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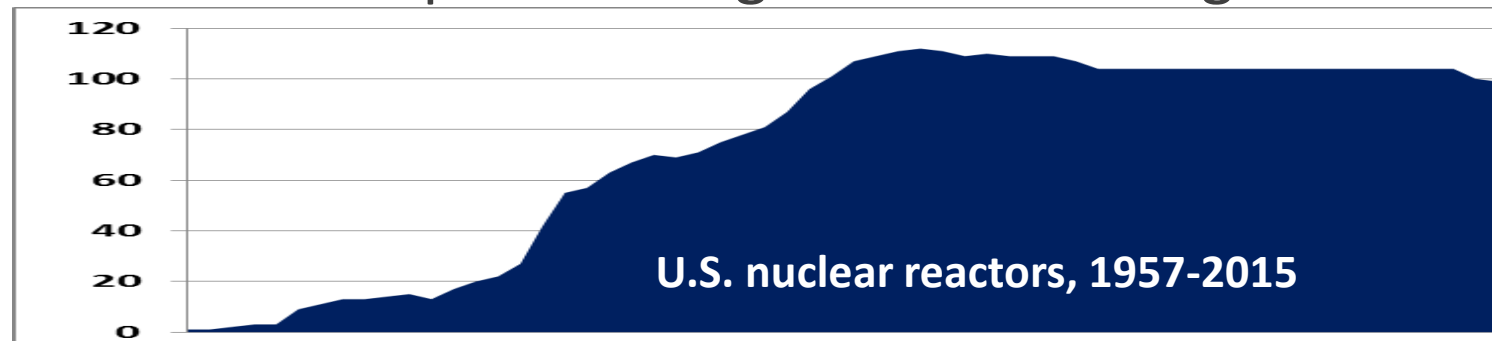
U.S. Nuclear Regulation after Three Mile Island

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Agenda

- Setting the scene: Before TMI
- Three Mile Island accident and aftermath
 - Presidential action: Kemeny Commission
 - Congressional action: Oversight and legislation
 - Regulatory action
 - Industry action
- Long-term effect on nuclear industry
- Post-TMI trends and challenges
- Conclusion: Impact of congressional oversight



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Setting the Scene: Before TMI

Breakup of the Atomic Energy Commission



Atomic Energy Commission, 1946

- Congress established AEC to provide civilian control over nuclear power after World War II
- Responsible for all nuclear activities, both defense and energy
- Developed nuclear power reactors from naval propulsion program
- In 1954 Congress authorized AEC to license and regulate commercial nuclear plants

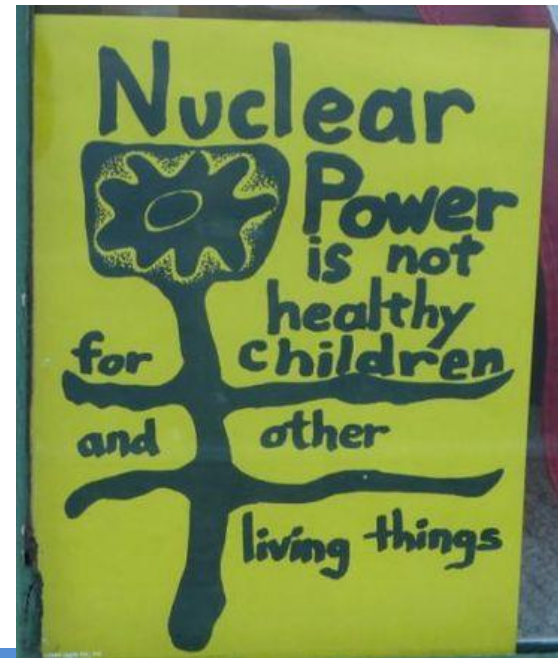
President Truman signs the Atomic Energy Act of 1946



Growing Public Controversy over Nuclear Power, Late 1960s through Early 1970s

- Concern that federal energy R&D too focused on nuclear
- Concern over AEC dual role as nuclear promoter and regulator
 - Fermi fuel melting, 1966
 - Questions about containment and emergency cooling as reactors grew larger
 - Radiation effects and dose limits

1970s anti-nuclear poster



Congress Splits AEC into NRC and ERDA (later DOE), January 1975



- NRC's sole mission is nuclear safety and licensing
 - Nuclear industry development goes to ERDA
- First crisis: Brown's Ferry 2 fire, March 1975
- Reactor Safety Study (Rasmussen Report), October 1975
 - Used probabilistic methods to quantify safety risks
- Nuclear industry still generally believed major nuclear accident implausible

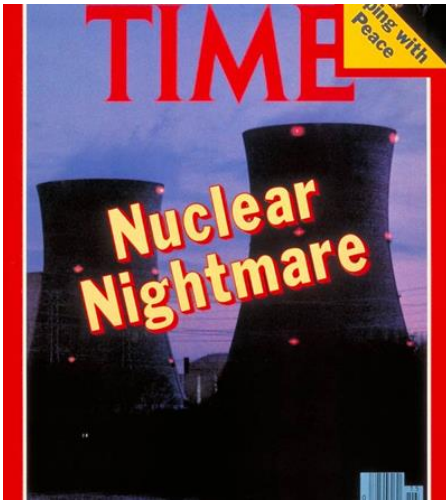


Three Mile Island

New Paradigm for Nuclear Regulators



TMI Loss of Coolant Accident, March 28, 1979



- Combination of design flaws and operator error
- Nuclear industry and NRC lost public credibility
- Similar scenario had been identified in Reactor Safety Study
- NRC not well prepared for emergency response
- Nuclear safety regulations and implementation appeared inadequate

Presidential Action: Kemeny Commission

- Presidential commission recommended in October 1979:
 - “Fundamental changes” in the attitudes of the nuclear industry and NRC
 - New nuclear regulatory agency with single administrator
 - Require state and local emergency plans approved by FEMA
 - Stronger operator licensing and training
 - Independent nuclear industry safety program
 - Improved nuclear plant design and equipment
 - Radiation effects research and monitoring

President Carter at TMI



Congressional Oversight

- Investigation by the Subcommittee on Nuclear Regulation of the Senate Committee on Environment and Public Works, completed June 1980, found:
 - “Inadequate” emergency response by NRC and state officials
 - Deficiencies in equipment and operations
- Numerous congressional hearings
 - House Interstate and Foreign Commerce Committee
 - House Interior and Insular Affairs Committee
 - Senate Labor and Human Resources Committee

**House Committee on
Interior and Insular Affairs**



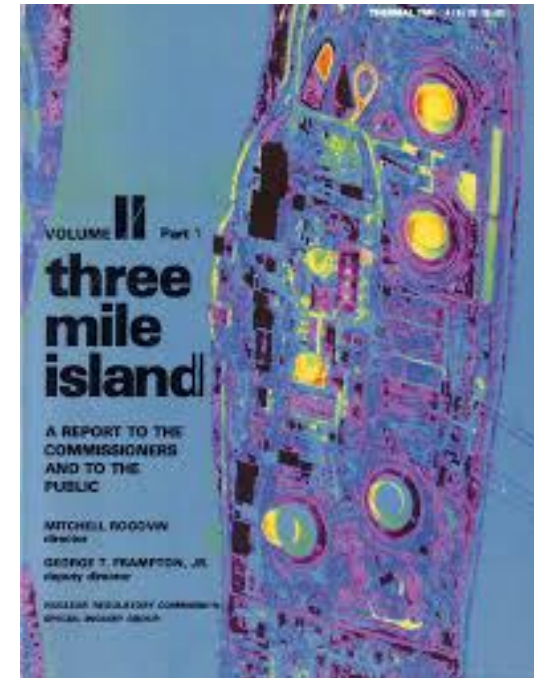
Nuclear Safety Legislation

- NRC Authorization Act for Fiscal Year 1980 (P.L. 96-295)
 - State, local, or utility emergency plans (Sec. 109)
 - Plant notification to NRC of potential releases (Sec. 201)
 - National Contingency Plan for nuclear plant accidents (Sec. 303)
 - Reliable communication between NRC and plants (Sec. 305)
- Reorganization Plan No. 1 of 1980
 - Strengthened role of Chairman as “principal executive officer”
 - Chairman takes charge of emergency response
 - Submitted by President Carter and enacted by P.L. 98-614



NRC Response

- NRC Special Inquiry Group: Report issued January 1980
- TMI Action Plan: Final post-TMI requirements issued November 1980 (NUREG-0737)
 - Hundreds of new requirements for existing and new plants
 - Plant operating staff levels and training
 - New equipment and plant modifications
 - New and modified operating procedures
 - Improved emergency preparedness



NRC Special Inquiry Group report

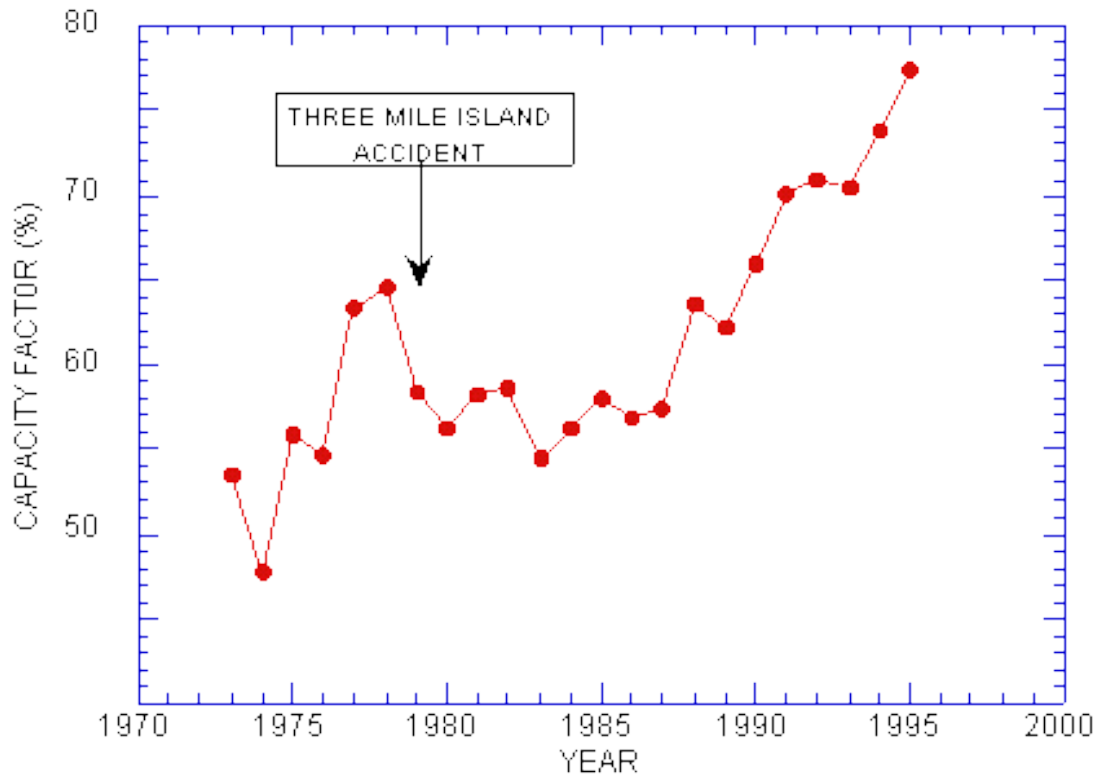
Industry Response: INPO

- Institute of Nuclear Power Operations founded in December 1979 as recommended by Kemeny Commission
 - Plant Evaluations
 - National Academy for Nuclear Training
 - Events analysis and information exchange
 - Assistance with specific technical or management issues
- INPO and NRC have “independent and complementary” programs
 - NRC receives INPO information but keeps it confidential
 - NRC monitors INPO activities but does not certify them
 - Avoids duplication of oversight



Long-Term Effects on Nuclear Industry

- Cost of plant upgrades
- Increased reactor cancellations (62 from 1979-1984)
- Years of low capacity factors



Source: American Physical Society





Post-TMI Trends and Challenges

Learning to Expect the Unexpected



Trend Toward ‘Risk-Informed’ Regulation

- 1975 Reactor Safety Study pioneered probabilistic methodology for reactors
 - Findings extremely controversial at first
 - TMI confirmed study’s identification of small LOCAs as significant risk
 - Methodology gained growing acceptance
 - Reactors required to conduct individual PRAs in 1988
- Government Performance and Results Act in 1993 requires strategic plan
 - NRC strategic plan moves toward “risk informed, performance based” regulation
 - PRA policy statement issued in 1995 encouraging greater use



Congressional Pressure for ‘Risk Informed, Performance Based’ Regulatory System

- Senate Appropriations Committee threatened 33% NRC budget cut for FY1999
 - “NRC’s approach to regulation is punitive rather than performance based.”
 - “Licensees are forced to expend considerable resources on regulations that are not related to safety.”
 - Regulations too prescriptive and enforcement punitive
 - Focus on “paper compliance” can detract from safety
- Smaller cuts ultimately made, after warning sent

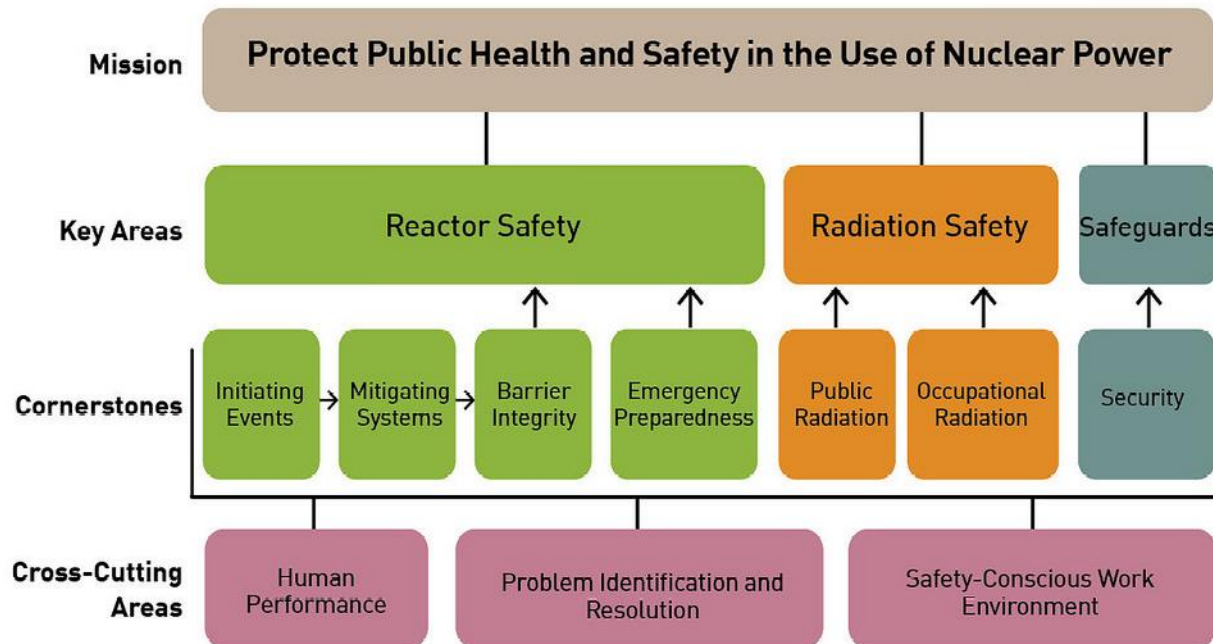
**Senate Appropriations Committee
Chairman Pete Domenici**



Reactor Oversight Process Initiated in 2000

- Risk informed and performance based
- Focuses inspections on activities with greatest risk
- Greater regulatory attention to plants with measurable performance problems
- Enforcement based on potential safety implications

Reactor Oversight Framework



Other Post-TMI Challenges

- 9/11 Attacks
 - NRC issues security and response regulations over 10 years
- Davis-Besse reactor pressure vessel head corrosion, 2002
 - Plant owner had resisted inspections
- Fukushima
 - Response ongoing



**Davis-Besse reactor vessel head
degradation**



Conclusions

Congress and Nuclear Regulation



Congress Has Many Tools to Shape the U.S. Nuclear Regulatory System

- Statutory changes to regulatory structure and processes
- Intensified oversight if legislators not satisfied
- Appropriations
 - Instructions in appropriations reports (threat of statutory action for noncompliance)
 - Appropriation of funds for specific purposes (while avoiding earmark restrictions)
 - Prohibiting use of funds for specific purposes
 - Increasing or reducing agency budget, or leaving unchanged
- Senate approval of NRC nominees
 - But President can designate an existing commissioner as chairman without approval
- Direct communications (letters, personal interaction)



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