

Nuclear Energy and the Management of Spent Nuclear Fuel
Yucca Mountain and the Future of Nuclear Energy

Presented to the National Defense University

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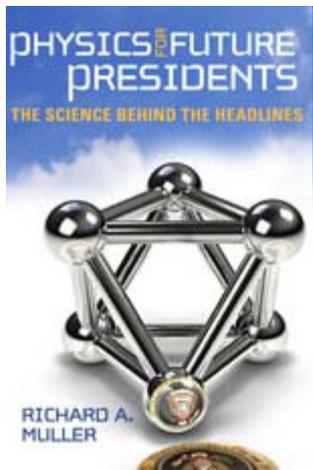
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Agenda

Yucca Mountain and the Future of Nuclear Energy

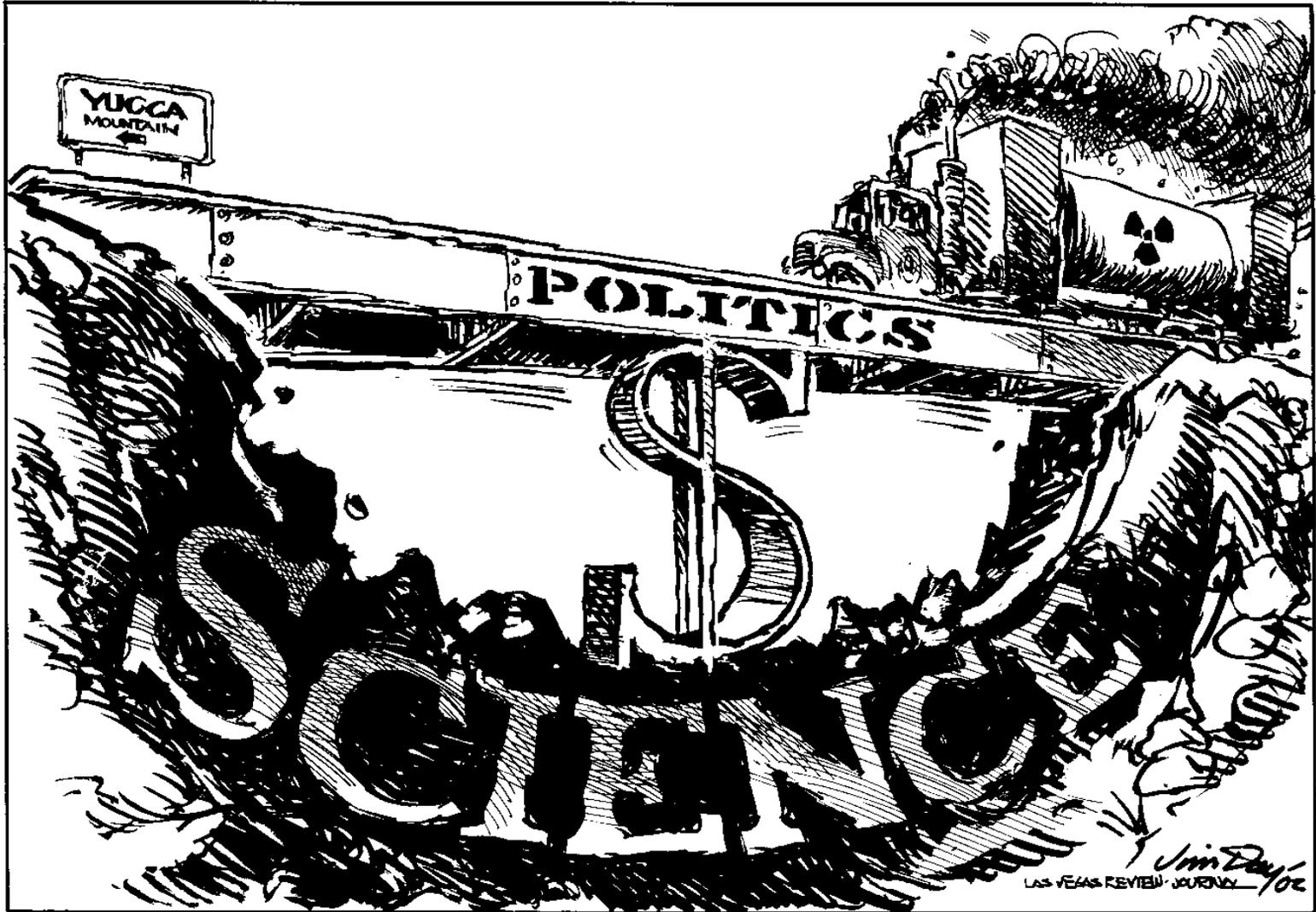
- What are the fundamental issues?
- The Coupling of Nuclear Energy and Nuclear Waste
- Political science observation
- Conclusions
- Questions



- We should start moving waste to Yucca Mountain as soon as possible. Research should continue, because more knowledge is good, but the hope that it will reassure the public is forlorn. Further studies are no more likely to reduce public concern now than scientific research would have calmed the fears of the people of Salem in 1692.
 - Richard A. Muller, a 1982 MacArthur Fellow, is a physics professor at the University of California, Berkeley, where he teaches a course called "Physics for Future Presidents."

What are the fundamental issues?

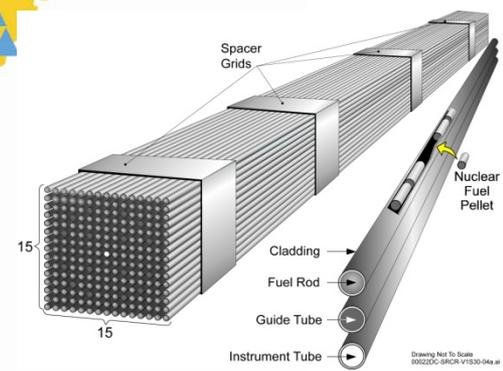
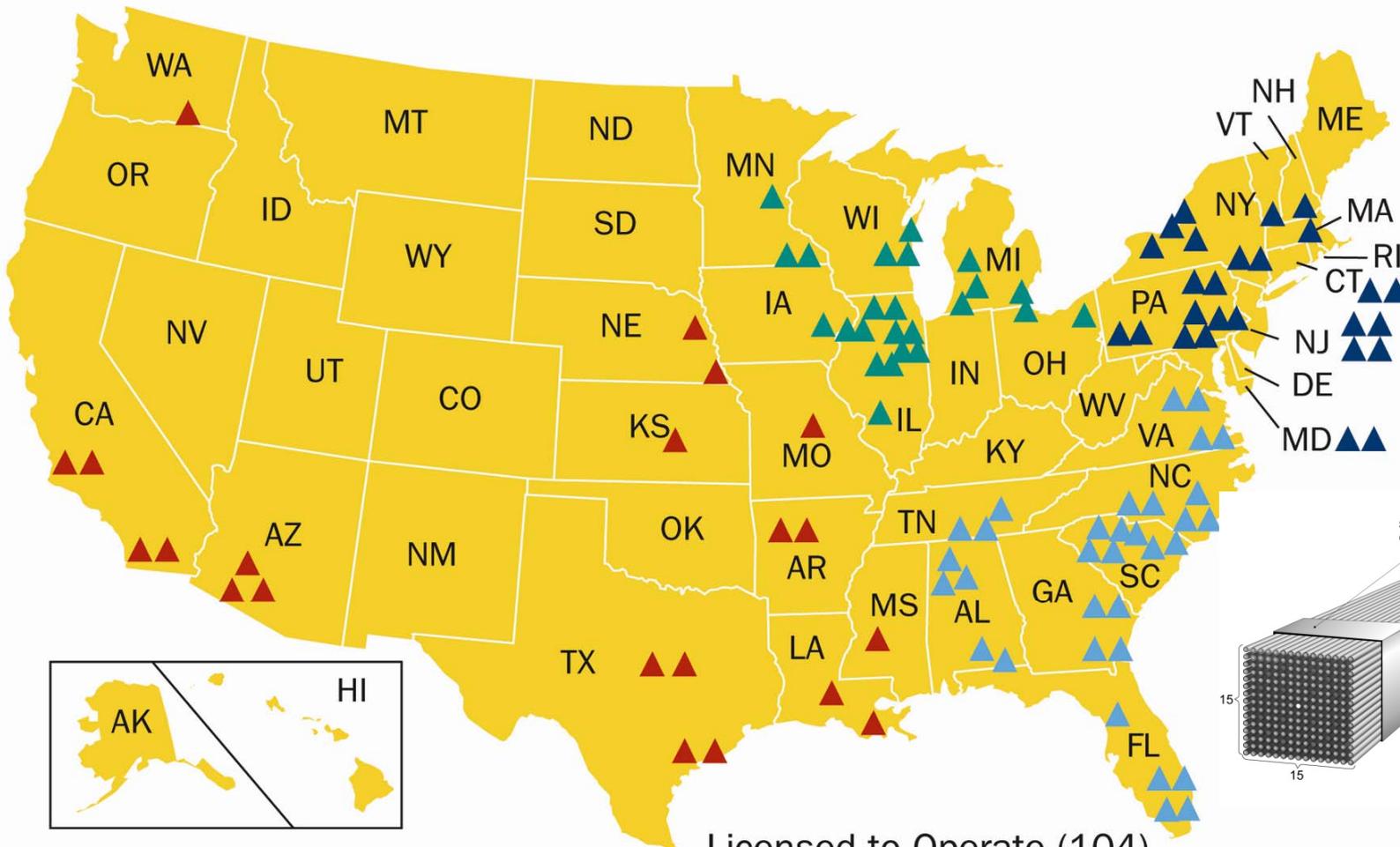
May 16, 2002





US Licensed / Operating Commercial NPP

31 States Total



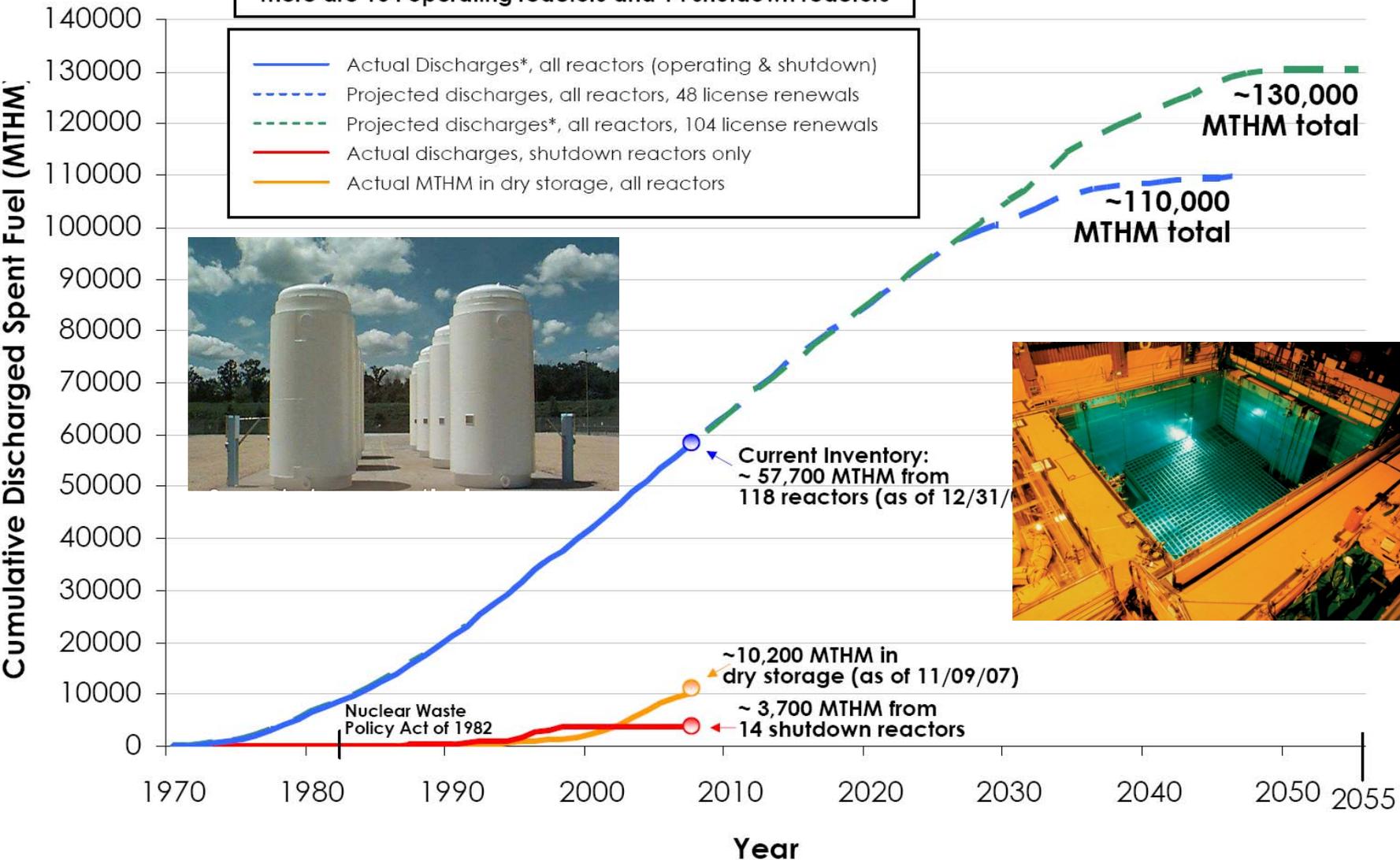
Color signifies NRC region

Licensed to Operate (104)

Commercial Spent Nuclear Fuel Discharges (as of 01/31/08)

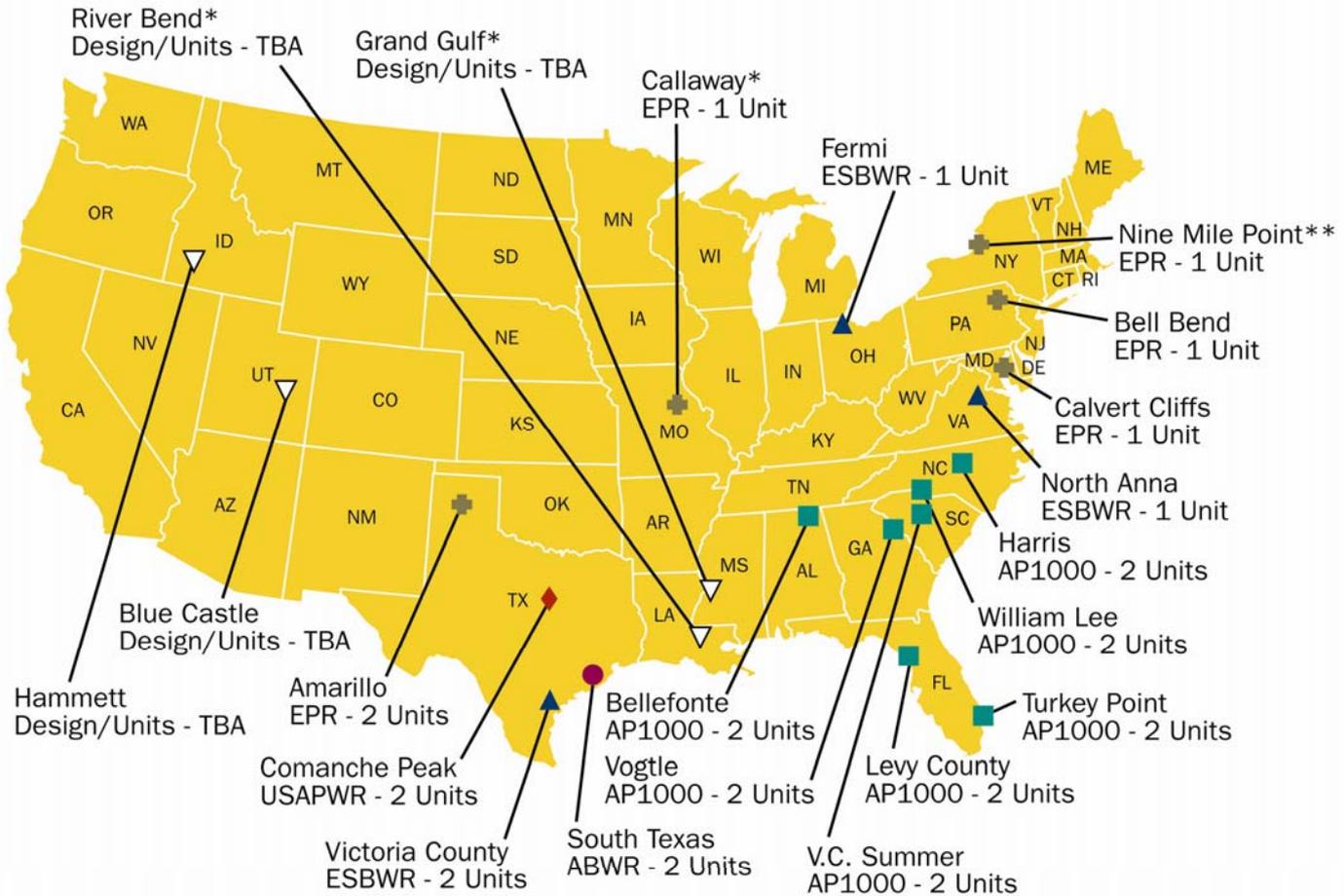
There are 104 operating reactors and 14 shutdown reactors

- Actual Discharges*, all reactors (operating & shutdown)
- - - Projected discharges, all reactors, 48 license renewals
- · - · - Projected discharges*, all reactors, 104 license renewals
- Actual discharges, shutdown reactors only
- Actual MTHM in dry storage, all reactors



Location of New Nuclear Power Reactors

June 2009



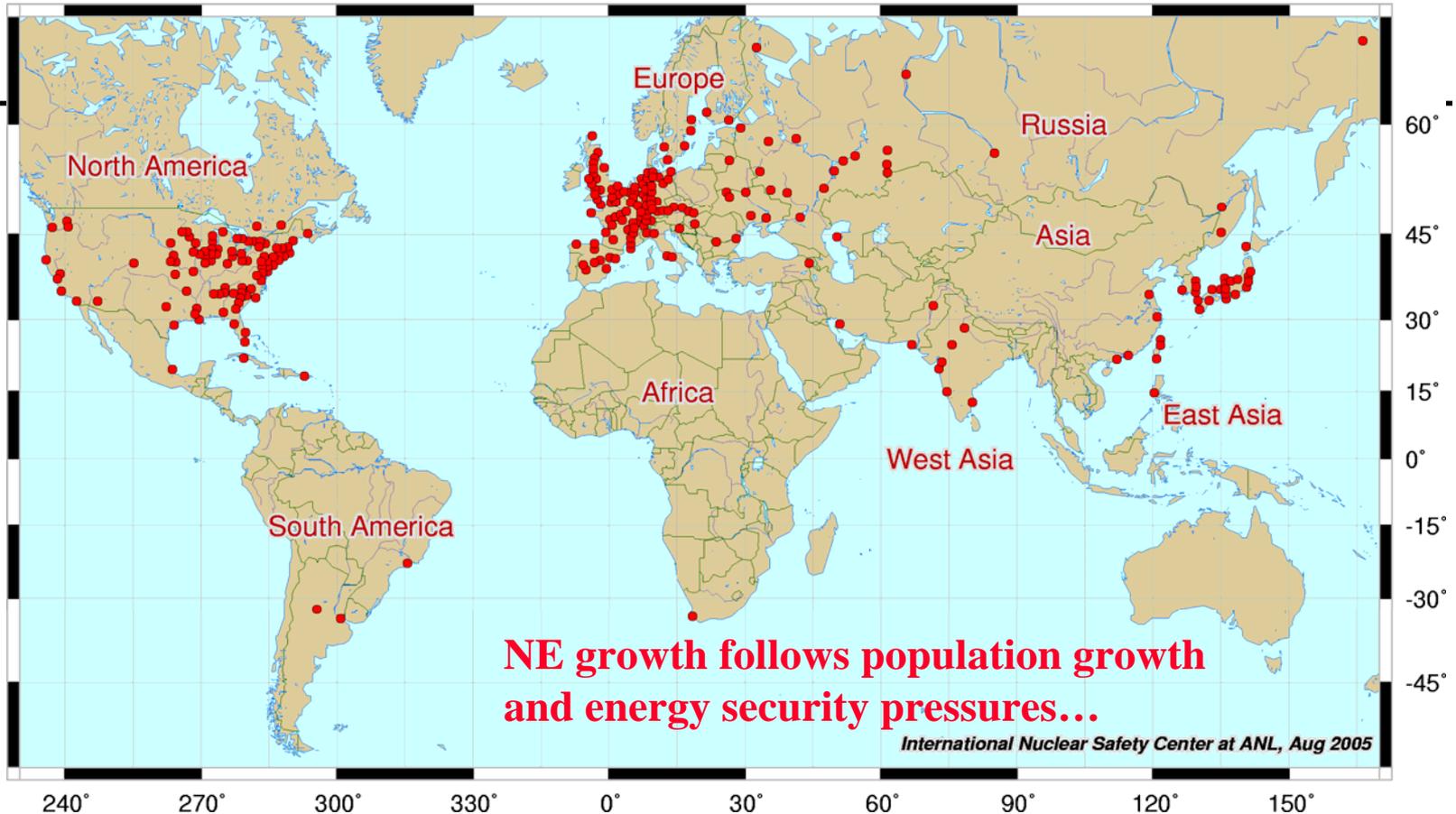
17 applications
for 26 units

● ABWR ■ AP1000 ⊕ EPR ▲ ESBWR ◆ USAPWR ▽ Design/Units - TBA

*Review Suspended

**Review Partially Suspended

World NPP Locations

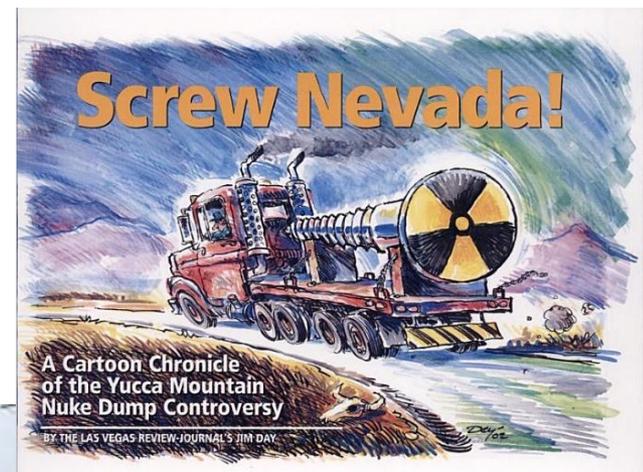


- As of November 2008, there were 439 nuclear reactors operating in 31 countries, with a total capacity of 372 GWe
- 42 plants with an installed capacity of 37 GWe are under construction in 13 countries
- Nuclear energy supplied 2.6 billion MWh in 2006: 16% of the world's electricity and 23% of electricity in OECD countries.
- Global operating experience of nuclear power reactors now exceeds 12,700 reactor-years.
- The **United States, France and Japan** have 57% of the world's nuclear generating capacity, 16 countries relied on nuclear energy to generate over 25% of their electricity.

The Coupling of Nuclear Energy and Waste

- Social (State of NV concerns, intergenerational equity)
- Regulatory (Waste Confidence Decision)
- Legal (Nuclear Waste Policy Act)

“Any decision about the management of nuclear wastes must be made in the cauldron of intense public controversy.” *Dr. Richard Meserve, Former NRC Chairman Oct 99 – Mar 03*



State of Nevada Concerns

Immediate Impact, January 31st, 2002

- **Study: Yucca stigma will hit economy**
 - Las Vegas' economy will be hobbled almost immediately if the federal government designates Yucca Mountain as the nation's nuclear waste repository, according to study.
 - The Clark County sponsored study says if Yucca Mountain is officially named, tourism, property values and gaming revenue will immediately drop because of the stigma attached to the waste.
 - County Commissioner Myrna Williams called the report astonishing. "(A repository at Yucca) would wipe us out," Williams said.

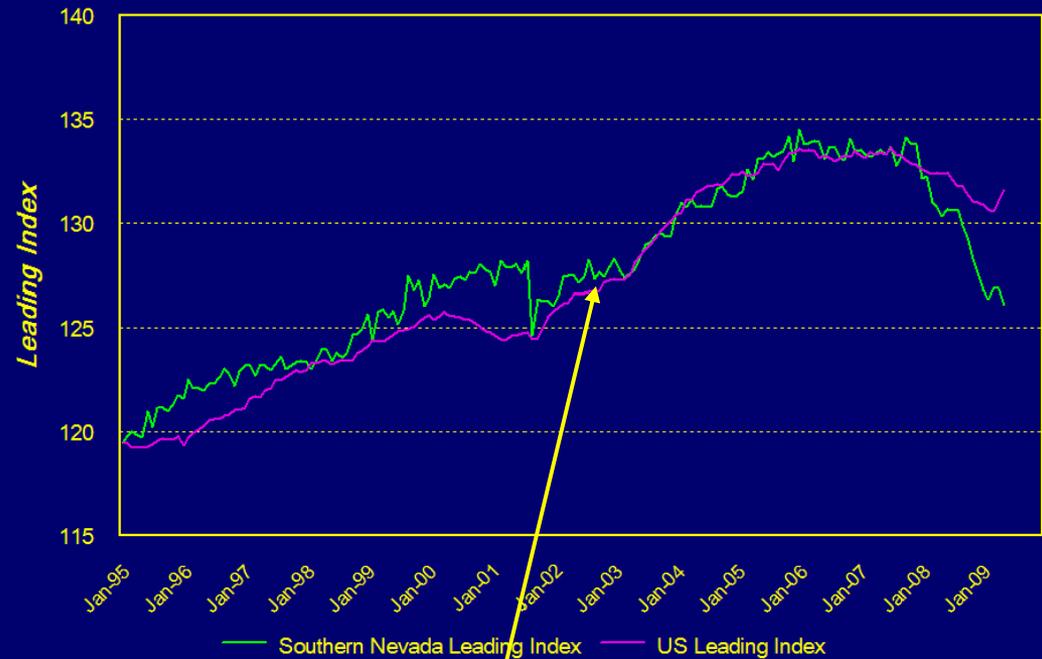
Change
From
May
2008

CLARK COUNTY SERIES

Residential Building Units Permitted (#)	-60.45%
Residential Building Permit Valuation (\$)	-64.48%
Commercial Building Permits (#)	-76.47%
Taxable Sales (\$)	-21.86%
McCarran Airport (Passengers On/Off)	-11.52%
Gross Gaming Revenue (\$)	-7.71%
Visitor Volume (#)	-5.78%
Conventions Held Attendance (Persons)	-32.90%

Southern Nevada and US Indices of Leading Economic Indicators

January 1980=100



The southern Nevada economic collapse did not occur here (at Site Recommendation) as predicted.

Waste Confidence Decision (1984)



- Before 1984 the NRC did not consider the spent fuel disposal issue when considering Environmental Impact Statements (EIS) for new reactor license applications.
- In October 1979, the NRC initiated a rulemaking proceeding, known as the Waste Confidence proceeding, **to assess its degree of assurance that radioactive wastes produced by nuclear power plants “can be safely disposed of, to determine when such disposal or offsite storage will be available, and to determine whether radioactive wastes can be safely stored onsite past the expiration of existing facility licenses until offsite disposal or storage is available”.**
- The Commission’s action responded to a licensing challenge raised by the State of Minnesota and also from the Commission’s statement that it intended to reassess periodically its finding of reasonable assurance that methods of safe permanent disposal of high-level radioactive waste would be available when they were needed.
- **The Commission stated that, as a matter of policy, it “would not continue to license reactors if it did not have reasonable confidence that the wastes can and will in due course be disposed of safely.”**

Waste Confidence Decision (1999)



- The 1984 Waste Confidence findings were updated in 1989-1990 and reaffirmed in 1999. In 1999, the NRC evaluated the Waste Confidence Decision and found revision unnecessary.
- **The NRC decided that it would only comprehensively reconsider the Decision when the repository development and corresponding regulatory activities “run their course” or “significant and pertinent unexpected events” occur that raise “substantial doubt” about the Decision.**



Waste Confidence Decision (2008-2009)



- 2008 (pre-election)
 - The Commission undertook a review of its Waste Confidence findings as part of an effort to enhance the efficiency of combined license proceedings for applications for nuclear power plants anticipated in the near future by ensuring that the findings are up-to-date.
 - Finding 2: The Commission finds reasonable assurance that sufficient mined geologic repository capacity will be available within 50-60 years beyond the licensed life for operation of any reactor to dispose of the commercial high-level radioactive waste and spent fuel originating in such reactor and generated up to that time.
- 2009 (post-election)
 - **March 2009: Secretary Chu testifies:** “Both the President and I have made clear that Yucca Mountain is not a workable option and that we will begin a thoughtful dialogue on a better solution for our nuclear waste storage needs.”
 - **July 2009: Senate Majority Leader Harry Reid (D-Nev.) announced that he has reached an agreement with the White House and the Department of Energy to provide no funding to support the license application of the Yucca Mountain nuclear waste repository.**



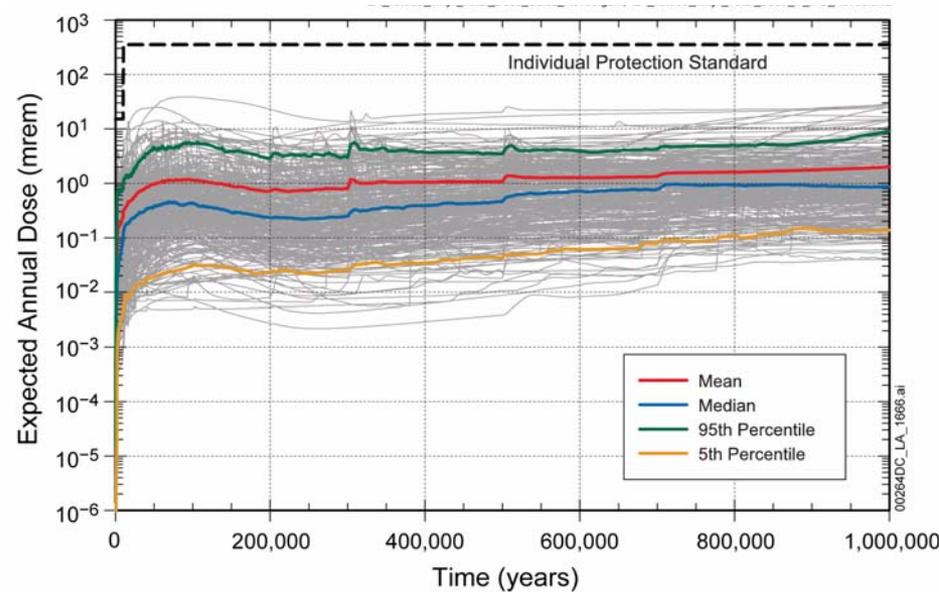
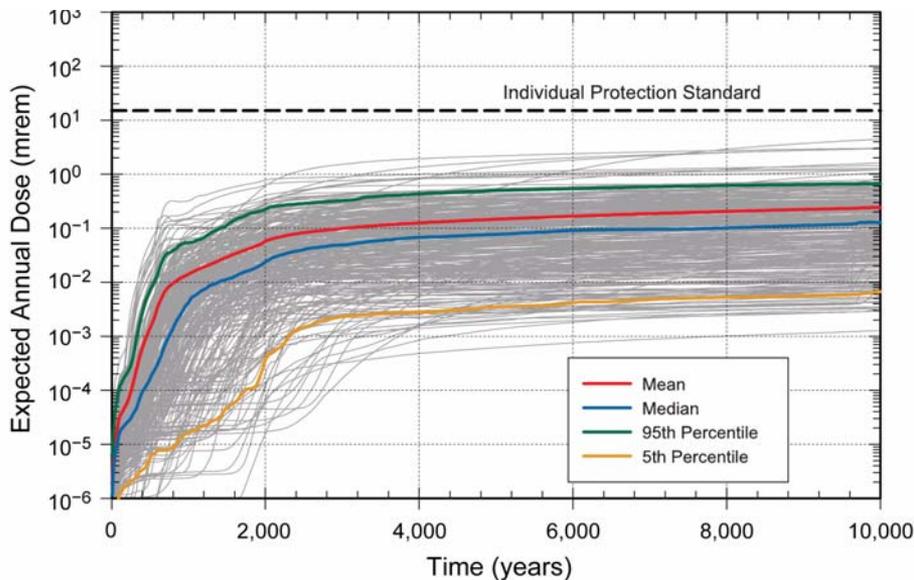
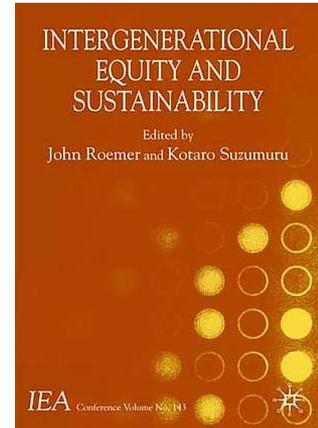
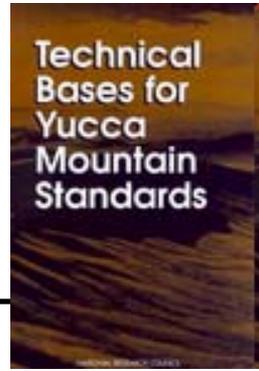
Practical Realities of Changing the NWPA



- Congress passed the Nuclear Waste Policy Act of 1982, and the amendments of 1987, and ratified the site recommendation in 2002. In all the debates over the years, Congress has never altered the statutory obligations that were created for DOE and NRC under the original Act. Legally, DOE and NRC are still bound to the goals set forth in the Act.
 - Ward Sproat (former RW-1) in letter to editor, 4/11/09
“... Yucca Mountain as a repository is not dead, and won't be unless the Nuclear Waste Policy Act of 1987 is repealed or amended. This won't happen any time soon because congressional representatives from the 39 states that have high-level radioactive waste are happy with the law just as it is. Sen. Harry Reid (D., Nev.) knows that he does not have the votes to change the law, so he has directly influenced the appropriations conference committees to reduce the funding. ...”

Intergenerational Equity

- The 2005 Eurobarometer poll indicate:
 - 92% agree that a solution for highly radioactive waste should be developed now and not left for future generations.
- Because governments are short-lived relative to the longevity of potential nuclear waste hazards, nuclear waste should achieve permanent disposal with a protection equal or greater to that present society would impose on itself.



Political Science

- **June 17th, 2008:** Polling outfit Mason-Dixon completed and released an exhaustive statewide survey of Nevada voters for the Las Vegas Review-Journal last week. In answer to the question, “**What issue is most important to you when considering your presidential vote?**”:

- Economy/jobs - 35%
- War in Iraq - 15%
- Energy/gas prices - 11%
- National security/terrorism - 9%
- Taxes/government spending - 8%
- Health care - 7%
- Immigration - 5%
- Education - 3%
- Social Security/Medicare - 2%
- Moral issues/family values - 1%
- Environment/global warming - 1%



- **June 4th, 2009:** A poll by the firm Mason Dixon, for the *Review-Journal*, showed that only 35 percent of respondents planned to vote for Nevada Sen. Harry Reid when he defends his Senate seat in next year’s election; 45 percent said they would vote against him. Bolstered by this latest sign that suggests Reid’s popularity is waning, local Republicans sound confident that Reid’s days may be numbered.

Conclusions



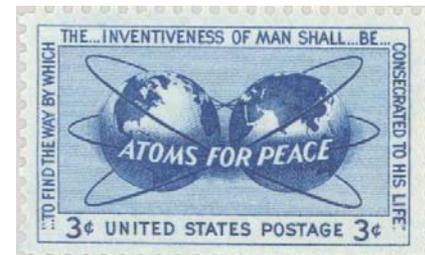


Conclusions

- Nuclear waste is more politically challenging than technically challenging
- The saga of Yucca Mountain will play out in time, but no matter what future is envisioned, a geologic repository is needed
- The license application process should proceed to construction authorization or Site Evaluation Report issuance, lest there be no benefit for a ~\$10B investment
- Consider the implications for future repository sites if Nevada succeeds on political grounds
- The 2010 election may once again shift the political leaning on YM
- The Blue Ribbon Commission may make many of the same technical recommendations (e.g. reprocessing) as past reviews, but should add binding site selection processes
- Reprocessing is not a panacea for repository acceptance or performance
- The popular notion of seeking volunteer sites is not a substitute for leadership's responsibility to make decisions for the good of society
- The need for a coherent Nuclear Energy Policy Act that *unifies* nuclear waste management policy, nuclear energy policy and non-proliferation policy is paramount



Questions



- But let's be clear: promoting science isn't just about providing resources – it is also about protecting free and open inquiry. It is about letting scientists like those here today do their jobs, free from manipulation or coercion, and listening to what they tell us, even when it's inconvenient – especially when it's inconvenient. It is about ensuring that scientific data is never distorted or concealed to serve a political agenda – and that we make scientific decisions based on facts, not ideology.
- - President Obama, March 9, 2009

