Life After 60 Years

NRC/DOE Workshop

The Early Years of License Renewal

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The Early Years Presentation

- Nuclear power circa 1978
- Early interest in life extension
- Early generic studies (1978 – 1982)
- Pilot plant studies (1983 – 1987)
- Lead plant projects and NRC rules (1988 – 1991)
- Calvert Cliffs and Oconee (1991 – 1998)
- Standardization (1999 and beyond)
- Life after 60

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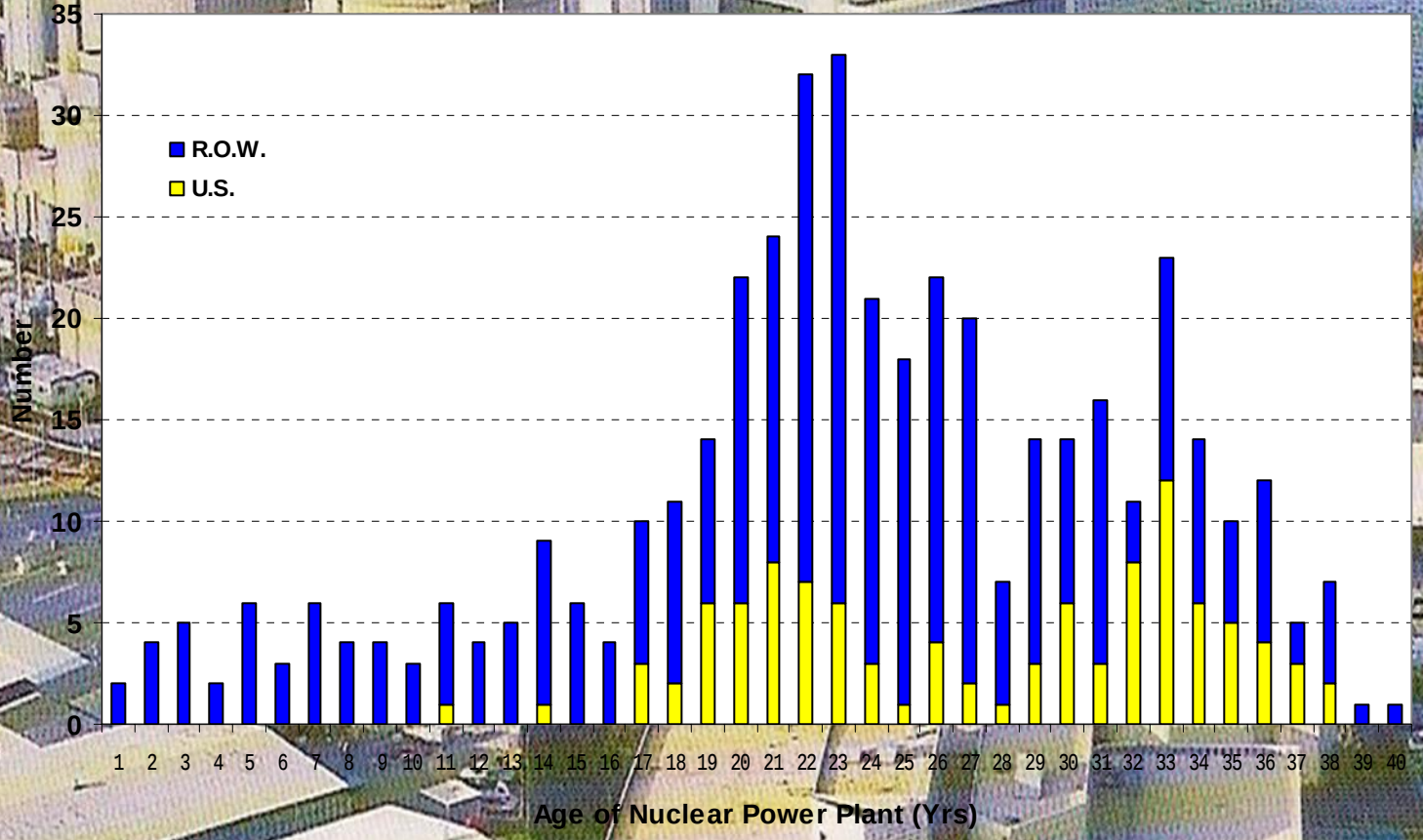
Global Status – 435 Commercial Reactors



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Nuclear Power in 1978

- 40 years was a comprise with the Justice Dept.
- Last plant ordered that was completed
- The old AEC had forecasted 1000 nuclear plants by 2000
- Plants were costing much more and taking much longer to build
  - Turnkey plants were nightmares for the suppliers
- Two-thirds of all plants ordered after 1970 were cancelled
- No major accident

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Interest in Life Extension

- From the utilities and the suppliers – none
  - When the license runs out…."we will build new ones"
- For all other parts of the utility industry life maximization was a principal objective
- A small group at EPRI, led by Mel Lapides, convinced the Nuclear Power Division Committee to fund $50 K study

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Initial Generic Studies (1978-1982)

- Examined technical and economic feasibility
- No significant technical obstacles were identified
- Potential long term aging issues
  - Pressure vessel integrity
  - Electric cables
  - Critical concrete structures
- Identified the loss of life due to extended time for construction – resulting regulatory change added over 6 years to a plants operating life

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Pilot Plant Studies (1983-1987)

- Detailed pilot plant studies funded by EPRI and DOE were conducted
  - Monticello – BWR – Northern States Power
  - Surry – PWR – Virginia Electric & Power Co.
- No insurmountable technical issues were found
- Favorable economics ~ 4:1 benefit to cost
  - Cost of aging management for critical components was key determinant
- Increasing utility interest
- NRC began their component aging program electrical followed by mechanical and structural

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Lead Plant Projects (1988-1991)

- NRC began to establish criteria for relicensing in the mid-1980s
- EPRI and DOE sponsored lead plant license renewal projects
  - Monticello – BWR
  - Yankee Rowe – PWR
  - 10 license renewal industry reports that formed the technical bases and models for all subsequent reviews of aging management

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Lead Plant Projects (cont.)

- Regulatory basis for license renewal was established as the current licensing basis
  - Adequate management of components and structures
- Economic basis for decisions – competitive in unregulated electricity markets during renewal term
- Defined technical scope of license renewal
- Difficult time in the nuclear utility industry
- Monticello and Rowe projects terminated
- NRC issued 10CFR54 in 1991

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Calvert Cliffs and Oconee (1991-1998)

- EPRI and BGE initiated a life-cycle management program at Calvert Cliffs to develop strategic plan for license renewal
- The three owner groups initiated programs
- Several projects to implement 10 CFR 54, which was amended in 1995
- Guidance provided to Industry in NEI 95-10
- BGE and Duke submitted the first license renewal applications in 1998

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Life After 60 Insights from Early Work

- Nothing magic about 60 years
- Maximize, safe, reliable, economic life
- From the beginning there appeared to be no "cliff" with regard to license renewal
- Aging management programs are key to longer life operation
  - Materials aging management is the most important
- Many large complex structures have operated well for more then 60 years

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The B52 is a Good Example

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Thank You

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