
Operational Reactor Safety

22.091/22.903

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Safety Culture
Lecture 22



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Topics to be Covered

- Important Safety and Performance Factors
- Definition of Safety Culture
- Examples – good – bad
- Recent examples
- How do you get it ?
- How do you keep it ?
- What is important?
- Role of regulator ?

Key Success Safety and Performance Factors ?

- Safety Culture
- Basic Design of Plant – Fault tolerant
- Training – Operations, Engineering, Mgt.
- Quality Assurance – Self Assessment
- Organizational Factors – Sustain Safety
- Regulations – Motivate Safety (Risk Informed Regulations)

Culture

- “The totality of socially transmitted behavior patterns, arts, beliefs, institutions and all other products of human work and thought characteristics of a community or population.”

Dictionary

Application in a Nuclear Plant

- Safety Culture

- Need to create a “community” that has socially transmitted behaviors, beliefs and work ethics that focus on safety.
- Management must create this community by transmitting behavior patterns that support the safety mission with clarity and without confusion. (production vs safety)

Safety Culture

- Vital ingredient of successful nuclear operations
- Essential to protect plant investment

Safety Culture Metrics ? Ideas ?

- If you have it, you know it
- If you don't have it, everyone knows it !

Attributes of A Good Safety Culture

- Trust People to:
 - Operate conservatively
 - Make the right technical decisions
 - Perform preventive maintenance
 - Make design and operational improvements not because someone ordered you to do it, but because it was the right thing to do.

Basic Attributes¹

- 1. A prevailing state of mind...
 - Always looking for ways to improve safety
 - Constantly aware of what can go wrong
 - Strong feeling of *personal accountability*
 - Sense of pride and ownership in the plant

1. Thomas Murley (former NRR Director)

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- 2. Disciplined and crisp approach to operations
 - Confident and highly trained staff that is *not* complacent
 - Good team work
 - Crisp communications (clear)

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- 3. Insistence on sound technical basis for actions.
 - Procedures, design basis and technical documentation is up-to-date.
 - Plant design basis well understood by all
 - Plant operated within the design basis

- 4. Rigorous Self- Assessment

- Organization should be open to problem *finding* and facing
- *Management* should be capable of dealing with bad and good news
- Problems should be dealt with immediately and not put off

Example: Plant A

- Staff rigorously follows procedures
- Little overtime
- Unplanned shutdowns rare
- Plant shutdown to fix safety problems even though tech specs permit operations
- Professional decorum exist in control room
- Plant clean
- Low maintenance backlog

Example Plant B

- Procedures are viewed as guidelines
- Many management and staff vacancies exist
- Frequent scrams
- Equipment allowed to run until it breaks
- High maintenance backlog
- Plant runs routinely under LCO
- Equipment out of service for a long time
- Plant has many high radiation areas.

Recent Examples of Failures of Safety Culture

- Davis Besse
 - Unwillingness to find out what was going on
 - Focus on Production - not safety
 - Management set wrong tone
 - Complacency - thought they were good
 - Oversight groups internal to utility, INPO, NRC failed to question
 - Plant staff didn't push concerns

Davis Besse Pictures



April 17, 1998



February 2002

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- Millstone Nuclear Power Station

- Thought they were good
- Management focus on reducing costs
- Significant staff reductions without a plan
- Many slogans but actions not consistent
- Employee concerns raised but dismissed
- No trust in management
- Employees thought it was just a “job”

Cost of Regulatory Non-compliance

- Millstone \$1.5 Billion
- Davis Besse >\$400 Million
- Nuclear industry Billions
- Loss of public support and confidence

Nuclear Plants are Businesses

- Policies and directions established by the Board of Directors and implemented by CEO.
- Chief Nuclear Officer is the field person
- Pressures of competition and cost are real
- Budgets need to be maintained - investments
- Plants need to operate well
- If not, they will be shut down
- Public support is needed

How do you get a good safety culture ?

- Developed over time
- Cannot be regulated, mandated or delegated (Can we ?)
- Awareness of the importance of each and every job
- Awareness of dependency on other to do the right thing
- Keen understanding that you are personally responsible for the people who work at the plant and the public

Role of Top Management

- Set tone and example
- Know what is going on
- Do not delegate safety
- Attention to detail
- Staff must believe in and respect top management
- Hire people who have good work ethic
- Commitment to safety that goes beyond slogans and posters and meetings.

How to Keep a Safety Culture ?

- Avoid complacency - hard to do..
- Safety culture is fragile - delegate balance of people, problems and pressures
 - *Requires strong internal communications*
- Foster identification and resolution of problems - no shooting messenger !
- Maintenance of trust in the organization and its value system
- *Motivate people to do the right thing*

Maintenance of Safety Culture

- People are an important “safety system”
- Organizational behavior issues are as important as plant components in assuring safety
- Managers and supervisors must be trained in dealing with people and open communications.
- People should understand the importance of their job in the overall success of the plant.

Summary

- Nuclear plants are complex man-machines.
- NRC regulations do not ensure safety – they establish requirements which if met will help.
- The utility determines whether the plant is safe or not.
- The management of the utility is part of the plant's safety system as are all the employees.
- Safety culture as set by senior management will determine the plant's economic and safety success.

What is Safety Culture? Not an Easy Question !

"We really don't understand what an adequate safety culture is and how to measure it"

**NRC ACRS Chairman
Dr. George Apostolakis:
(Plain Dealer Dec 2002)**

Homework Assignment

- Safety culture is an important aspect of safe nuclear plant support and operations. At present it is not “regulated” by the Nuclear Regulatory Commission and only indirectly assessed by INPO.

Question:

- If you were a regulator, what regulation would you suggest with associated metrics to regulate safety culture? Please specifically identify the metric and how it will be measured considering all the factors associated with safety culture. Justify your answer.
- Read Sorensen article on “Safety Culture: A Survey of the State of the Art” – posted.
- Due on Tuesday May 13, 2008 - 2 pages

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22.091 Nuclear Reactor Safety
Spring 2008

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