NRC STANDARDS FORUM

IEEE NPEC
Current And Future Reactor Standards

Greg Hostetter

Nuclear Power Engineering Committee

Standards Coordinator

Chairman Sub Committee 6

Agenda

- Standards for Current Nuclear Power Reactors (Operating Fleet)
- Standards for Future Reactors

NPEC's Industry Contribution

- Working aggressively to address increased use of digital technology (IEEE 603 – just balloted, IEEE 7-4.3.2)
- Committed to addressing evolving issues and producing acceptable solutions
- Committed to the nuclear promise in reducing costs and achieving operational excellence
- Welcoming ideas on areas where NPEC can facilitate advancements in these areas through new standards or revision to existing standards

NRC Utilization of IEEE Standards

- Incorporated into Regulations
- Endorsed through Regulatory Guides
- Referenced in Standard Review Plan for license applications / amendments

IEEE Standards Incorporated into Regulation by NRC

Standard	Edition	Title	CFR Location
IEEE 279	NDG	Criteria for Protection Systems for Nuclear Generating Stations	10 CFR 50.55a(h)(2)
IEEE 603	1991	Standard Criteria for Safety Systems for Nuclear Power Generating Stations	10 CFR 50.55a(h)(2)
IEEE 603	1991	Standard Criteria for Safety Systems for Nuclear Power Generating Systems	10 CFR 50.55a(h)(3)
IEEE 803	1983	Recommended Practice for Unique Identification in Power Plants and Related Facilities	10 CFR 50.73(b)(2)(ii)(F)(1)

IEEE 603 is being reviewed by IEEE Standards Board. Expected to be issued by the end of the year

Areas of Standards Endorsed Through Regulatory Guides

- Battery, sizing, maintenance
- Electrical Control Systems (Analogue & Digital)
- Class 1E Electrical Power System
- Primary Guidance for Environmental Qualification
- Seismic Qualification
- Human Factors (*in process*)
- Accident Monitoring

IEEE Collaboration

Sponsor ORG	TASK ID	Research Project	IEEE Standard	Current IEEE Activity
EPRI	2014-08	Advanced Battery Evaluation	IEEE 535	EPRI & NRC participates
EPRI	2015-02	SMR Staff Optimization	None	Under review
EPRI	2015-09	Seismic Hi-Freq. Loadings	IEEE 344	Joint IEC revision on progress
		HTGRs	None	Under consideration
		Liquid metal Reactors +SFR	None	Under Consideration

Concepts Considered for Future Reactors

- **Approach for Fault Tolerance**
  - Consideration of Three Safety Trains (n+2)
  - Channels and divisions contained within fire zone (zone of influence) with two instrument channels in a Division
  - Power supplies contained within divisional zone (DC power, inverter, Emergency Diesel Generator)
  - Process signals shared for logic cabinets only through fiber optic cables without any metal sheathing

Concepts Considered for Future Reactors

- Ideal Separation for fire, electrical, and train independence
- Worst failure takes out only one electrical train and two instrument channels and it is contained in a fire zone
- Use of qualified optical cables between divisions/channels to prevent propagation of energy or any other deleterious effects

Contacts

Thomas Koshy, **NRC –SDO Coordinator for IEEE**

Member: – IEEE Standards Board, Standards Revision Committee

Chairman, Nuclear Power Engineering Committee (NPEC)

Ravi Subramaniam, Technical Director – IEEE-SA

IEEE Conformity Assessment Program

r.subramaniam@ieee.org

IEEE

Advancing Technology for Humanity