

EnergX



Commercial Nuclear Power Safety

Minnesota Legislative Energy Commission

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Nuclear Power Industry Experience

- 25 years in regulatory management
- 30 readiness verifications on large scale nuclear operations
- Startup Review Board at Texas Utilities (Two 1100 Mw units)
- TMI-2 USNRC Response Team
- U.S. Nuclear Industry Program Manager for the Industry Degraded Core Rulemaking
- Chernobyl-4 U. S. Nuclear Industry Response Team
- Crystal River INPO Emergency Response Team
- Fellow of the American Nuclear Society (elected for safety and risk management contributions)
- Currently processing and shipping Highly Radioactive Nuclear Waste for permanent disposal (NV & NM)



IS NUCLEAR POWER SAFE?

- Industry Overview
- Stakeholders transparency and direct involvement
- Track record demonstrates Safety & Performance
- Industry Safety Culture
- New designs and operation processes include lessons learned from past and reduced risk for workers and public
- Regulatory process has improved dramatically

INDUSTRY OVERVIEW

- 30 years since Three Mile Island Accident March 1979
- 23 years since Chernobyl-4 accident in the Soviet Union April 1986
- Extensive Regulatory, Operations, Procedures and Training Changes as well as plant upgrades to include extensive Instrumentation and Control
- Safety Culture Changes
 - INPO
 - WANO
 - Changes from “NRC Catch me if you can” to Continuous Improvement , Self Assessments, Performance Indicators and Self Regulation

STAKEHOLDERS

- Nuclear power is the safest option for large base load electric power.
- Believing this is an experiential process requiring TRUST and active stakeholder involvement.
- TRUST: Firm reliance in the honesty, dependability, strength, or character of someone or something.
- “To earn TRUST you must offer trust.”



TRUST

- “Firm reliance in the honesty, dependability, strength, or character of someone or something. One in which faith or confidence is placed”. (Webster’s II: New Riverside Dictionary)
- Industry and Regulators were not there in 1979.

BUILDING TRUST

Paradoxically, trust is an attribute that is built in another by extending trust to the other person first.

“To earn trust, you must offer trust.”

In behavior terms, trust is consistency and predictability.



BUILDING TRUST (CONTINUED)

Trust is required in safety cultures, in high performance organizations, and in successful relationships.

It is required for the free flow of information about safety and performance, and for alignment of persons in organizations around goals and objectives. Continuous improvement requires honest, candid feedback, and this, in turn, requires trust.

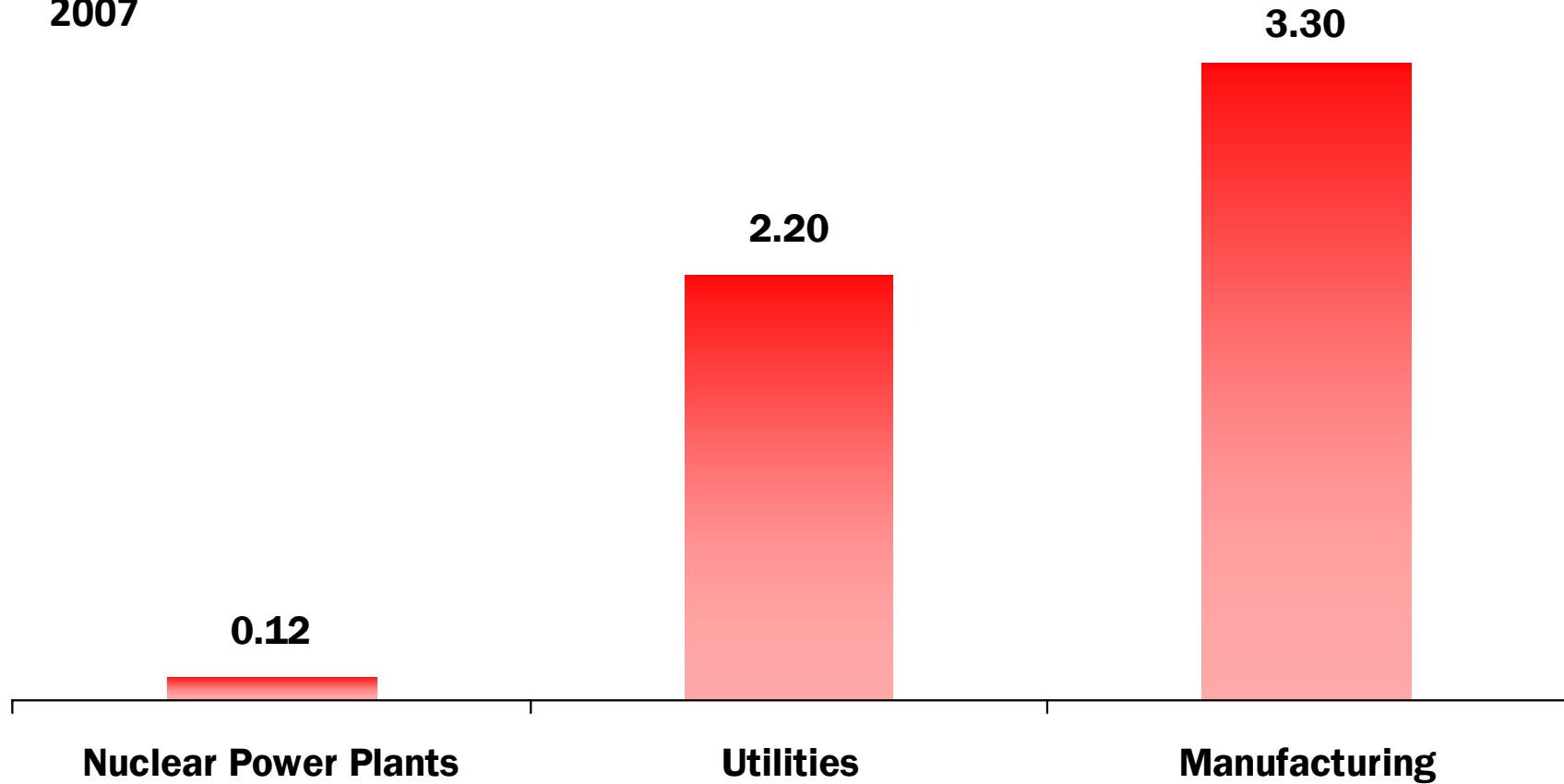


Track Record

- Only two significant accidents in 50 year history of civilian nuclear power generation worldwide, 12,700 cumulative reactor years of operation
- Average number of significant reactor events over the past 20 years has dropped to nearly zero
- Average number of times safety systems have had to be activated is about one-tenth of number 22 years ago
- Average number of unplanned reactor shutdowns has decreased ten-fold (530 shutdowns in 1985, 2 in 2007)

U.S. INDUSTRIAL SAFETY ACCIDENT RATE

2007



ISAR = Number of accidents resulting in lost work, restricted work, or fatalities per 200,000 worker hours. Electric utilities and manufacturing do not include fatality data.

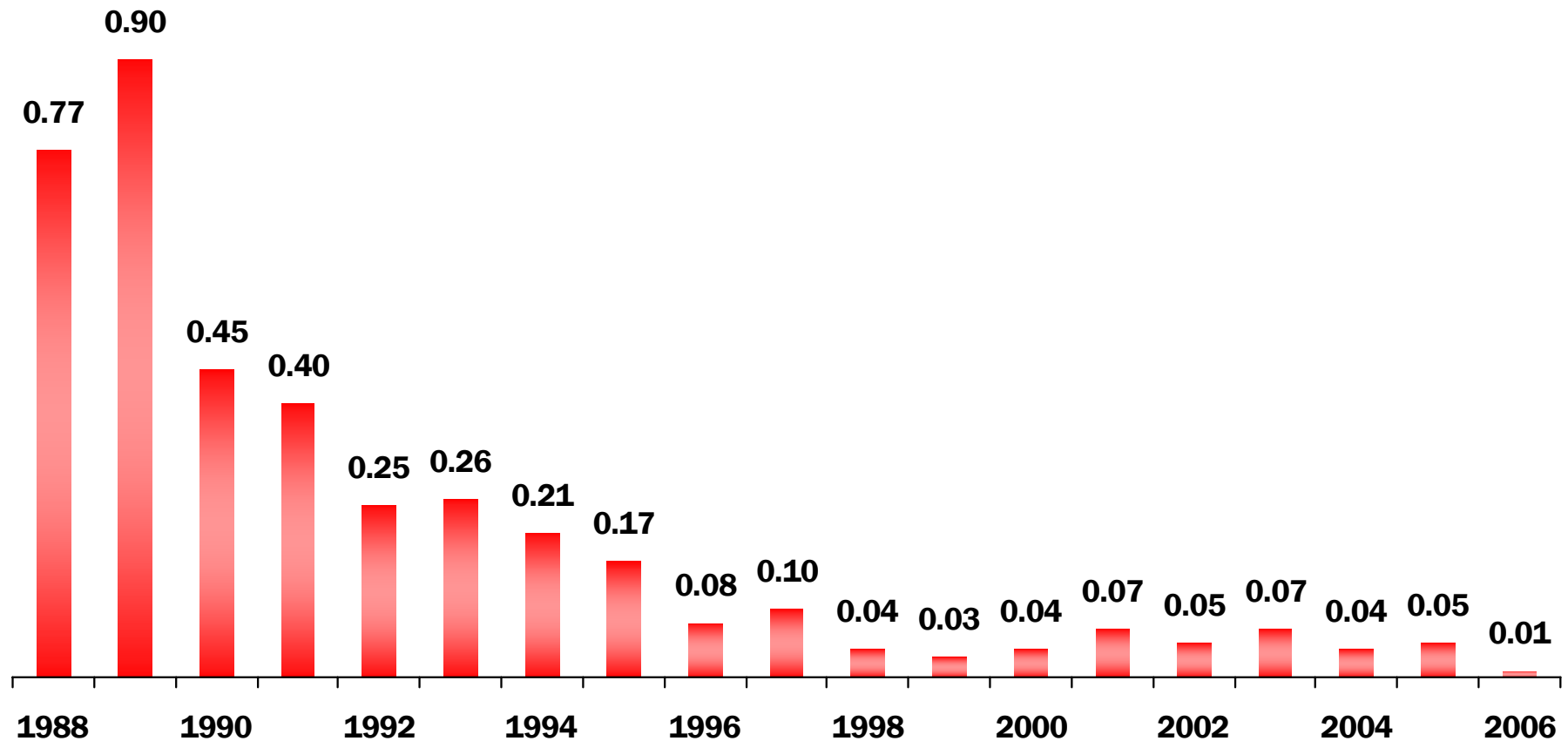
Sources: Nuclear (World Association of Nuclear Operators), 2006 Data for Electric Utilities and Manufacturing (U.S. Bureau of Labor Statistics).

Updated: 4/08



Significant Events at U.S. Nuclear Plants:

Annual Industry Average, Fiscal Year 1988-2006



Source: NRC Information Digest, 1988 is the earliest year data is available.
Updated: 11/07



INDUSTRY SAFETY CULTURE

Safety Culture is “that set of behaviors, beliefs, attitudes and assumptions that demonstrate an intentional and overriding priority on safety in everything an organization does.” (James Reason)

A safety culture is a reflection of the values shared throughout an organization a based on the belief that safety is very important and everyone’s responsibility. (Nuclear Regulatory Commission)



SAFETY CULTURE (CONTINUED)

The key words in these definitions are “shared”, “safety in everything”, “everyone’s responsibility”, “intentional”, and “overriding”.

Thus, a working definition might be:

“The overwhelming majority of people in an organization share the concepts that:

- all tasks *can* be performed safely,
- everyone desires to perform them safely, and
- **all** members of the organization are equally responsible to perform work safely.”



BASIC SAFETY PHILOSOPHY

- Every incident can be avoided.
- No job is worth getting hurt for.
- Every job will be done safely.
- Incidents can be managed.
- **Most importantly safety is everyone's responsibility**



KEY SAFETY PRINCIPLES

- Working safely is a condition of employment
- Each employee is expected to give consideration to the prevention of injury to self and to coworkers.
- Involvement and thinking of all people in the safety process is valued and expected.
- Continuous improvement is the goal.
- Individuals and teams must be recognized for their adherence to and advancement of safety.



Nuclear Power Industry has Incorporated Numerous Safety Improvements

- Redundant safety equipment
- Containment buildings
- Licensing and training requirements
- Physical security
- Remote sites, with emergency plans
- Highly developed and evolving regulations
- Not all present in other technologies



IDCOR

- **Comprehensive Nuclear Power Safety Evaluation**
 - 100 scientists and engineers for 4 years
 - 23 Contractors
 - 63 sponsors including 8 countries
- **Purpose - Resolve all severe accident issues and serve as industry spokesman with the USNRC**
 - Eight plant designs were completely evaluated.

SELF REGULATIONS

INSTITUTE OF NUCLEAR POWER OPERATIONS

- All US energy companies that own and operate nuclear power plants are members
- Focus on operational excellence, open communications, and continuous improvement
- Formed National Academy for Nuclear Training
- Provides inspections and assessments of plant performance and effectiveness of management



NUCLEAR PLANTS: A MODEL FOR INDUSTRIAL SECURITY

- Industry moved aggressively to meet post-9/11 environment:
 - \$2.1 billion investment since 9/11
 - Extended, strengthened security perimeters
 - Increased security forces by 60% to 8,000 officers; 9,500 by end of 2009
- Closely coordinated with DHS, NRC, other government agencies



New security tower at the Clinton nuclear plant

ADDRESSING PROLIFERATION CONCERNS

- Physical solutions
 - Continue current barriers (guns, gates, & guards)
 - Reduce inventory of weapons-grade material by fission in power reactors
- Political solutions (proposed by GNEP)
 - Prohibit reprocessing facilities in additional countries
 - Prohibit enrichment facilities in additional countries
 - Establish centralized world-oversight of all weapons-grade material

CONCLUSIONS

At least for the next few decades, there are only a few realistic options of reducing carbon dioxide emissions from electricity generation

- Increase efficiency in electricity generation and use;
- Expand use of renewable energy sources such as wind, solar, biomass, and geothermal;
- Capture carbon dioxide emissions at fossil-fueled (especially coal) electric generating plants and permanently sequester the carbon; and
- Increase use of nuclear power.

“The future of this country is dark without nuclear power.”

Rep. John Dingell (D-Mich.)

Richmond Times Dispatch

April 9, 2008