



Human, Technical and Organizational factors for U.S. research reactors

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Overview

- Introduction
- The Mission and authority of the USNRC
- U.S. Research and Test Reactor categorization
- Interactions between Human, Technical and Organizational Factors
 - management system and processes
 - technical & licensing requirements
 - Safety Culture

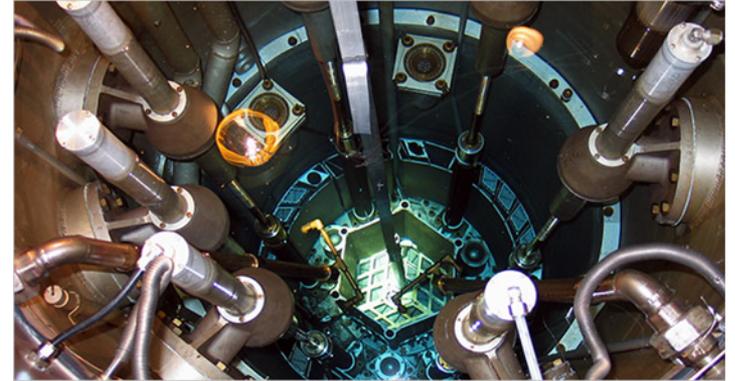
NRC's Mission

To license and regulate the Nation's civilian use of byproduct, source, and special nuclear materials to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment.



U.S. Research and Test Reactors

- 31 operating reactors
 - Power range
 - 5 watts to 20 MW
 - Five are 2 MW or greater
 - Reactor types
 - 16 TRIGA
 - 9 plate-type fuel
 - 3 AGNs
 - 3 one-of-a-kind
 - PULSTAR, Argonaut, and critical assembly





Management System Objectives

- Define and maintain the organization, as required, including training and certification
 - maintain shift staffing composition for operation, including on-call personnel
 - administrative controls for the conduct of operations and maintenance activities are consistent with safety
 - Ensure operations and maintenance activities comply with the administrative controls
 - ensure adequate resources and funding for management and disposal of radioactive waste and decommissioning
 - ensure adequate arrangements for emergency preparedness and response
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Technical & Licensing Requirements

During licensing and inspection, the NRC verifies the licensee has specified information and controls on staffing and operations, including:

- Structure – defined organizational structure indicating how/when staff communicates with management to resolve safety issues
- Review & Audit – maintaining a safety committee, with a defined charter, for independent review and approval of changes for safety evaluations, procedures, and experiments



Importance of Safety Culture

- Operating experience has demonstrated nexus between safety culture and events
- A positive safety culture contributes to the safe and secure use of radioactive materials
- NRC recognizes that licensees bear the primary responsibility for the safe use of nuclear materials while the NRC, as the regulator, must consider the importance of safety culture in its oversight programs

Background of Safety Culture in the U.S.

- Commission policy documents related to safety culture
 - Conduct of Operations (1989)
 - Safety Conscious Work Environment (1996)
“Freedom of Employees in the Nuclear Industry to Raise Safety Concerns without Fear of Retaliation”
 - Safety Culture Policy Statement (2015)

Definition of Nuclear Safety Culture

“Nuclear safety culture is the core values and behaviors resulting from a collective commitment by leaders and individuals to emphasize safety over competing goals to ensure protection of people and the environment.”

– NRC Safety Culture Policy Statement

Traits of a Positive Nuclear Safety Culture

- Leadership safety values and actions
- Problems identification and resolution
- Personal accountability
- Work processes
- Continuous learning
- Environment for raising concerns
- Effective safety communication
- Respectful work environment
- Questioning attitude





Safety Culture Inspections for RTRs

Reactive Inspection

- Usually in response to an allegation
- Frequency depends on size of facilities and operating schedule
 - Size thresholds are listed in Inspection Manual Chapter 25.45
 - Operational schedule: 24/7 versus once a week



Safety Culture Inspection Questions

1. Are you willing to raise a safety concern?
 - a. Are there any conditions under which you would be hesitant to do so?
 - b. If yes, does that condition exist here?

2. Are you aware of situations where any employee or contractor may be hesitant to raise concerns, internally or externally? If yes, please explain.

3. Where would you go to raise a safety issue? (i.e., supervisor, alternative program (Employee Concerns Program (ECP)/Ombudsman), NRC, or other avenue/method).
 - b. Why would you pick this avenue/method?
 - c. Have you or others had any experiences, or know of any situations, that have influenced your decision to pick this avenue/method? If so, please describe.

Safety Culture Inspection Questions (continued)

4. Are there other avenues/methods available to you for raising safety issues?
- Have you ever submitted a safety issue to management? Why not?
 - If yes, was the issue adequately addressed? Why or why not?
 - If not adequately addressed, did you further pursue the issue? If not, why not?
 - Given the nuclear safety importance of the issue, did you receive timely feedback?
 - Describe any instances in which you know of another employee who submitted an issue to {insert avenue/method} and you considered the response unacceptable.

Safety Culture Inspection Questions (continued)

5. Would you say that your management is supportive of the ECP/Ombudsman program?
 - a. If yes, how is such support demonstrated?
 - b. If no, please describe what has led you to believe that they are not supportive.

6. Are you aware of any actions taken by your management to prevent and detect retaliation and/or chilling effect?
 - a. Are their actions effective?
 - b. Has management's handling of any chilling effect issues been consistent?

7. Are you aware of any instances in which another individual experienced a negative reaction for raising a safety issue? If yes, please describe the incident, including any information conveyed by management concerning the incident.

Safety Culture Inspection Questions (continued)

8. What does Safety Conscious Work Environment/Chilled Work Environment (SCWE/CWE) mean to you?
 - a. Do you know if this facility has a SCWE/CWE policy?
 - b. If yes, can you briefly explain what the established policy requires?

9. Would you say your management is supportive of the SCWE/CWE policy?
 - a. If yes, how is such support demonstrated?
 - b. If no, please describe what has led you to believe they are not supportive.

10. Have events or circumstances occurred in the past six months that have reduced:
 - a. Your willingness to identify or raise safety issues?
 - b. Your confidence in the corrective action program?
 - c. Your willingness to challenge actions or decisions you believe are unsafe?



Results of a Safety Culture Inspection

- Bottomline: Is there a chilled environment?
- Safety Culture Inspection Report documents the answer to this question, in a general sense
- Report is very general about the facility
- Many levels of personnel are interviewed
- Result: Either
 - No issues, or
 - Areas for improvement

Resources

- NRC safety culture website
 - <http://www.nrc.gov/about-nrc/safety-culture.html>
- NUREG-1537, Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors
- ANSI/ANS-15.1-2007, the development of technical specifications for research reactors
- NRC Inspection Procedures for research and Test Reactors, and non-power production or utilization facilities: <https://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/>

QUESTIONS

