



**EPRI**

ELECTRIC POWER  
RESEARCH INSTITUTE



## NDE Program update



**Greg Selby**

Director, NDE

**NRC / Industry Technical Meeting**

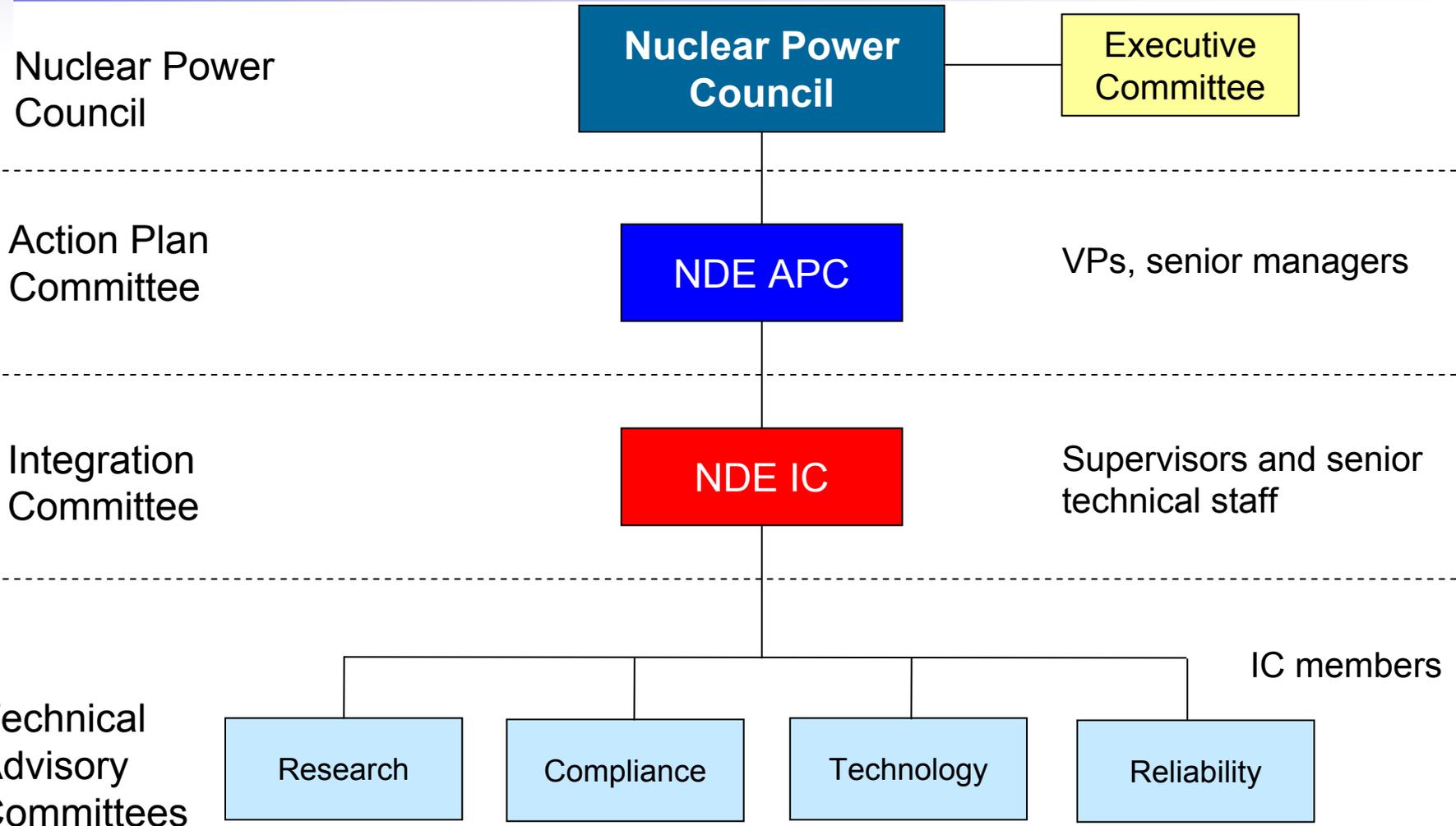
June 2011



# Topics

- Advisory structure
  - How we work
- Strategic planning
  - IMT
  - Modeling and Simulation
- Update on 'Fast Track' NDE training program
  - Getting new people into nuclear NDE
- Regulatory collaboration
  - Memorandum of Understanding
  - This item is last but not least: it's a nice segue to the next presentation

# EPRI NDE advisory structure



# How we decide what to work on

- Project ideas
  - Developed by EPRI staff and by TACs
  - Coordination and prioritization (H, M, L) by TACs
- Ranking
  - Integration Committee ranks the year N+1 proposals
  - Forced ranking, 1 through (this year) 40+
  - TACs review the ranking and make recommendations
  - Integration discusses TAC recommendations, formulates final recommendation to APC
- Final endorsement
  - APC considers IC recommendations and any additional EPRI recommendations
  - APC makes its adjustments and then endorses the workplan to EPRI

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2009	NDE IC Refine workplan					NDE IC Mid-year review		NDE APC Approve workplan			NDE IC (webcast) Year-end review	
	NDE APC Refine workplan					NDE IC Rank projects		NDE APC Review Issues Mtg			NDE IC (webcast) Refine workplan	
	NDE TACs refine projects, prioritize; IPs prioritize					NDE Issues Mtg - ideas		NDE APC priorities guidance			NDE TACs (webcast) develop projects	
2010	NDE IC Refine workplan		EPRI: Proposal Integration Meeting (Internal)	EPRI: Proposals Finalized	EPRI: Distribute Proposals to NDE IC	NDE IC Mid-year review		NDE APC Approve workplan			NDE IC (webcast) Year-end review	
	NDE APC Refine workplan					NDE IC Rank projects		NDE APC Review Issues Mtg		NDE IC (webcast) Refine workplan		
	NDE TACs refine projects, prioritize; IPs prioritize					NDE Issues Mtg - ideas		NDE APC priorities guidance		NDE TACs (webcast) develop projects		
2011	NDE IC Refine workplan		EPRI: Proposal Integration Meeting (Internal)	EPRI: Proposals Finalized	EPRI: Distribute Proposals to NDE IC	NDE IC Mid-year review		NDE APC Approve workplan			NDE IC (webcast) Year-end review	
	NDE APC Refine workplan					NDE IC Rank projects		NDE APC Review Issues Mtg		NDE IC (webcast) Refine workplan		
	NDE TACs refine projects, prioritize; IPs prioritize					NDE Issues Mtg - ideas		NDE APC priorities guidance		NDE TACs (webcast) develop projects		
2012	NDE IC Refine workplan		EPRI: Proposal Integration Meeting (Internal)	EPRI: Proposals Finalized	EPRI: Distribute Proposals to NDE IC	NDE IC Mid-year review		NDE APC Approve workplan			NDE IC (webcast) Year-end review	
	NDE APC Refine workplan					NDE IC Rank projects		NDE APC Review Issues Mtg		NDE IC (webcast) Refine workplan		
	NDE TACs refine projects, prioritize; IPs prioritize					NDE Issues Mtg - ideas		NDE APC priorities guidance		NDE TACs (webcast) develop projects		
2013												
2014												

# Strategic planning: NDE Issue Management Table

- The Materials Issue Programs maintain PWR and BWR IMTs
- The NDE Program has never had one, but this year we are preparing our first
- Scope: everything
  - Primary system, BOP, below ground, above ground, metal, plastic, concrete, new plants, old plants, etc.
  - Ambition is to include everything that we anticipate ever needing to work on
  - This probably is an aspirational goal, but it's a good one
- Schedule: first draft end of 2011

# Strategic planning: NDE Modeling and Simulation

- Have initiated development of a world-class modeling and simulation capability
- Assigned Mark Dennis to lead
  - Engaged three new staff 12/2010
  - Evaluating models and acquiring the right ones
  - Buying fast computers and big monitors
- Objectives
  - Optimize costs of expensive mockups – eliminate some, build only the necessary ones
  - Support research, performance demonstration, reliability statistics, and training

# Fast Track NDE training program

- Program offered at two community colleges
- Coordinated with their two-year NDE degree programs
- Fast Track is targeted to bring new people into nuclear NDE
  - Course work directed at nuclear applications, 40 hours/week
  - Final exam is PDI qualification
  - Students' PDI costs sponsored by NDE vendor companies and by NRC



# Fast Track NDE training program: What they learn

- 9 students enrolled in the program
  - Fast-Track began in 8/2010
    - PDI-UT-1/PDI-UT-2
  - Transitioned to PDI-UT-3 (Depth) in 1/2011
  - Covered PDI-UT-8 (WOR) in February
  - Finished PDI-UT-10 (DSM) in March
  - Reviewed PDI-UT-1/2 in mid-April
  - Attempted PDI-UT-1/2 (Supplement 12) qual in May
    - PDI provided brief IGSCC training
      - Conducted a practice practical
      - 3 day mini-course



# Fast Track NDE training program: How they did

- 9 candidates
  - One attempted Supplement 12 w/IGSCC
    - Unsuccessful
  - Eight attempted Supplement 12 w/o IGSCC
    - Austenitic/ferritic (Supplement 12)
      - 1 qualified
    - Ferritic Only (qualification in limbo until austenitic is passed)
      - 2 qualified (in addition to the one above)
    - Austenitic qualification only (Supplement 2)
      - 2 qualified (in addition to the one above)



# Fast Track NDE training program: Strengths observed

- Well versed in profiling, plotting, theory and concepts
- Knowledgeable of ultrasonics
- Knowledgeable of the procedures
- Exposed to a variety of samples
- Numerous hours of hands-on (scan time)
  - Good scanning techniques (Ax and Circ)
- Most had established protocols
- Excellent paperwork
- Well versed in use of the UT equipment
  - Instrument, shear waves, etc.



# Fast Track NDE training program: Areas for improvement

- Not well versed with RLs
- Structured labs may be beneficial
  - Specific lab exercises (for example, scanning with a 45-degree, and...)
  - Time per sample - set time constraints
  - Practice practicals
    - Utilize mock-ups and make comparable practice tests
- Move towards emphasis on signal discrimination
  - Samples where geometry coincides with flaws
  - Few, if any, used technique sheets
- Ferritic - flaw coincides with clad roll



# Regulatory collaboration

- Memorandum of Understanding
  - Between EPRI and RES
  - Several topical Addenda
- Addendum on NDE
  - Several Attachments
    - Visual examination
    - Cast austenitic stainless steel
    - UT/RT for repairs, replacements, and modifications
    - Documentation of the basis for Appendix VIII
    - RMSE – ID pipe examinations depth sizing
  - Biweekly coordination call

# Regulatory collaboration

- Addendum on NDE
  - Several Attachments
    - Visual examination
      - RES conducting a round robin test on reliability of remote visual examination for detecting cracks
      - Invited industry collaboration
      - Phase 1 complete – ‘trial run’ round robin
      - Phase 2 in 2012 – round robin including qualified, field examination teams
      - Phase 3 in 2013 – opportunity for trying advanced technologies

# Regulatory collaboration

- Addendum on NDE
  - Several Attachments
    - Cast austenitic stainless steel
      - EPRI and PNNL are jointly (alternately) examining each others' mockup sets, comparing notes
      - Considering data sharing in the effort to develop probabilistic approach to thermal aging embrittlement

# Regulatory collaboration

- Addendum on NDE
  - Several Attachments
    - UT/RT for repairs, replacements, and modifications
      - Working together in Code
      - Considering a workshop

# Regulatory collaboration

- Addendum on NDE
  - Several Attachments
    - Documentation of the basis for Appendix VIII
      - Capturing the knowledge and reasoning of the people who developed it

# Regulatory collaboration

- Addendum on NDE
  - Several Attachments
    - RMSE – ID pipe examinations depth sizing
      - Working on technology to qualify at 0.125” RMSE
      - Working on the basis for an RMSP alternative

# Together...Shaping the Future of Electricity