



Challenges of a Nuclear Renaissance

**The Honorable Peter B. Lyons
Commissioner
U.S. Nuclear Regulatory Commission**

2009 ISOE North American ALARA Symposium/
EPRI Radiation Protection Conference
January 12, 2009

NRC's Legislative Mandate

- **Atomic Energy Act (1954) as amended**
 - “Assure the adequate protection of public health and safety and the promotion of the common defense and security.”
- **National Environmental Policy Act (1969) as amended**
 - “...to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.”

NRC Oversight



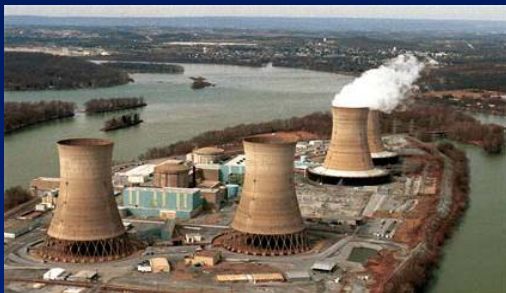
Uranium Recovery



Uranium Conversion



Uranium Enrichment



Power Reactors



Transportation



Storage



Waste Disposal



Medical/Industrial



New Reactors

The Role of NRC in any Nuclear Renaissance Derives From The NRC Values

The safe use of radioactive materials and nuclear fuels for beneficial civilian purposes is enabled by the agency's adherence to the principles of good regulation—independence, openness, efficiency, clarity, and reliability. In addition, regulatory actions are effective, realistic, and timely.

Public Openness

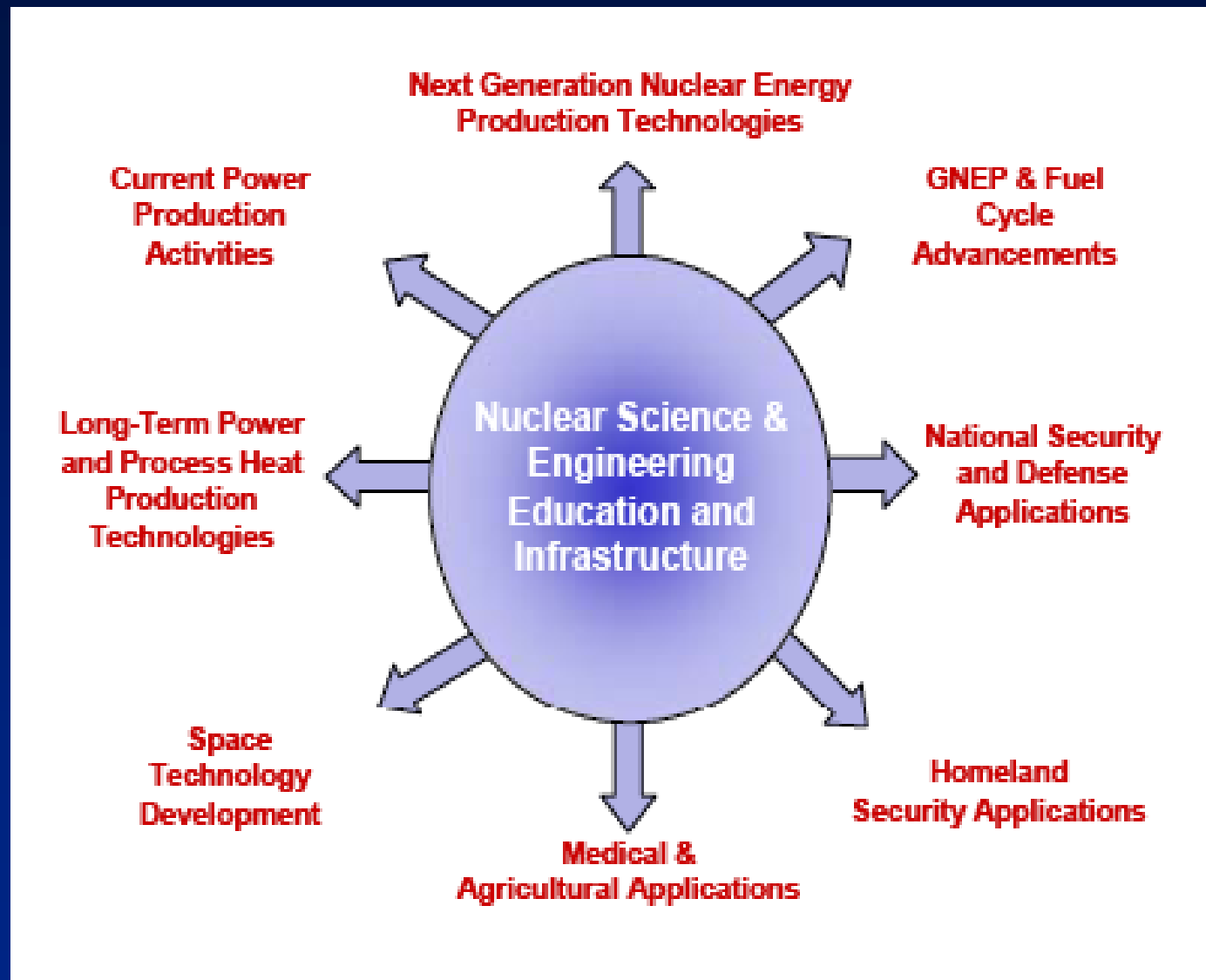
- Essential to Regulatory Strength
- Opportunities for Public Comment
- Public Comments Addressed Openly
- Opportunities for Public Hearings
 - Licensing New Reactors
 - Amending Licenses for Existing Reactors
- Balanced with Security Needs

Open Communications

“One must create the ability in his staff to generate clear, forceful arguments for opposing viewpoints as well as for their own. Open discussions and disagreements must be encouraged, so that all sides of an issue will be fully explored.” Admiral H. G. Rickover

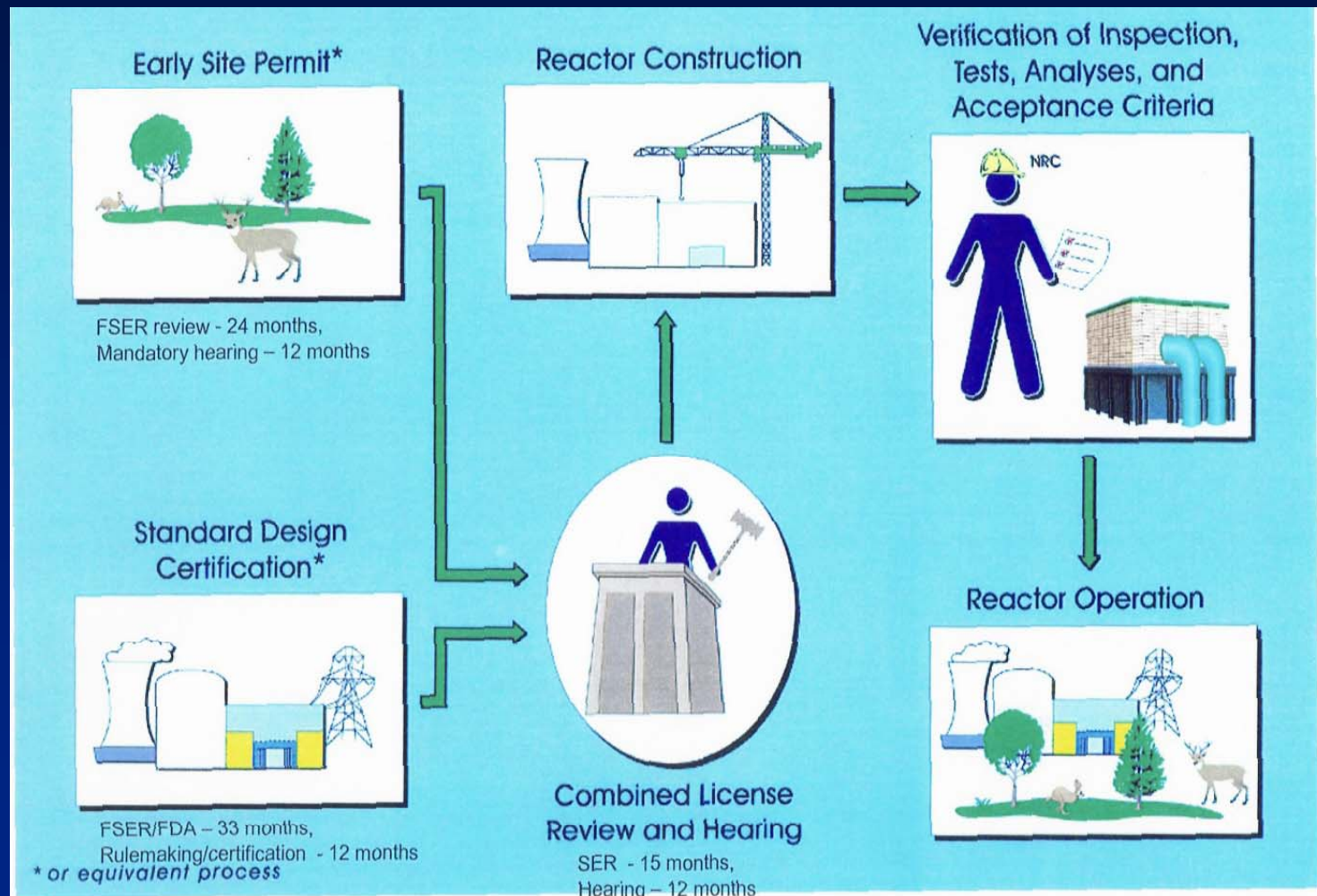


Nuclear Workforce Drivers

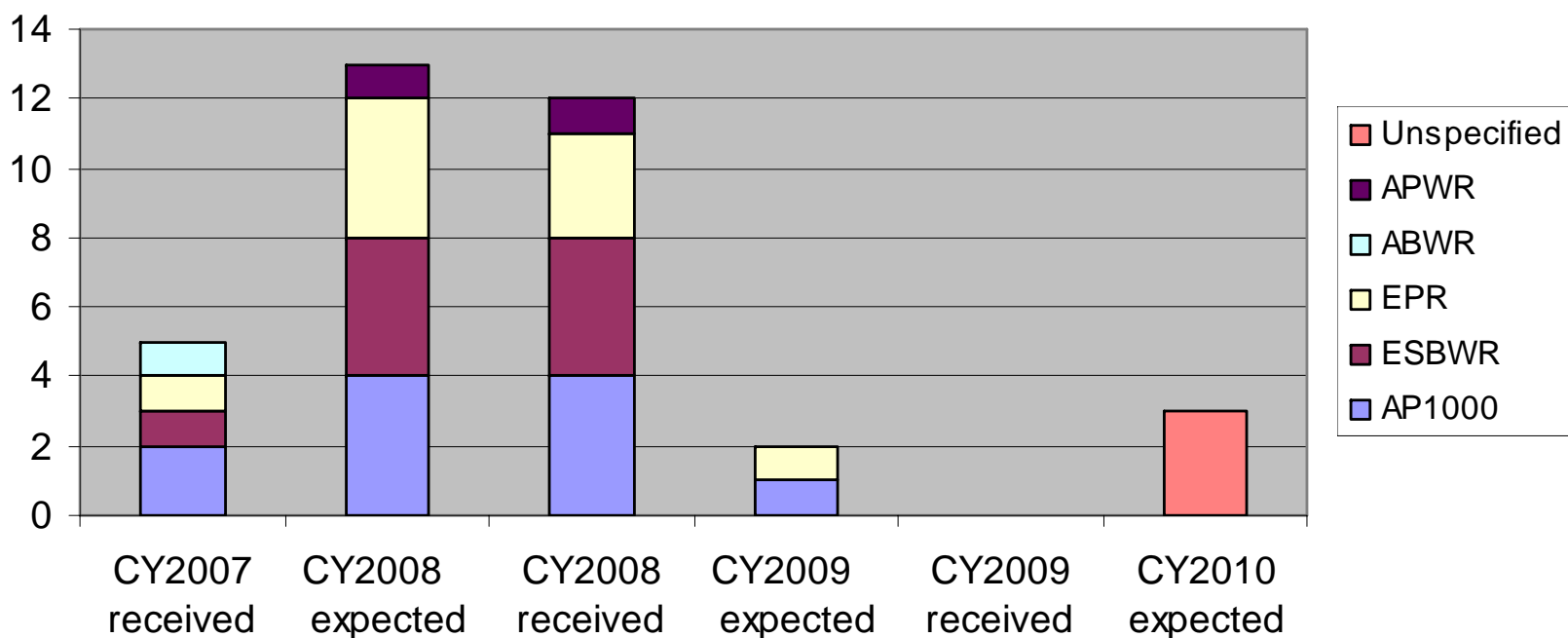


From: Nuclear's Human Element, ANS, 2006

10 CFR Part 52 Licensing Process



COL Applications Expected & Received

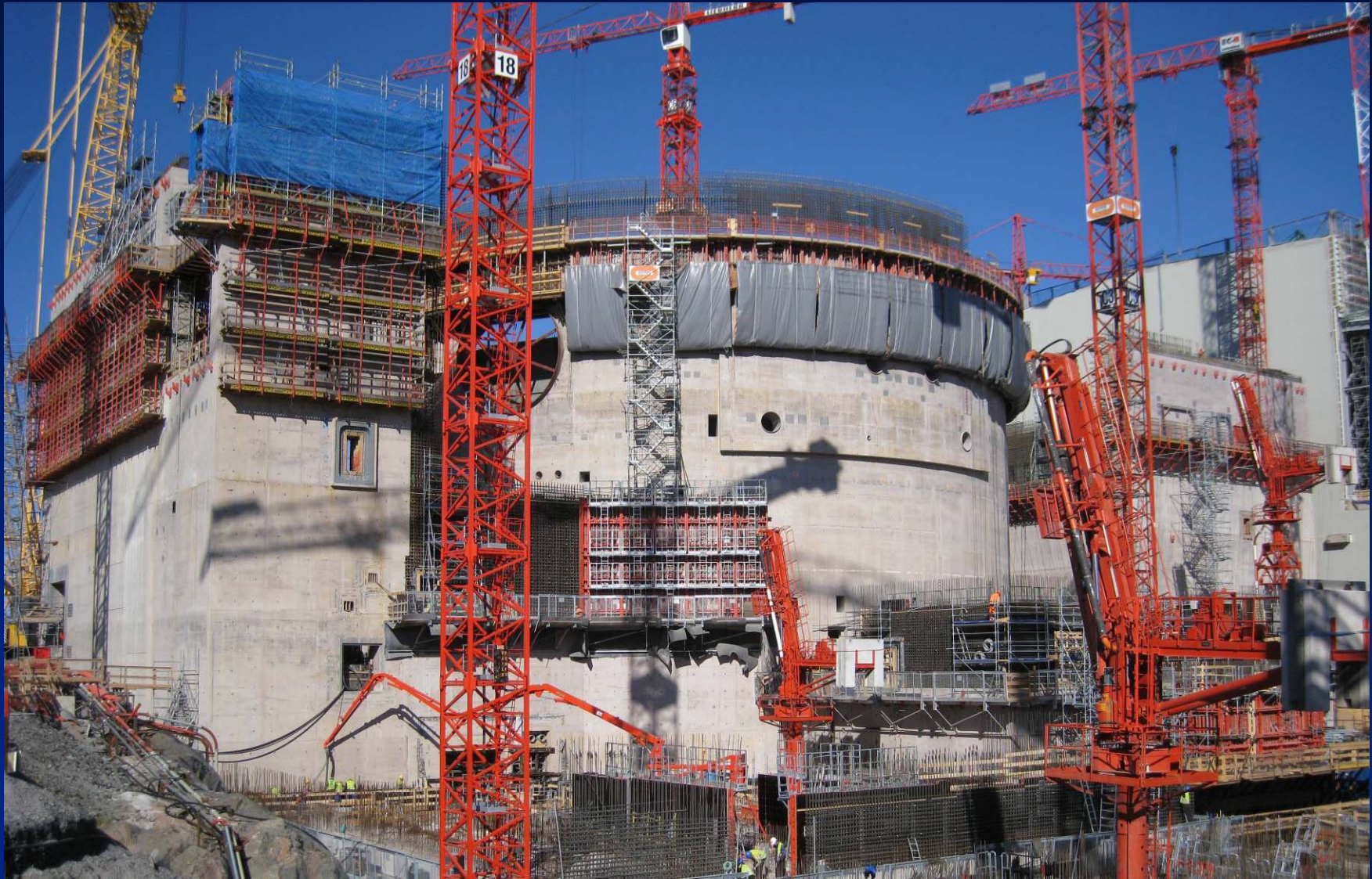


Valid as of Nov 18, 2008

Design-Centered Reviews

- NRC staff's parallel review of multiple standardized COL applications
- Dependent on extent of industry standardization of COL applications
- Principle:
 - One Issue
 - One Review
 - One Position

Construction Inspection



Modular Construction



Off-gas Equipment Module



Piping Unit in T-G Pedestal Module



CUW Heat Exchanger Module



MSV/CV Module



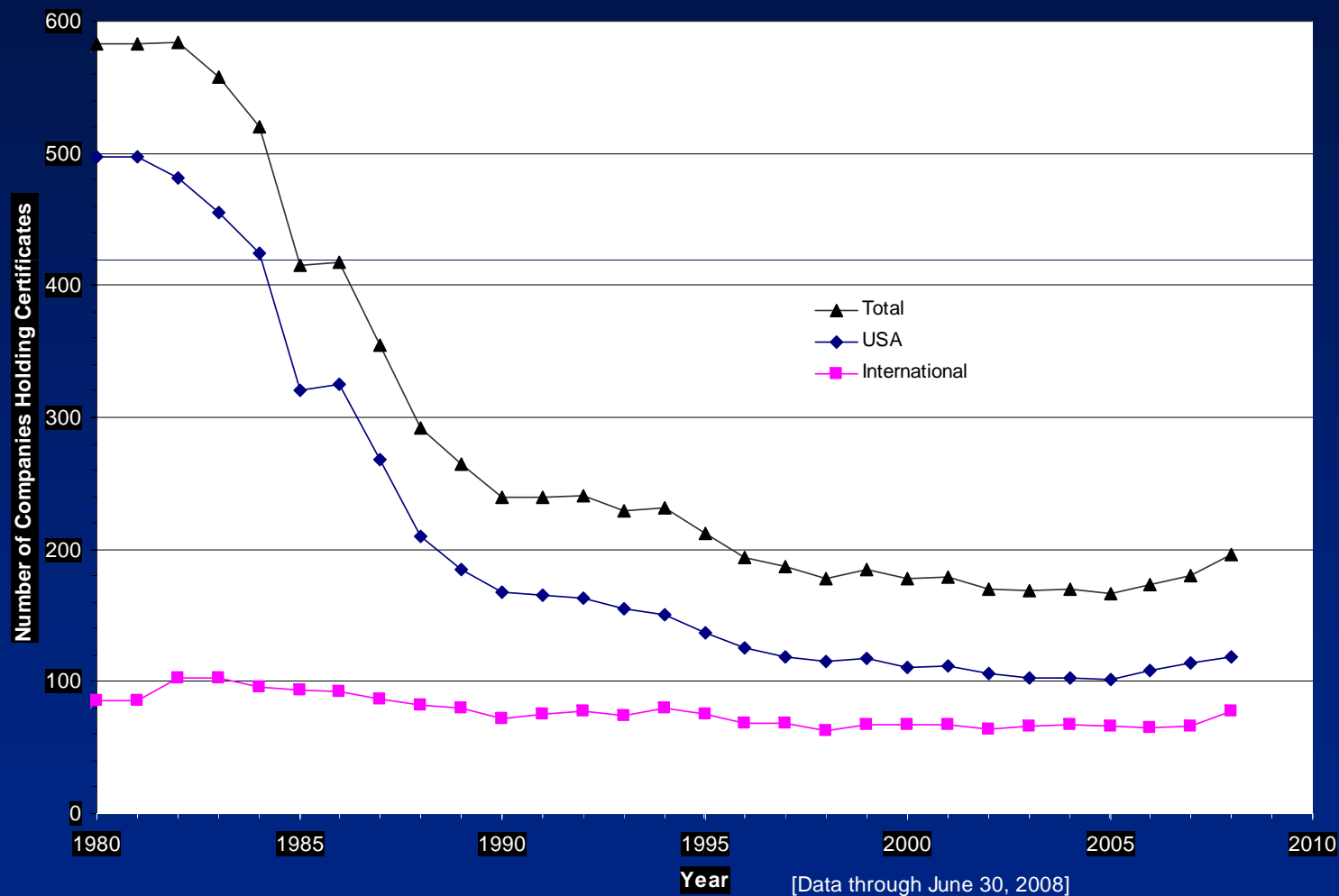
Condensate Demineralizer Module

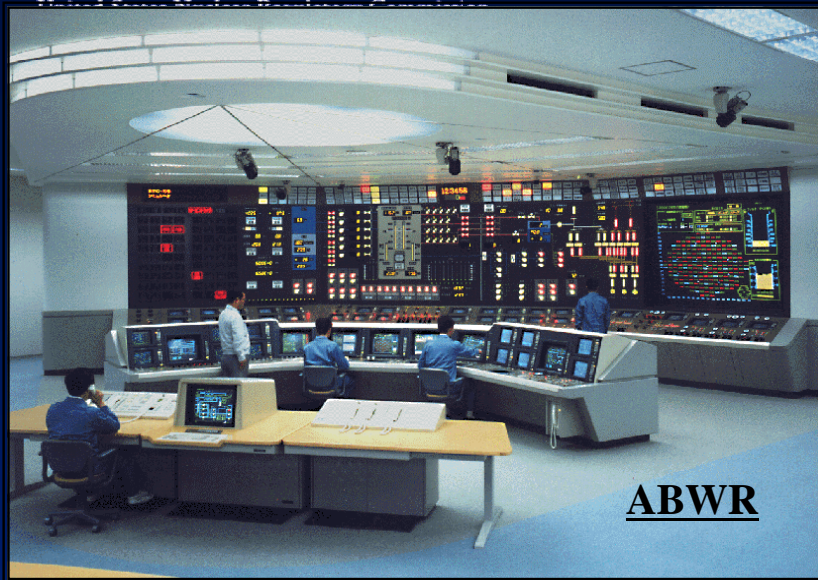


CUW Reheat Exchanger Module

ASME Nuclear Certificate Holders

ASME Section III Nuclear Certificates by Company





Global Environment

- Global marketplace a reality – ABWR, EPR, AP1000, APWR
- International partnerships of regulators
 - Multi-National Design Evaluation Program (MDEP)
 - International Nuclear Regulators Association (INRA)
- Need for research:
 - International Test Facilities
 - Provide sound technical bases for decisions
- Lack of United States manufacturing base
- International industrial focus on safety
 - World Association of Nuclear Operators (WANO)

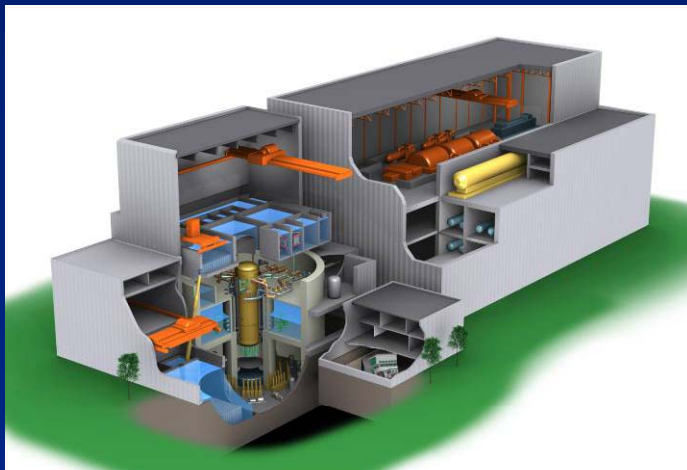
Safety and Security



Emergency Planning



Security Features



Improved Passive Designs



Trained Guard Force

NRC Hiring Trends

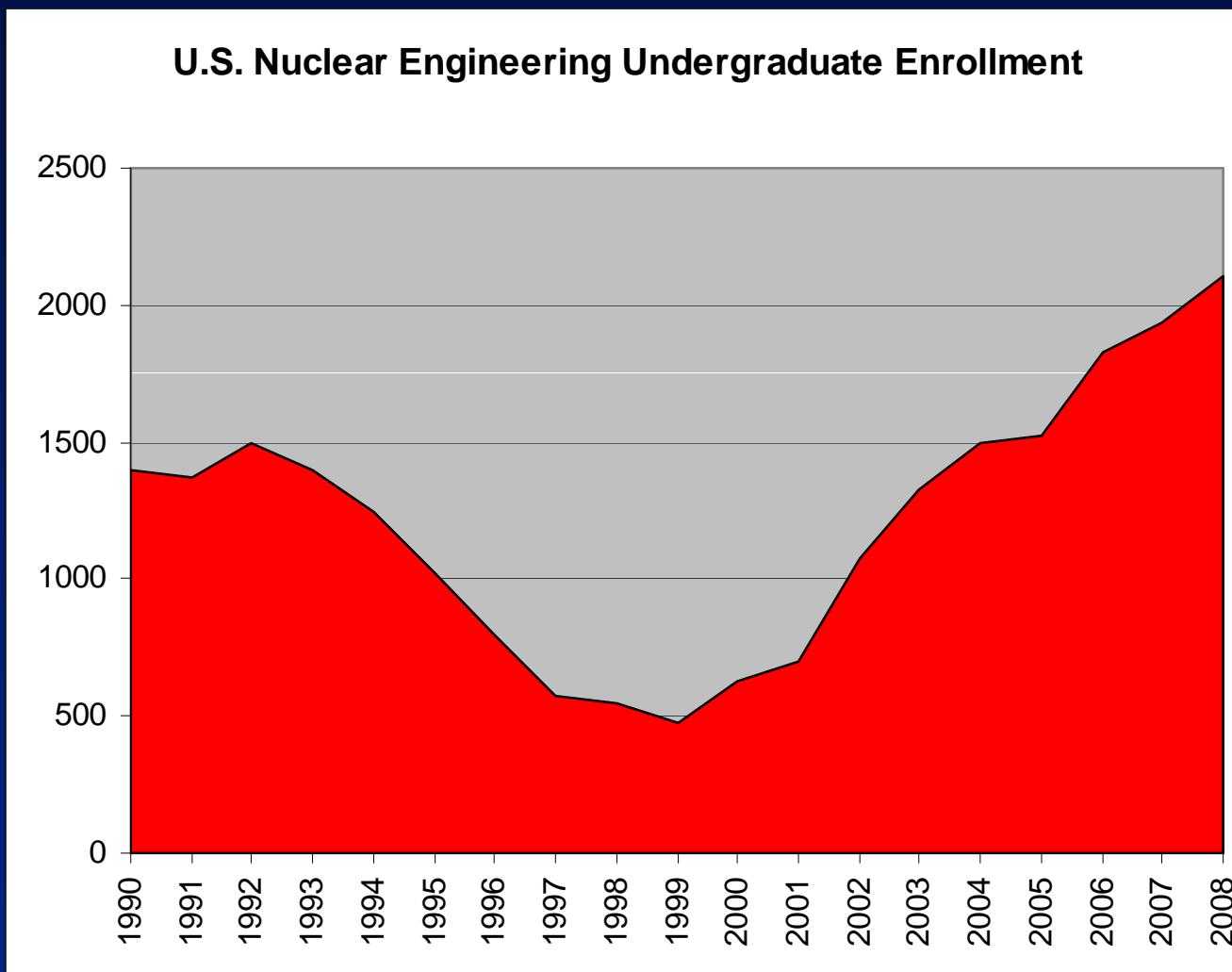
Goal – increase net staff by
200 per year

Accomplishments

| Fiscal Year | 2006 | 2007 | 2008 |
|-------------|------|------|------|
| Hired | 371 | 441 | 521 |
| Attrition | 211 | 222 | 208 |
| Net Gain | 160 | 219 | 313 |

College Enrollment Trends

DOE Investment
(\$ in Millions –red)



Source: DOE Survey, J. Gutteridge (2008)

Maintaining a Competent and Dedicated Workforce

- Attract, Hire, Retain a workforce
- Knowledge Management
- 32 % of NRC staff have been with the NRC less than 5 years
- 15 % of NRC staff eligible for retirement
 - 33% will be eligible by the end of FY 2013
- Maintain recognition as one of the best U.S. Federal agency workplaces

Davis-Besse Reactor Head



NRC Inspectors



The Linear No-Threshold Model

HYPOTHESIS?

FACT?

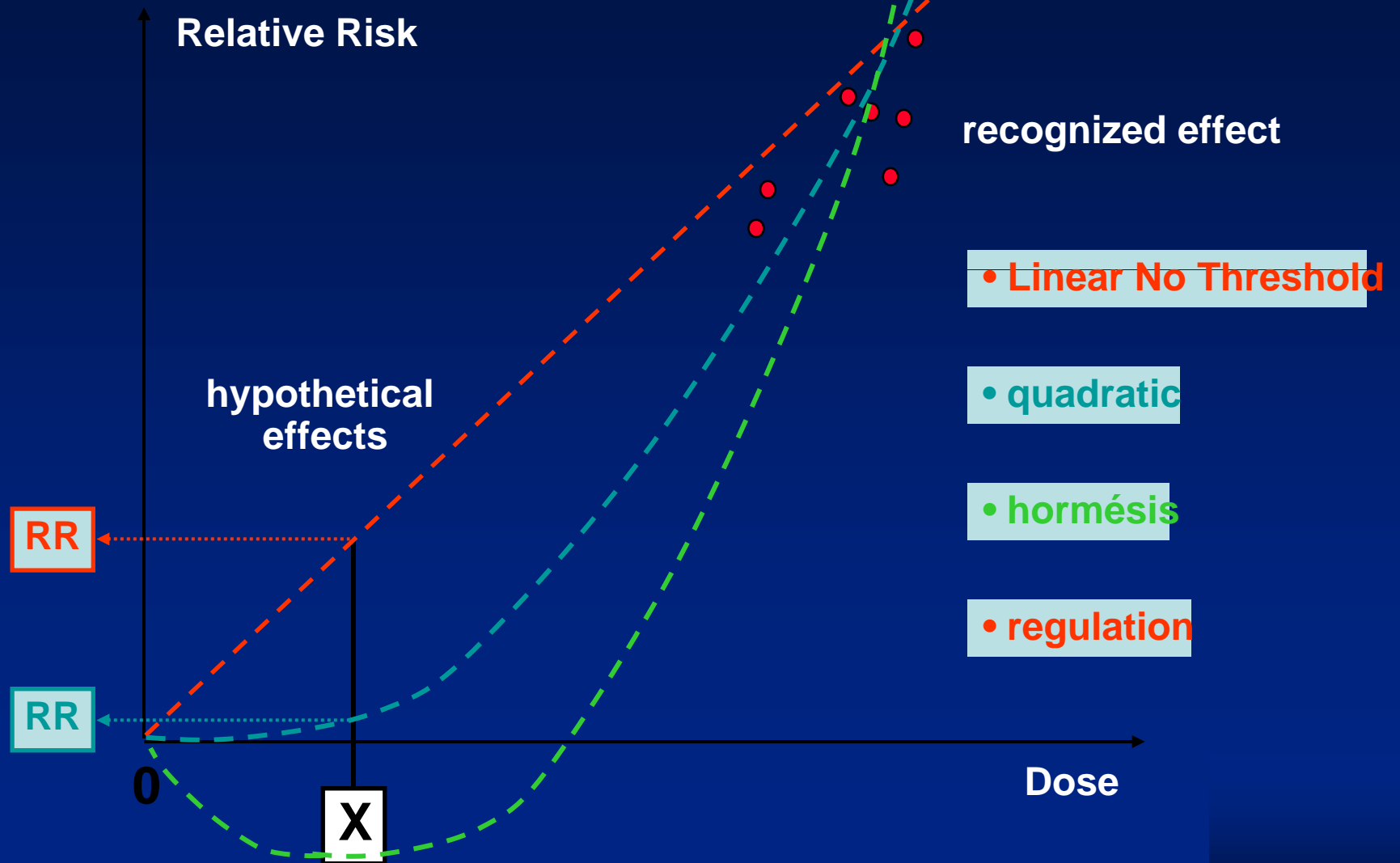
PRUDENT?

CONSERVATIVE?

Implications

- **STEWARDSHIP OF PUBLIC FUNDS**
- **COLLECTIVE DOSE**
- **FEAR OF RADIATION**

What is the relation between dose and effect ?

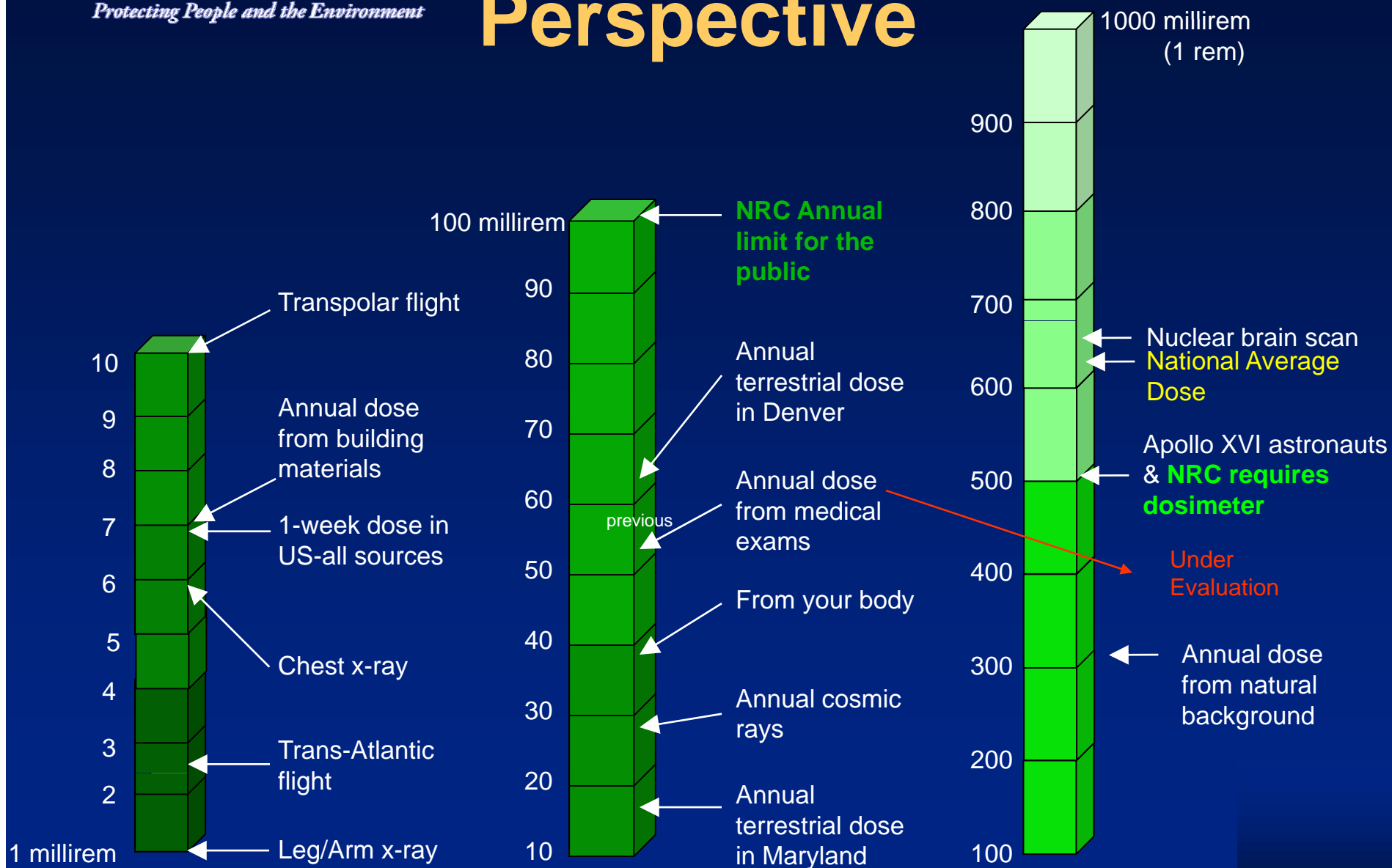


LOW DOSE RADIATION RESEARCH PROGRAM UPDATE²

- “New research from [the] Program directly challenges the old fundamental assumptions. The new findings provide compelling evidence that ionization events in cells and tissues are not completely independent and that tissues have surveillance mechanisms that dramatically affect the development of cancer and the behavior of cancer cells. “
- “Cells within a tissue are not independent . . . In a multi-cellular organism . . . signaling from non-irradiated cells can actually eliminate damaged cells. . . “
- “Results are consistent with conclusions of the recent French National Academy Report . . . “
- “Growing body of research from . . . the Program now provides a legitimate scientific basis for stimulating reconsideration of regulatory standards.”

²DOE April 2007 -- <http://www.lowdose.energy.gov/index.htm>

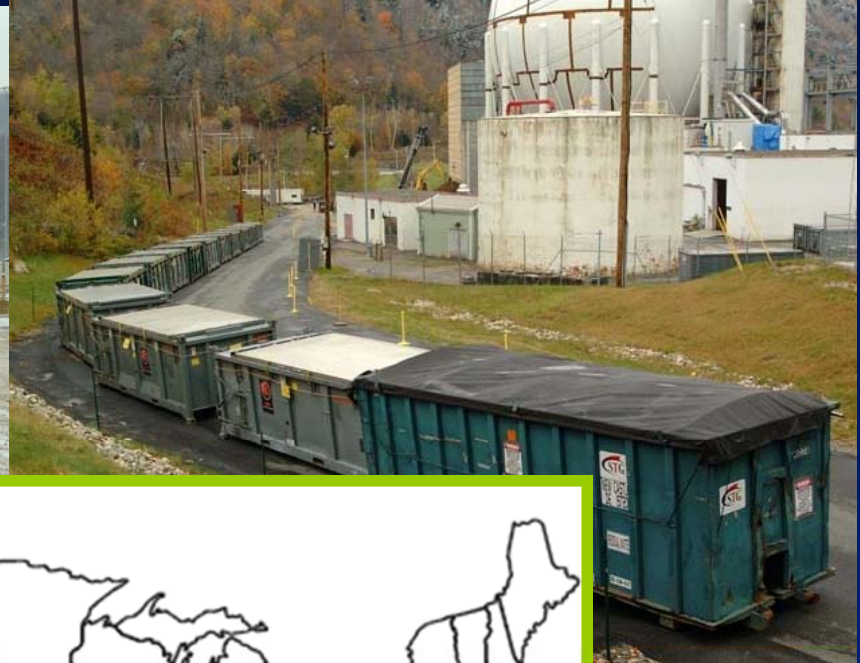
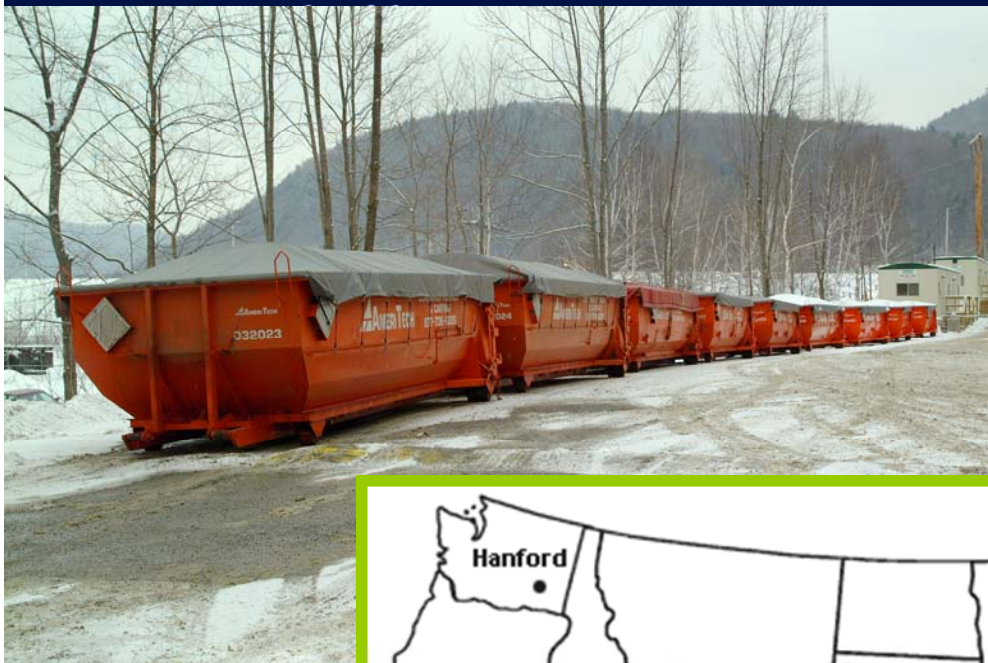
Radiation Doses in Perspective



High Level Waste



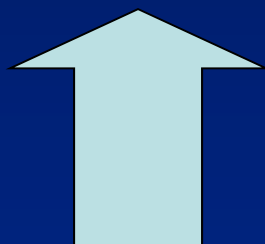
Low Level Waste



Nuclear Renaissance ?

Favorable Outlook for Increased Safe and
Secure Utilization of Nuclear Energy.....

Depends on a
foundation of....



**Demonstrated Continued
Safe Operations**

Keys to the Future

Continued Safe Operation

Strong Regulator

Open Communications

Culture of Safety

Quality Design and Construction

Qualified Workforce

Security

Global Cooperation

Appropriate use of New Technologies

