nuclear power industry standards for design and operation, respectively, because they have been incorporated by reference through rulemaking within the Code of Federal Regulations.

This seminar will provide a brief history and introduction to the ASME Code, and will explain how the NRC uses consensus standards in our regulatory process.

Hosted by RES/DE
Mike Case



Presenters:

Carol Moyer
Program Manager, RES

Carol Moyer is a Program Manager, Codes and Standards, in the Corrosion and Metallurgy Branch. A materials engineer in RES since September of 2001, she directs research related to stress corrosion cracking and non-destructive examination. Previously, she worked in the fossil power generation industry and as a failure analysis consultant. She has been a member of ASME Code committees for about 5 years.

Gary L. Stevens
Sr. Materials Engineer, RES

Gary Stevens is a Senior Materials Engineer in the Component Integrity Branch, who joined the NRC in February of 2010. He previously worked for GE Nuclear Energy, and most recently for Structural Integrity Associates, Inc. His background has been primarily focused in structural mechanics, stress, fatigue, and fracture mechanics analyses for BWRs . He has been a member and contributor to ASME Codes and Standards work for Section XI for 20 years.

History and Background of the ASME Code

Gary L. Stevens
Senior Materials Engineer
RES/DE/CIB

RES Seminar

Wednesday, October 20, 2010

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Outline

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- History of the ASME Code
- Index of the ASME Code
- Content of the Nuclear Sections of the ASME Code
- Organization of ASME Codes and Standards
- How Does Something Get Approved and Published in the ASME Code?

History of the ASME Code

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

"The Society's history helps to reveal the outlines and consequences of a complex technological information-processing system. It is an article of faith that Americans are inventive people. But besides machines, they also created a welter of interrelated institutions to translate technical knowledge into industrial practice, and that may have been one of the country's most successful inventions." — Bruce Sinclair, U.S. historian, *A Centennial History of the American Society of Mechanical Engineers*

History of the ASME Code (cont'd)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- The American Society of Mechanical Engineers (ASME) was founded in 1880
  - Alexander Lyman Holley (1832-1882) -- steel and plant engineer and designer
  - Henry Rossiter Worthington (1817-1880) – inventor and pump manufacturer
  - John Edson Sweet (1832-1916) -- inventor, manufacturer, and author
- First meeting was on February 16 in New York at the offices of the American Machinist
  - About 30 in attendance
  - Holley chaired the meeting
- A formal organizational meeting was held on April 7 at the Stevens Institute of Technology in Hoboken, NJ
  - About 80 in attendance

History of the ASME Code (cont'd)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- First annual meeting was held in November
  - Robert Henry Thurston (1839 – 1903) was elected the first president -- professor of mechanical engineering at Stevens Institute and later Cornell
- Why was ASME started?
  - "…"to promote the art, science and practice of mechanical engineering and the allied arts and sciences."
  - Manufacturing standards were needed
  - Several deadly boiler explosions led to a desire by some states for regulation
    - Not all states agreed
    - Progress was painfully slow
    - A couple of explosions in 1905 and 1906 in Massachusetts set the wheels in motion for the first Code
  - Good historical summaries at:
    - http://www.asme.org
    - http://www.psig.sg/Birth%20of%20a%20Code.html

History of the ASME Code (cont'd)

United States Nuclear Regulatory Commission
Protecting People and the Environment

Codes and Standards Chronology

Year	Event
1884	Code for the Conduct of Trials of Steam Boilers — first Performance Test Code
1886-87	Standard for the Diameter and Overall Dimensions of Pipe and Its Threaded Ends
1889-91	Committee for the creation of a federal commission to recommend standards and a bureau for their maintenance
1890	Establishment of a Committee on Standard Methods of Testing Locomotives
1891-92	Method of Conducting Duty Trials of Pumping Engines
1892	Committee formed to prepare a proposed Standard for Divergences in Flange Diameter
1893	Standard Method of Conducting Efficiency Tests of Locomotives
1899	Standard for Divergences in Flange Diameters
1899	Establishment of a Committee on Standards for Direct-Connected Generating Sets
1901-02	Standard for Pipe Unions
1901-02	Proposed Standard for Machine Screw Thread Sizes
1901	Standard for Direct-Connected Generating Sets
1905	Standard Proportions for Machine Screws
1911	Establishment of a committee to propose a Boiler Code
1913	New Committee to revise the Boiler Code
1914-15	First publication of the Boiler Code
1915	Standards for Specifications and Construction of Boilers and Other Containing Vessels in Which High Pressure is Contained
1915	Standards for Engineering Drawings
1916	Code of Safety Standards for Cranes
1917	Code of Safety Standards for Industrial Ladders
1918	American Engineering Standards Committee (later to be known as ANSI) formed
1919	Standards of Carburetor Performance
1919	Formulation of Committee on Power Test Codes
1921	First elevator code issued

History of the ASME Code (cont'd)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- First Boiler Code published in 1915
  - 1914 Edition
  - Hardcover book 6" x 9" in size, and bound in olive drab cloth
  - Entitled, "Report of the Boiler Code Committee of the American Society of Mechanical Engineers"
  - Published at the expense of Babcock & Wilcox
  - PART I = new installations; PART II = existing installations
  - First Code formula:

$$P = T_s \, t \, E/(R \, F_s)$$

P = maximum allowable working pressure (psi)
T_s = ultimate tensile strength (psi)
t = minimum thickness of shell plate (inches)
E = efficiency of longitudinal joints or ligaments between tube holes
R = inside radius (inches)
F_s = factor of safety

History of the ASME Code (cont'd)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Code has now been adopted in part or in its entirety, by:
  - All 50 states
  - Numerous municipalities and territories of the US
  - All the provinces of Canada
- Nuclear sections
  - Section III first published in 1963
  - Section XI first published in 1970

Index of the ASME Code

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

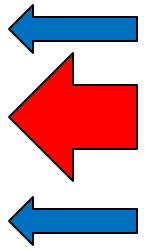
- By the start of the 1930s, the Code had grown to eight sections:
  - I Power Boilers
  - II Material Specifications
  - III Locomotive Boilers
  - IV Low-Pressure Heating Boilers
  - V Miniature Boilers
  - VI Rules for Inspection
  - VII Suggested Rules for Care of Power Boilers
  - VIII Unfired Pressure Vessels

Index of the ASME Code (cont'd)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Today, the Code has grown (and been revised) to twelve sections:
  - I Power Boilers
  - II Material (Parts A – D)
  - III Rules for Construction of Nuclear Facility Components
  - IV Rules for Construction of Heating Boilers
  - V Nondestructive Examination
  - VI Recommended Rules for the Care and Operation of Heating Boilers
  - VII Recommended Guidelines for the Care of Power Boilers
  - VIII Rules for Construction of Pressure Vessels
  - IX Welding and Brazing Qualifications
  - X Fiber-Reinforced Plastic Pressure Vessels
  - XI Rules for Inservice Inspection of Nuclear Power Plant Components
  - XII Rules for Construction and Continued Service of Transport Tanks

Nuclear sections



Current price: $13,799.99

Content of the Nuclear Sections Of the ASME Code

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Nuclear Code sections are divided as follows:
  - Subsections
    - NB, NC, IWD, etc.
  - Articles
    - NB-1000, NC-3000, etc.
      - 1000 - Introduction or Scope
      - 2000 - Material
      - 3000 - Design
      - 4000 - Fabrication and Installation
      - 5000 - Examination
      - 6000 - Testing
      - 7000 - Overpressure Protection
      - 8000 - Nameplates, Stamping, and Reports
  - Subarticles
    - units of 100
    - NB-3200, IWA-4100, etc.
  - Subsubarticles
    - units of 10
    - NB-3210, IWA-4150, etc.

Content of the Nuclear Sections Of the ASME Code (cont'd)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Paragraphs
  - units of 1
  - NB-3221, IWA-4114, etc.
- Subparagraphs
  - major subdivisions of a paragraph
  - NB-3221.1, IWA-4214.2, etc.
- Subsubparagraphs
  - major subdivisions of a subparagraph
  - NB-3221.1(a), IWA-4214.2(d), etc.
  - IWA-4214(d)(1) also allowed

Content of the Nuclear Sections Of the ASME Code (cont'd)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Section III - Rules for Construction of Nuclear Facility Components (first published in 1963)
  - Division 1
    - Subsection NCA - General Requirements Division 1 & 2
    - Subsection NB - Class 1 Components
    - Subsection NC - Class 2 Components
    - Subsection ND - Class 3 Components
    - Subsection NE - Class MC Components
    - Subsection NF - Supports
    - Subsection NG - Core Support Structures
    - Subsection NH - Class 1 Components in Elevated Temperature Service
    - Appendices (Mandatory and Nonmandatory)
    - Code Cases: Nuclear Components
      - Clarify the intent of existing requirements or provide, when the need is urgent, rules for materials or constructions not covered by existing Code rules
  - Division 2 = Code for Concrete Containments
  - Division 3 = Containments for Transportation & Storage of Spent Nuclear Fuel & High Level Radioactive Mat & Waste

Content of the Nuclear Sections Of the ASME Code (cont'd)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

ARTICLE NB-1000
INTRODUCTION

NB-1100 SCOPE

NB-1110 ASPECTS OF CONSTRUCTION COVERED BY THESE RULES

(a) Subsection NB contains rules for the material, design, fabrication, examination, testing, overpressure relief, marking, stamping, and preparation of reports by the Certificate Holder of items which are intended to conform to the requirements for Class 1 construction.

(b) The rules of Subsection NB cover the requirements for strength and pressure integrity of items, the failure of which would violate the pressure-retaining boundary. The rules cover initial construction requirements, but do not cover deterioration which may occur in service as a result of corrosion, radiation effects, or instability of material. NCA-1130 gives further limitations to the rules of this Subsection.

04 **NB-1120 TEMPERATURE LIMITS**

The rules of Subsection NB shall not be used for items which are to be subjected to metal temperatures that exceed the temperature limit in the applicability column shown in Section II, Part D, Subpart 1, Tables 2A, 2B, and 4 for design stress intensity values. Above those temperatures, the creep and stress rupture characteristics of materials permitted to be used become significant factors which are not presently covered by the rules of this Subsection. Fatigue design curves and specified methods for fatigue analysis are not applicable above 700°F (370°C) for materials covered by Figs. I-9.1 and I-9.4, and above 800°F (425°C) for materials covered by Figs. I-9.2 and I-9.3.

NB-1130 BOUNDARIES OF JURISDICTION APPLICABLE TO THIS SUBSECTION

NB-1131 Boundary of Components

The Design Specification shall define the boundary of a component to which piping or another component is attached. The boundary shall not be closer to a vessel, tank, pump, or valve than:

(a) the first circumferential joint in welded connections (the connecting weld shall be considered part of the piping);

(b) the face of the first flange in bolted connections (the bolts shall be considered part of the piping);

(c) the first threaded joint in screwed connections.

NB-1132 Boundary Between Components and Attachments

NB-1132.1 Attachments

(a) An *attachment* is an element in contact with or connected to the inside or outside of the pressure-retaining portion of a component.

(b) Attachments may have either a pressure-retaining or a nonpressure-retaining function.

(1) Attachments with a pressure-retaining function include items such as pressure boundary stiffeners, and branch pipe and vessel opening reinforcement.

(2) Attachments with a nonpressure-retaining function include items such as:

(a) valve guides, thermal sleeves, and turning vanes;

(b) core support structures, internal structures, or other permanent structures within the reactor pressure vessel; and

(c) vessel saddles, support and shear lugs, brackets, pipe clamps, trunnions, skirts, and other items in the support load path.

(c) Attachments may also have either a structural or nonstructural function.

(1) Attachments with a structural function (structural attachments):

(a) perform a pressure-retaining function;

(b) are core support structures, internal structures, or other permanent structures within the reactor pressure vessel; or

(c) are in the support load path.

(2) Attachments with a nonstructural function (nonstructural attachments):

1

Content of the Nuclear Sections Of the ASME Code (cont'd)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

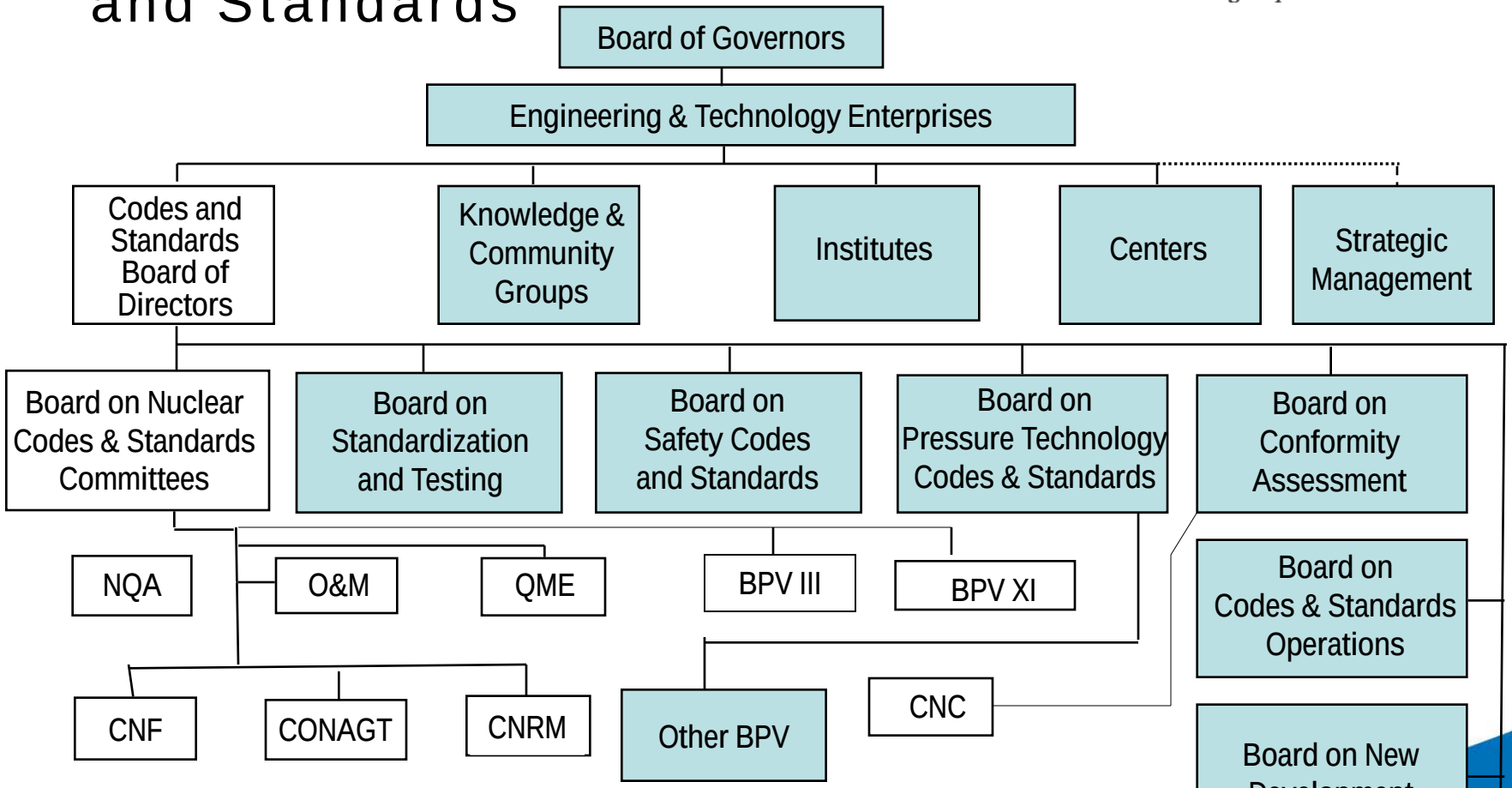
- Section XI - Rules for Inservice Inspection of Nuclear Power Plant Components (first published in 1970)
  - Division 1 = Rules for Inspection and Testing of Components of Light-Water Cooled Plants
    - Subsection IWA - General Requirements
    - Subsection IWB - Requirements for Class 1 Components of Light-Water Cooled Plants
    - Subsection IWC - Requirements for Class 2 Components of Light-Water Cooled Plants
    - Subsection IWD - Requirements for Class 3 Components of Light-Water Cooled Plants
    - Subsection IWE - Requirements for Class MC and Metallic Liners of Class CC Components of Light-Water Cooled Plants
    - Subsection IWF - Requirements for Class 1, 2, 3, and MC Component Supports of Light-Water Cooled Plants
    - Subsection IWG - Core Internal Structures (in course of preparation)
    - Subsection IWL - Requirements for Class CC Concrete Components of Light-Water Cooled Plants
    - Mandatory Appendices I – X
    - Nonmandatory Appendices A – R

Content of the Nuclear Sections Of the ASME Code (cont'd)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Section XI - Rules for Inservice Inspection of Nuclear Power Plant Components (cont'd)
  - Division 2 = Rules for Inspection and Testing of Components of Gas-Cooled Plants
  - Division 3 = Rules for Inspection and Testing of Components of Liquid-Metal Cooled Plant

Organization of ASME Codes and Standards



Details Shown for Nuclear Standards Committees

Over 3,000 volunteers Participate in the C&S process

Organization of ASME Codes and Standards (cont'd)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

BNCS	Provides procedural and strategic oversight for all NCS activities
Standards Committee Executive/Strategic Body	Advises on consistency, strategy, and R&D
Standards Committees	Establishes consensus on all technical matters in a given subject area – e.g., nuclear components
Subgroups	Provides recommendations to the standards on technical matters in a given specialty – e.g., design committee
Working Groups, Task Groups, Project Teams	Develops detailed proposals in a specific field – e.g., valve design

Organization of ASME Codes and Standards (cont'd)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Decisions are reached through ***consensus*** among those affected
- Participation is open to all affected interests
  - There are no membership fees
  - There is no requirement to be an ASME member
- Balance is maintained among competing interests where no more than 1/3 of members may represent a single interest category
- The process is transparent - information on the process and progress is directly available

Organization of ASME Codes and Standards (cont'd)

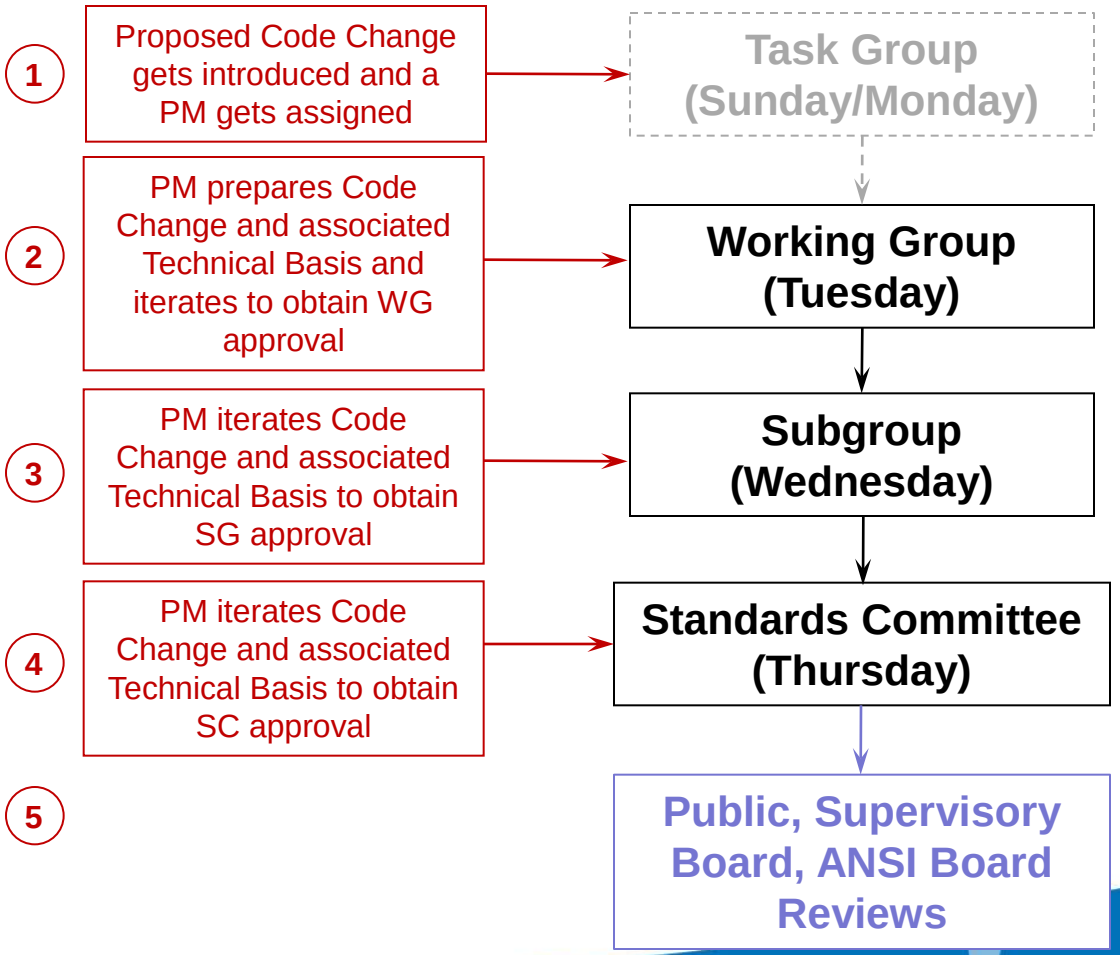
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- ASME standards are consensus standards
- Consensus means:
  - Substantial agreement by affected interest categories
  - Consideration of views, attempted resolution is part of the process
  - Unanimity not required
- The Standards Committee is responsible for establishing consensus on proposed standards actions

How Does Something Get Approved and Published in the ASME Code?

- Procedures for ASME Codes & Standards Development Committees are accredited by the American National Standards Institute (ANSI)
- Development of standards action
  - Initiation
  - Project Team
  - Review and Comment
  - Sub-tier Committee Approval
- Standards Committee Vote
- Public review
- Supervisory Board approval
- Appeals
- ANSI approval

How Does Something Get Approved and Published in the ASME Code? (cont'd)



TG may not exist

How Does Something Get Approved and Published in the ASME Code? (cont'd)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Proprietary Issues
  - ASME does not 'approve', 'rate' or 'endorse' any item, construction, proprietary device, or activity
  - Proprietary devices may only be incorporated in a generic manner

How Does Something Get Approved and Published in the ASME Code? (cont'd)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- A proposed Code Change is initiated by:
  - ASME Committee; e.g. updating an existing rule, editorial improvements, correcting errata, technology enhancements, experience and process improvements, etc.
  - Code user; e.g. request for a new material via the issuance of a Code Case, request for interpretation of a code rule, etc.
  - Supervisory Board and/or Executive Committee; e.g. development of new standard, such as Section XI, Div. 2
- A project technical manager is assigned
  - Usually the proposer

How Does Something Get Approved and Published in the ASME Code? (cont'd)

- Sub-tier Committee Review and Vote
  - After the project technical manager has developed a draft proposal or a project team has reached agreement, the proposal is provided to the Working Group(s) and Subgroup(s) with the assigned jurisdiction over that item.
  - The Working Group(s) and Subgroup(s) then must reach consensus to approve the proposal

How Does Something Get Approved and Published in the ASME Code? (cont'd)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Standards Committee Vote
  - All standards committee votes for standards actions are recorded in C&S Connect, ASME's web-based electronic voting system. C&S Connect also archives all proposals for future reference.
  - All voting is done via Letter Ballots
  - First Consideration Ballot
    - The Section XI Standards Committee accredited standards development procedures requires that a proposed standards action is approved on first consideration vote if the proposal receives no disapprovals or substantive technical comments

How Does Something Get Approved and Published in the ASME Code? (cont'd)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Standards Committee Vote (cont'd)
  - Recirculation Ballot
    - review unresolved disapproved votes
    - substantive committee, supervisory board, and public comments
    - any changes to the proposal as a result of the resolution of comments
    - The Section XI Standards Committee accredited standards development procedures states that a standards action is approved on recirculation vote if the proposal receives no more than three negatives

Note: NRC internal consensus/position should be coordinated by NRC group members throughout process !

How Does Something Get Approved and Published in the ASME Code? (cont'd)

- Public Review
  - All proposed standards actions are required to be made available for the public to review and comment
  - The proposal is announced in ANSI's Standards Action publication and included on the ASME Codes and Standards website
  - If the proposed standards action is available electronically, the comment period is 45 days; if not, the period is 60 days
  - All public comments must be addressed and responded to
  - If there are any unresolved public review objections, a recirculation vote must be conducted to provide members with an opportunity to change their votes based on support of the objections

How Does Something Get Approved and Published in the ASME Code? (cont'd)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Supervisory Board Approval
  - Approval by the supervisory board is based upon evaluation of the committee's compliance with the procedures in developing the proposed standards action, rather than an evaluation of the technical content of the proposal
- ANSI Approval
  - ANSI approval is based upon an evaluation of ASME's compliance with its accredited procedures in the development of the proposal

Code Publication

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- The Code is published once every 2 years (previously 3 years)
  - Next publication = 2011 Edition (next summer)
  - No Addenda (previously issued annually)
  - Code Cases published as 4 Supplements/year
  - Interpretations, not printed, available immediately on-line
  - Errata posted immediately on-line on Committee page, published in new editions

Code Meetings

- ASME Code Committees meet 4 times per year
  - Late January/early February
  - Late April/early May
  - August
  - November
- Meetings occur all week
  - Most Code Sections meet
- Normal meeting break-down
  - Sunday/Monday = Task Groups
  - Tuesday = Working Groups
  - Wednesday = Subgroups
  - Thursday = Standards Committees
  - Friday = Other
  - Schedule usually released by ASME 2 weeks ahead of meetings

2010 – PLANNED BPVC MEETINGS
Aug 2 – 6: Washington, DC; Hyatt Regency Wash Capitol Hill ($159/Nt)
November 1 – 5: Vancouver, BC; Westin Bayshore ($159/Nt)
2011 – PLANNED BPVC MEETINGS
January 31 –February 4: Seattle, WA; Grand Hyatt Seattle ($139/Nt)
May 9 – 13: Las Vegas, NV; Caesars Palace ($179/Nt)
August 8 – 12: Boston, MA; Boston Park Plaza Hotel & Towers ($159/Nt)
November 7 – 11: St. Louis, MO; Union Station Marriott ($175)
2012 – PLANNED BPVC MEETINGS
February 6 – 10: (SECONDARY DATES); Location TBD
February 13 – 17: (PRIMARY DATES); Location TBD
May 14 – 18: Nashville, TN; Gaylord Opryland Hotel ($179/Nt)
July 30 – August 3: (SECONDARY DATES); Location TBD
August 6 – 10: (PRIMARY DATES); Location TBD
August 13 – 17: (SECONDARY DATES); Location TBD
October 24 – 28: (SECONDARY DATES); Location TBD
November 5 – 9: (PRIMARY DATES); Location TBD

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

NRC Use of Codes and Standards

Carol Moyer
Prog. Mgr. – Codes & Standards
Division of Engineering, RES
carol.moyer@nrc.gov

RES Seminar
October 20, 2010
Rockville, Maryland

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

NRC's Policies on Consensus Codes and Standards

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- **Consensus codes and standards have been integral to the regulatory process for 3 decades**
- **Codes and standards promote safe operation of nuclear power plants, improve effectiveness and efficiency of regulatory oversight**
- **Federal law requires Government staff to use consensus standards where possible**
  - **National Technology Transfer and Advancement Act of 1995**
  - **OMB Circular A-119**

Common Goals

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Safe plant operation
- Practical technical requirements
- Cost-effective technology

NRC Staff Participation

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- NRC staff participate on codes and standards development committees along with other stakeholders
  - See Management Directives 6.5, 7.3
- Codes and standards are developed based on a rigorous consensus process with input from all stakeholders
- NRC reviews Codes and standards for possible endorsement in regulatory documents

NRC Formal Endorsement Processes

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Rules / Regulations (10 CFR)
  - Part 20: Standards for Protection Against Radiation
  - Part 50: Domestic Licensing of Production and Utilization Facilities
  - Part 52: Licenses, Certifications, and Approvals for Nuclear Power Plants
- Regulatory Guides (RG)
- Standard Review Plans (SRP)
- Generic Communications

NRC Other Endorsement Processes

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Safety Evaluation Reports
- Licenses
- Inspection Procedures
- Memoranda
- Regulatory Issue Summaries (RIS)
- Reports (NUREGs)

Shortcomings of Informal Processes

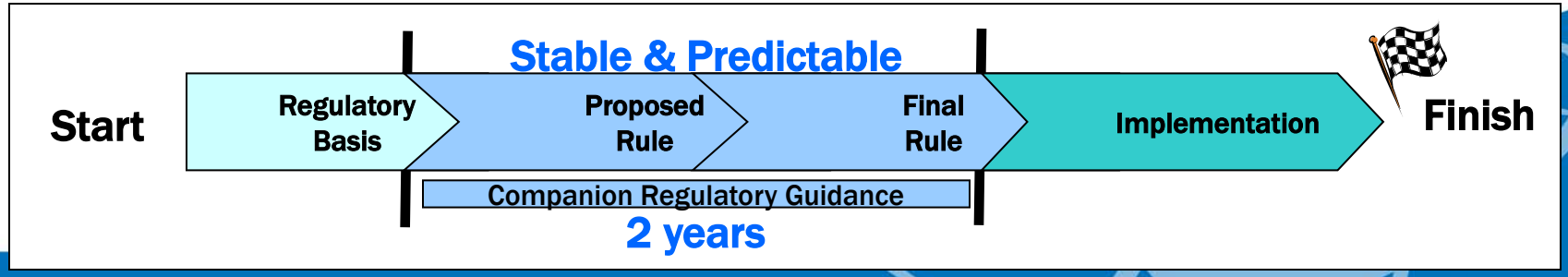
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Incomplete treatment of the standard
- Bypasses key agency checks and balances
- Difficulty in establishing the staff position
- Difficult to find in the regulatory record

NRC Endorsement Process: Rulemaking

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Most formal of NRC endorsement processes
  - About 1% of cited standards
- Standards endorsed in rulemaking process become licensee requirements
- Backfit Rule considered
- Includes public comment and rigorous reviews
- Takes 2-3 years to complete



Special Rulemaking: 10 CFR § 50.55a

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Incorporates by reference and requires use of ASME Codes:
  - ASME BPV Code, Section III for design
  - ASME BPV Code, Section XI for in-service inspection
  - ASME OM Code for in-service testing
- Approves, conditions, or disapproves use of ASME Code Cases, via 3 referenced Regulatory Guides
  - Regulatory Guide 1.84 (Section III)
  - Regulatory Guide 1.147 (Section XI)
  - Regulatory Guide 1.192 (OM Code)
- Incorporates by reference two IEEE Standards for Nuclear Power Generating Stations:
  - Standard 279 – Criteria for Protection Systems
  - Standard 603-1991 – Criteria for Safety Systems

NRC Endorsement Process: Regulatory Guides

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Describe methods that the staff considers acceptable for use in implementing specific parts of the agency's regulations
- Not substitutes for regulations; compliance with RGs is not required
- Typically have forward-fit applicability
- Best repository of the current staff position
- Includes ACRS, CRGR and public comment reviews
- Takes 1-2 years to complete
- About 41% of cited standards

ANS/ASME Standards

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- ASME RA-S-2002, “Standard for Probabilistic Risk Assessment for Nuclear Power Plant Applications”
  - Referenced in NRC RG 1.200, “An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities”
- ANS/ASME joint program on risk
  - Developing updated and more comprehensive PRA standards, to be referenced in NRC RG 1.200

Standards for New & Advanced Reactor Construction

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- ASME Boiler & Pressure Vessel Code
  - Changes expected in Section III – Construction
  - Re-start activity on Sec III, Subsection NH – Elevated Temperature Design
  - Section D – Subgroup on Elevated Temperature Design
  - New Working Group on High Temperature Gas Reactors, new Section III, Division 5
  - New materials and fabrication techniques?

International Standards Developers

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- International Atomic Energy Agency (IAEA) Safety Standards, Codes of Conduct
- International Standards Organization (ISO) Standards
- International Committee on Radiation Protection (ICRP) recommendations
- NRC participates in the work of these & other organizations, but does not directly endorse their standards

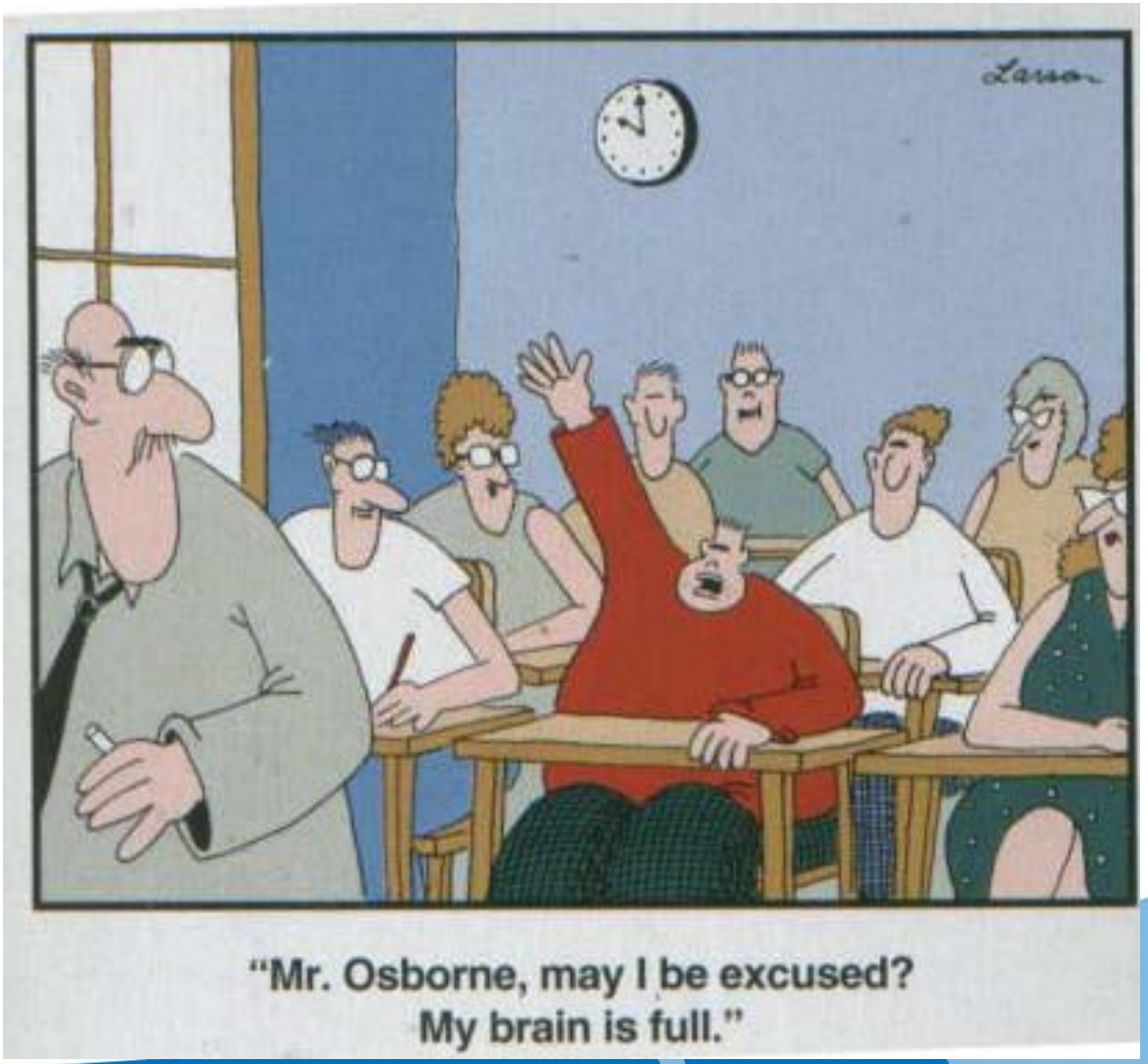
Conclusions

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- NRC makes extensive and effective use C&S as part of its regulatory process
- Regulatory vehicles include regulations, regulatory guides, standard review plans
  - C&S endorsed or cited in all types of regulatory vehicles
- C&S written by numerous standards bodies, domestic & international
- NRC staff participate in writing C&S and have influence in setting the priorities of C&S bodies
- Endorsement of codes & standards creates durable regulatory guidance that is key to improved safety performance

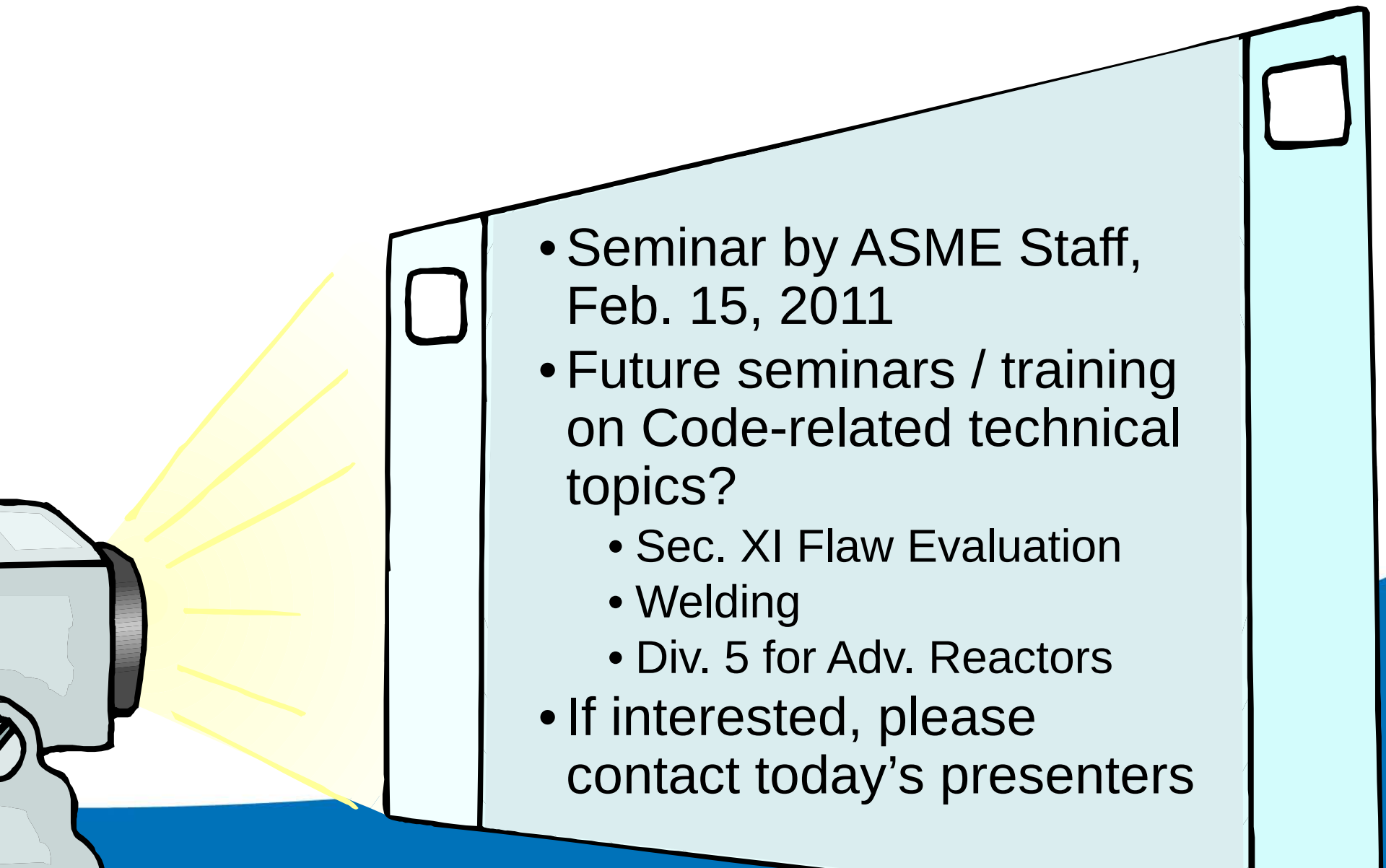
Questions?

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment



Coming Attractions

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment



- Seminar by ASME Staff, Feb. 15, 2011
- Future seminars / training on Code-related technical topics?
  - Sec. XI Flaw Evaluation
  - Welding
  - Div. 5 for Adv. Reactors
- If interested, please contact today's presenters