



Union of Concerned Scientists

Citizens and Scientists for Environmental Solutions

Presentation to the Wisconsin Legislative Council's Special Committee on Nuclear Power

**David Lochbaum
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UCS is a leading science-based nonprofit organization working for a healthy environment and a safer world.

UCS combines independent scientific research and citizen action to develop innovative, practical solutions and secure responsible changes in government policy, corporate practices, and consumer choices.

David Lochbaum, as Director of the Nuclear Safety Project for UCS, leads UCS's efforts to ensure the safety of U.S. nuclear power by monitoring licensed commercial nuclear plants to identify and publicize risks. Prior to joining UCS in 1996, Lochbaum worked for more than 17 years in the nuclear power industry.



Positions on Nuclear Power

Inconsistent enforcement of federal regulations by the Nuclear Regulatory Commission resulted in nuclear power safety levels being far lower and nuclear power costs being far higher than necessary.

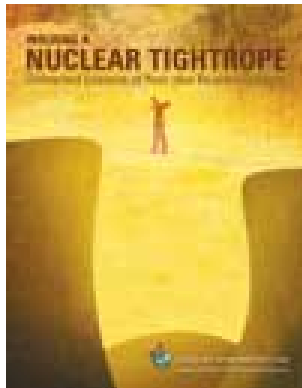
The NRC must remedy this situation to ensure adequately safe operation of existing nuclear power plants and before additional nuclear power plants are constructed.



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Walking a Nuclear Tightrope



*Walking a Nuclear Tightrope:
Unlearned Lessons from Year-plus
Reactor Outages* released by UCS on
September 18, 2006.

**Full report and the 51 year-plus reactor outage
case studies available at:**

http://www.ucsusa.org/clean_energy/nuclear_safety/unlearned-lessons-from.html



Nuclear Safety Levels Far Lower Than Necessary

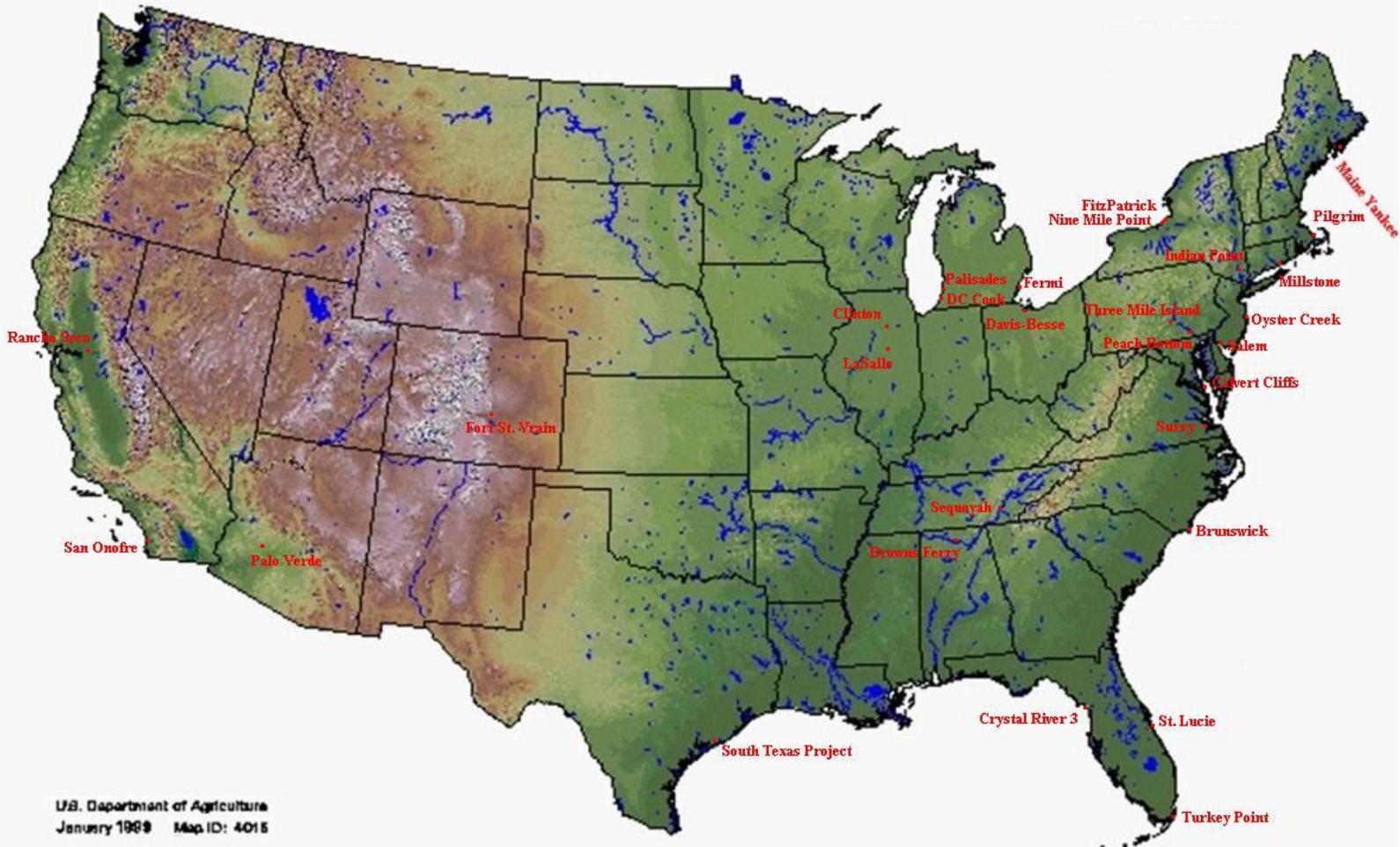
- NRC has licensed 130 nuclear power reactors
- 41 of these reactors have experienced year-plus outages to restore safety levels
- 10 of these reactors have experienced two year-plus outages to restore safety levels
- 36 of the 51 year-plus outages (70%) were caused by failures to comply with federal regulations (10 CFR 50, App. B) over months and sometimes years



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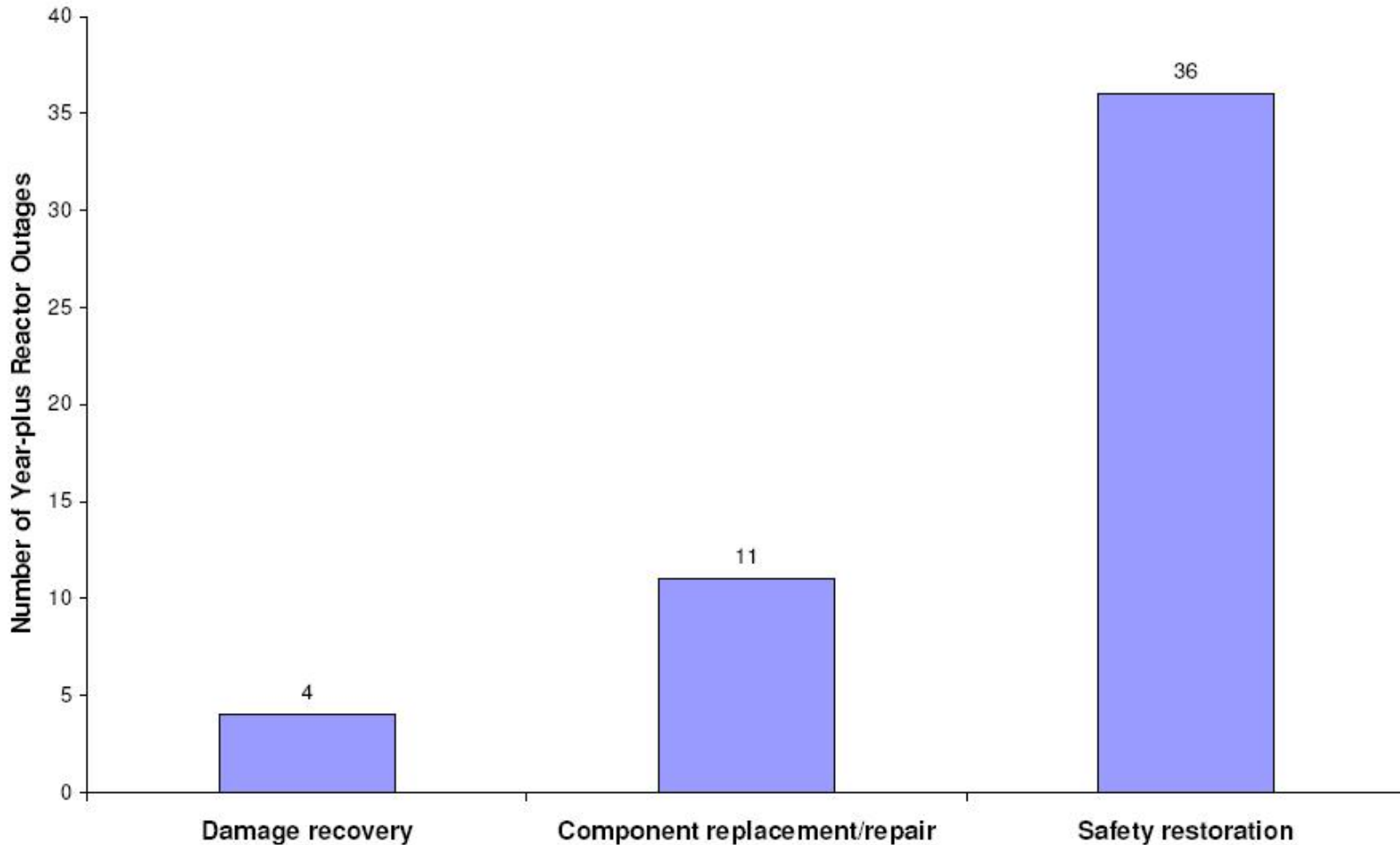
Nuclear Safety Levels Far Lower Than Necessary





Nuclear Safety Levels Far Lower Than Necessary

Extended Outage Causes

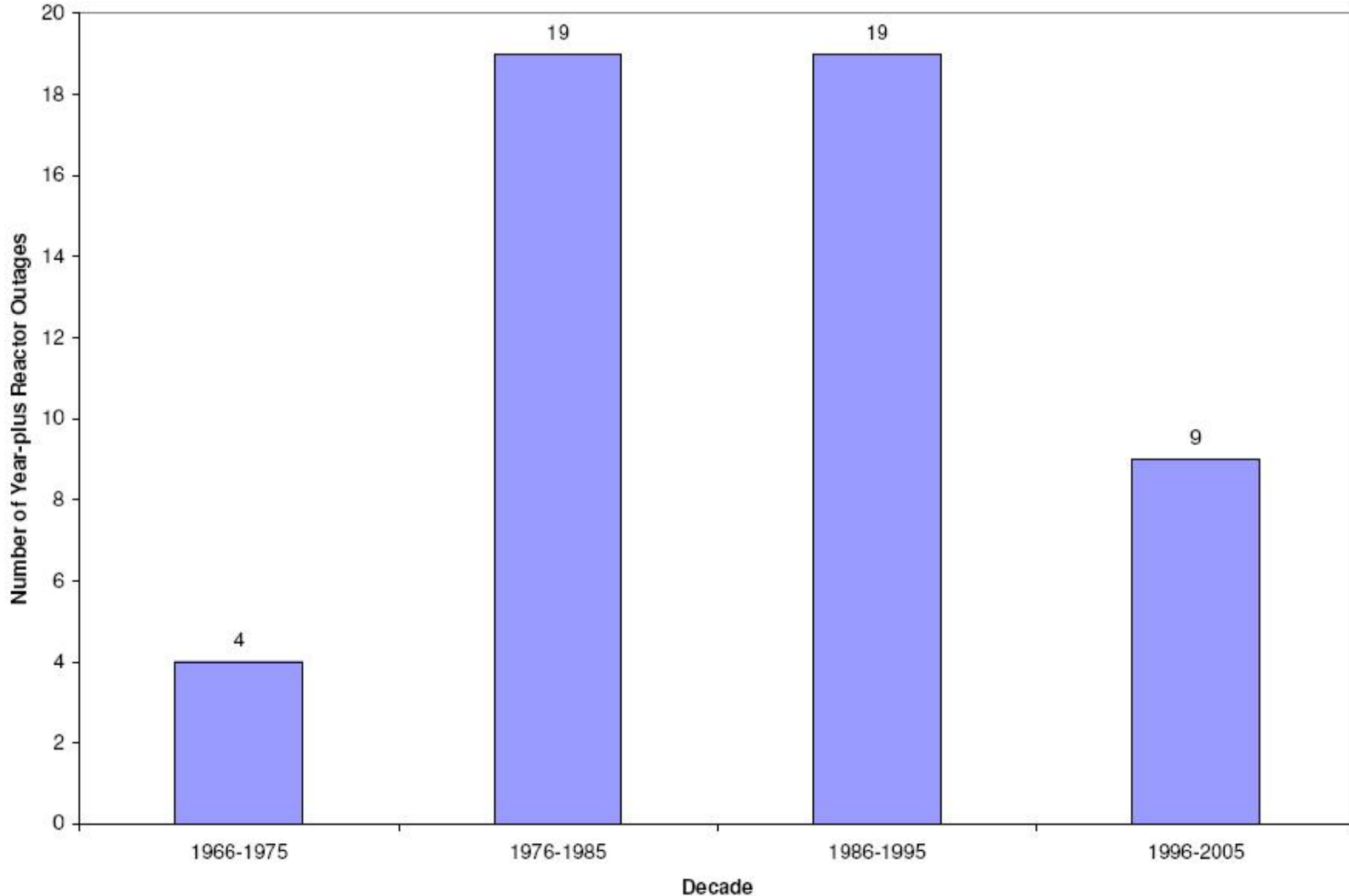




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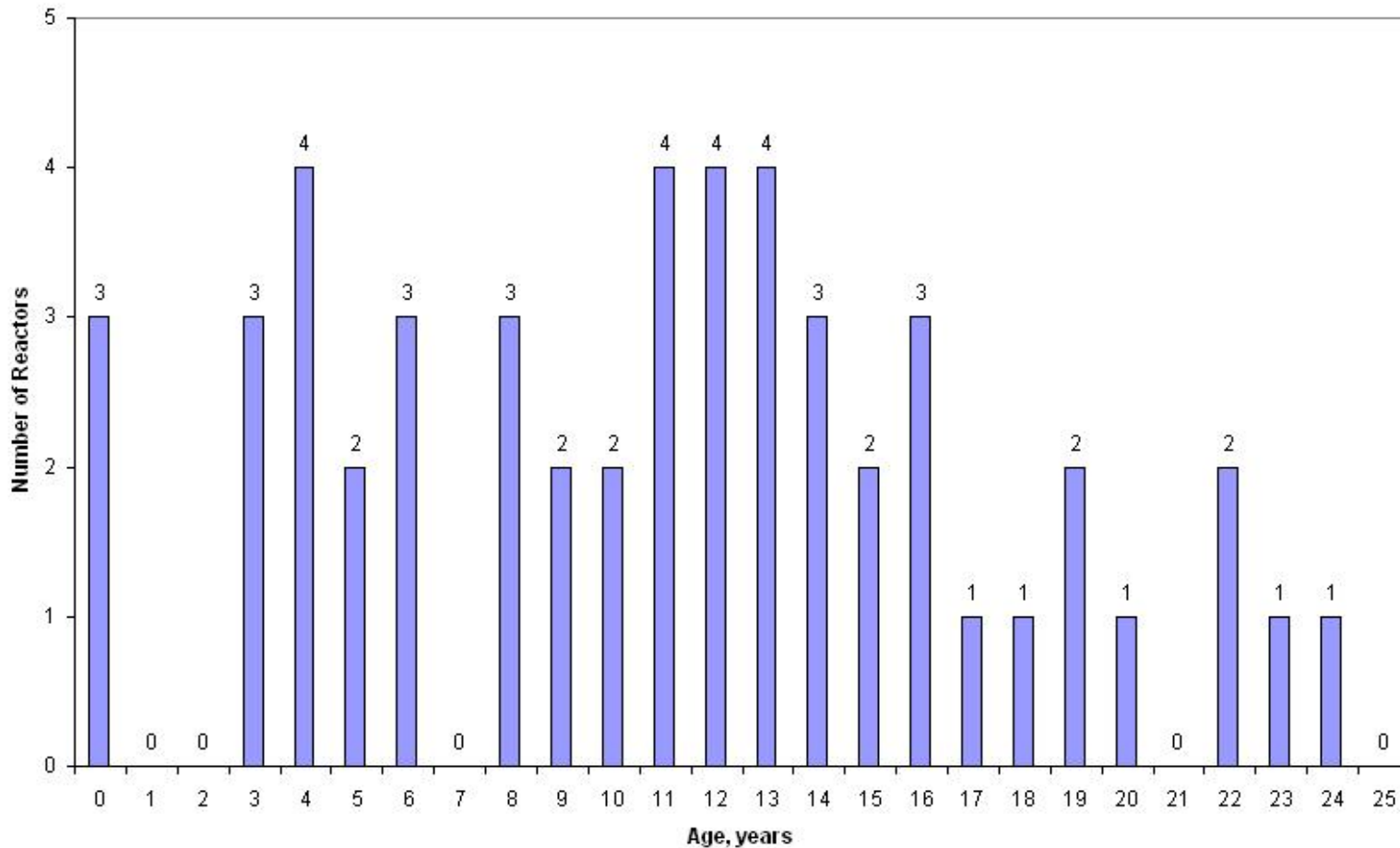
Nuclear Safety Levels Far Lower Than Necessary





Nuclear Safety Levels Far Lower Than Necessary

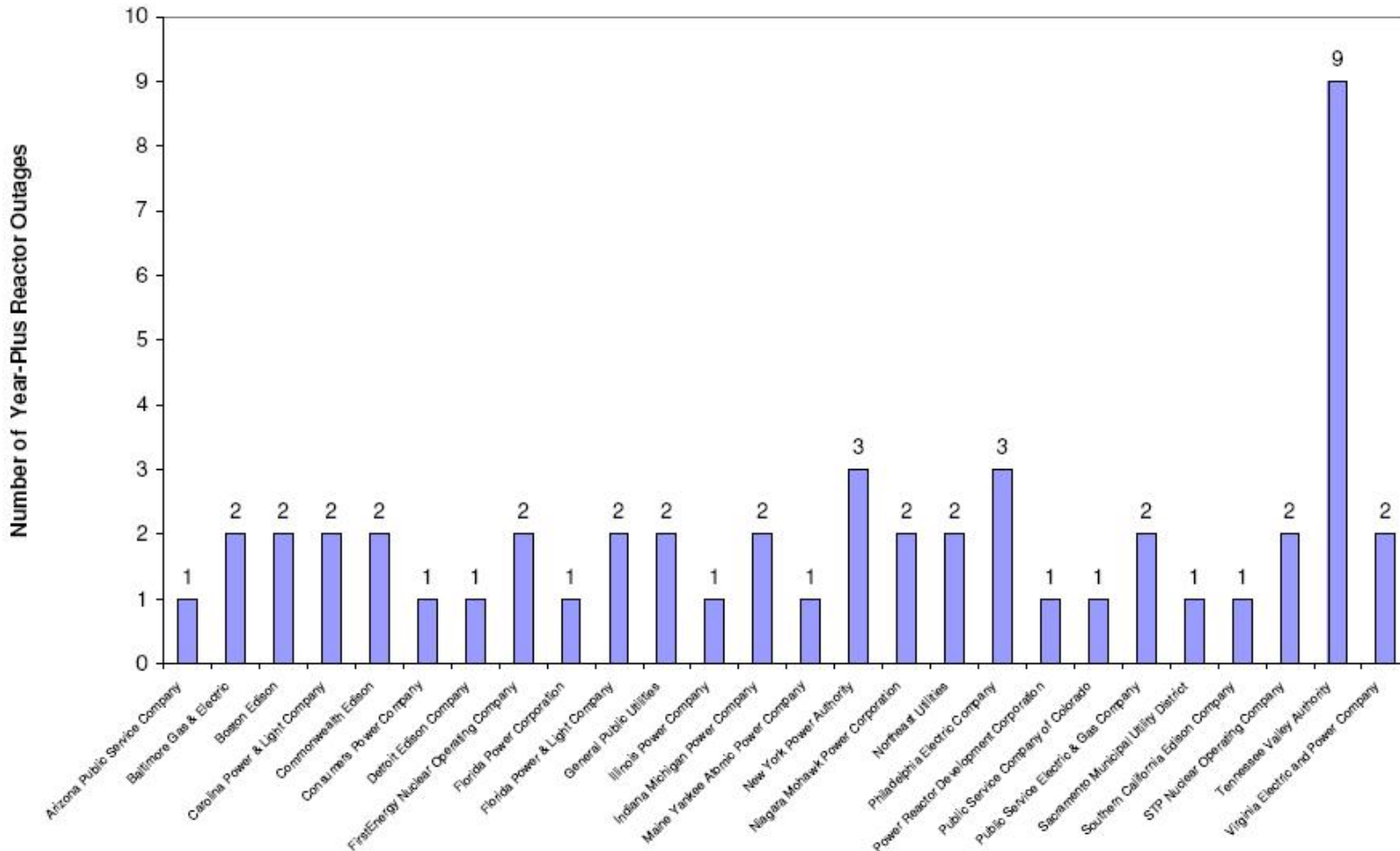
Age of U.S. Reactors Entering Extended Outages





Nuclear Safety Levels Far Lower Than Necessary

Owners





Nuclear Safety Levels Far Lower Than Necessary

- Year-plus reactor outages are not “outgrown”
- Since first such outage in 1973, there have been 36 safety restoration year-plus outages over those 33 years, a rate of slightly over 1 per year
- In last decade, there have been 11 safety restoration year-plus outages, a similar rate
- 26 companies owned reactors experiencing year-plus reactor outage(s)
- Bottom line – it’s neither an isolated problem nor an obsolete problem



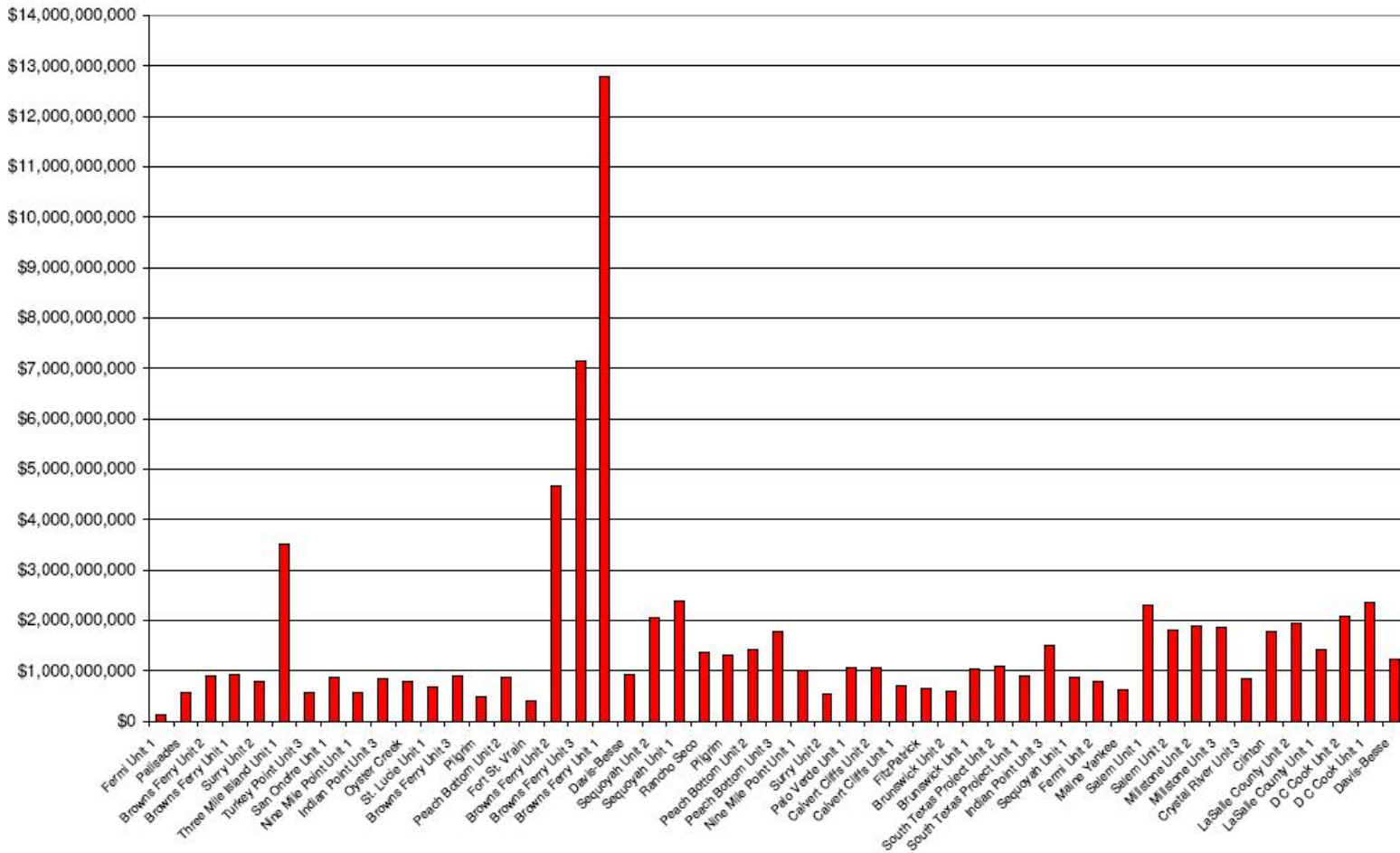
Nuclear Power Costs Far Higher Than Necessary

- 51 year-plus outages collectively lasted 135 years**
- Based on time-weighted plant capacity factors and electricity costs, the total revenue lost from these outages is approximately \$82 billion (2005 dollars)**
- Ratepayers and/or bondholders paid a huge price for these recurring problems**



Nuclear Power Costs Far Higher Than Necessary

Financial Costs of Year-plus Reactor Outages





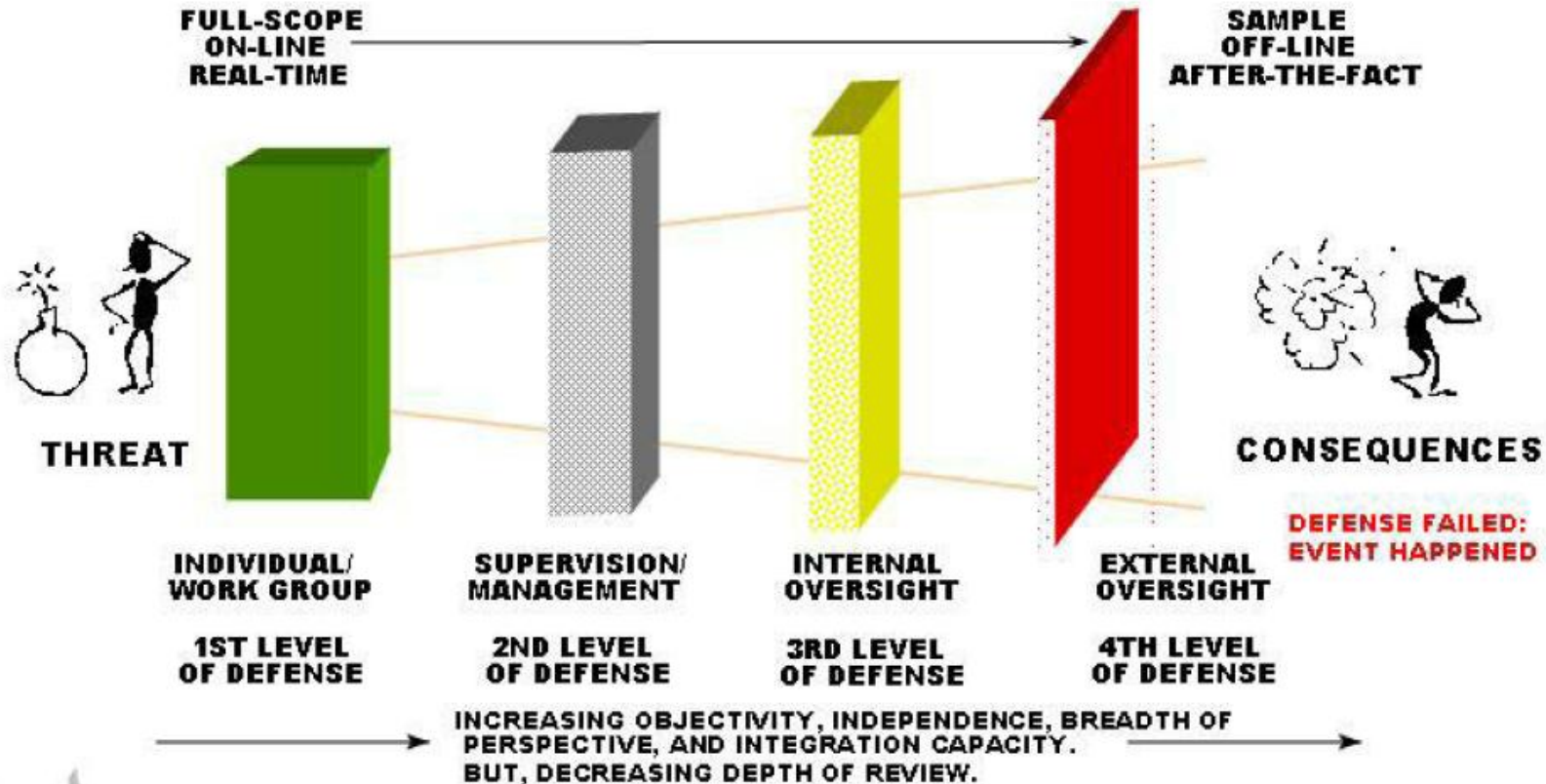
Nuclear power is a complex technology.

Plant workers and the NRC have developed sophisticated tools to monitor equipment performance.

Like NASA before *Columbia*, plant workers and the NRC have not developed comparable tools to monitor non-equipment performance (i.e., safety culture).



FOUR LEVELS OF DEFENSE OF QUALITY





For an NRC inspector (the 4th level of defense) to find a problem, ALL THREE OTHER LEVELS HAD TO FAIL. If just one of the levels had worked, the problem would have been found and fixed before the NRC inspector came by.

But when NRC inspectors find problems, all that is required is for those problems to be fixed.

The NRC should also require the “holes” in the other three levels of defense to be identified and patched so that other problems don’t get through.



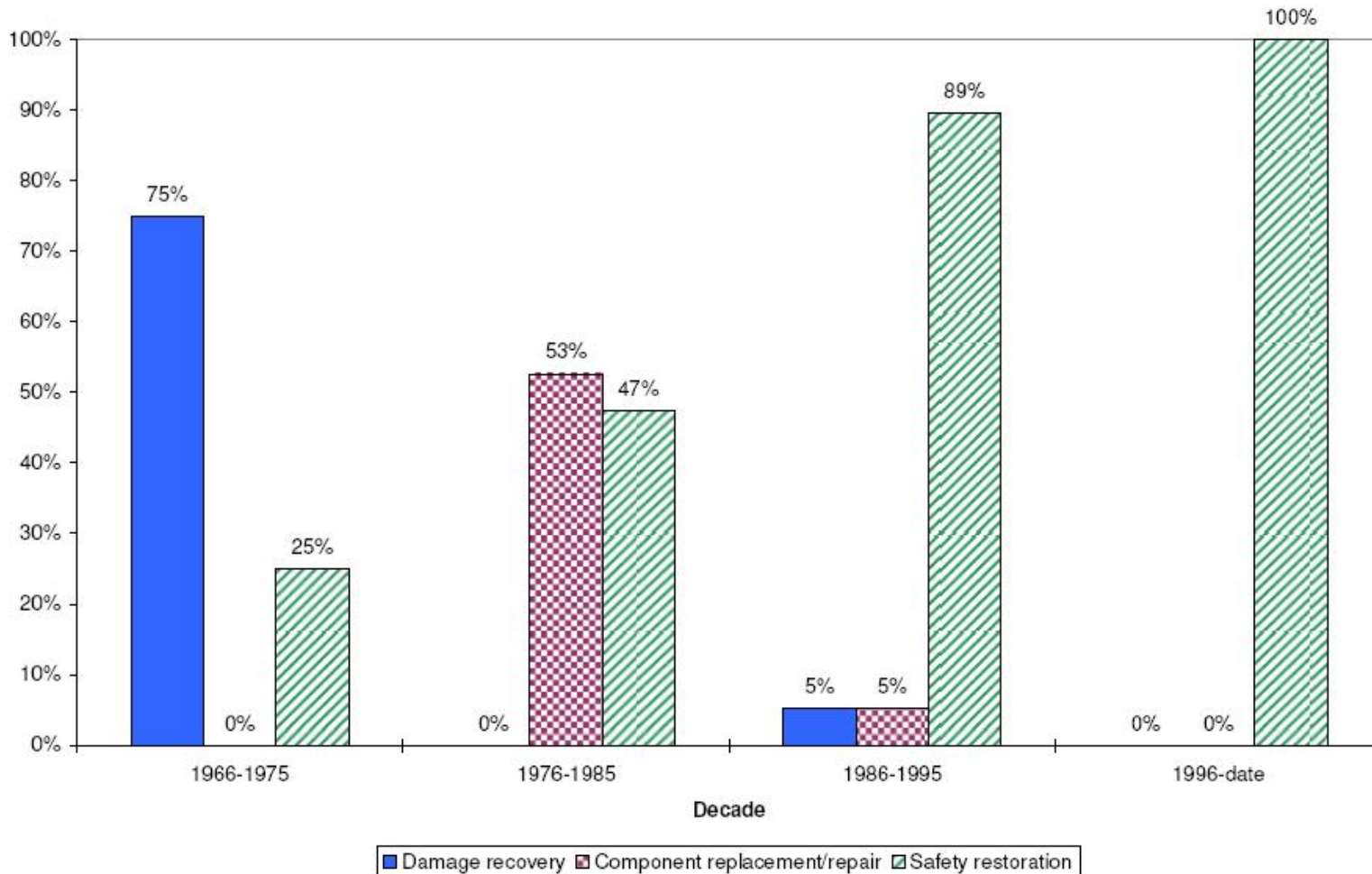
Achievable Goal

- The 51 year-plus outages have three causes.**
- Two of the causes are equipment-related and NRC attention to those causes has curtailed – if not eliminated – their recurrence.**
- The remaining cause is not equipment-related and is proliferating. BUT, history suggests that NRC attention to this cause would be equally successful in reducing recurrences.**



Achievable Goal

Causes of Extended Reactor Outages





Inconsistent enforcement of federal regulations by the Nuclear Regulatory Commission resulted in nuclear power safety levels being far lower and nuclear power costs being far higher than necessary.

The NRC must remedy this situation to ensure adequately safe operation of existing nuclear power plants and before additional nuclear power plants are constructed.