Safety Culture Reactor Oversight Process Training

Training Overview

Purpose

to provide an overview
basic understanding
familiarization of safety culture
Reactor Oversight Process (ROP) treatment of safety culture.

Length: approximately 2 hours

Maximize this window

Inspection documents used are linked to the Inspection Manual Public Web site

Select the type of document and then scroll to the desired document.

POC: Contact Molly Keefe at (301) 415-5717.

Objectives

Upon completion of this training, participants should be able to:

- Define safety culture
- Discuss why safety culture is important
- Describe the safety culture aspects
- Describe the treatment of safety culture by the Operating Reactor Assessment Process and by the Baseline and Supplemental Inspection Programs

Safety Culture Background

This section will help you become familiar with the concept of safety culture and its role in nuclear safety.

- Why do we care?
- Safety culture definitions
- Safety in day-to-day operations
- Organizational culture
- NRC initiatives related to safety culture
- Safety culture aspect development

Why Do We Care?

"Safety Culture" describes the human element to the Chernobyl accident

Causes to the Chernobyl accident included design issues.

Safety Culture related causes

- Inadequate procedure adherence issues
- Non-conservative decision making
- Lack of clear authority
- Poor training/understanding
- Production (testing) over safety

Numerous IAEA follow-on activities were conducted and documents were developed to increase the understanding of safety culture.

Chernobyl (1986)

Why Do We Care? (continued)

Davis-Besse Reactor Vessel Head Degradation (2002)

Problems included:

- Less than adequate (LTA) nuclear safety focus
- LTA implementation of the corrective action program
- LTA analysis of safety implications
- LTA procedure compliance

Red Rusty Boric Acid Deposits on Vessel Flange (12RFO)

Columbia Space Shuttle accident (2003)

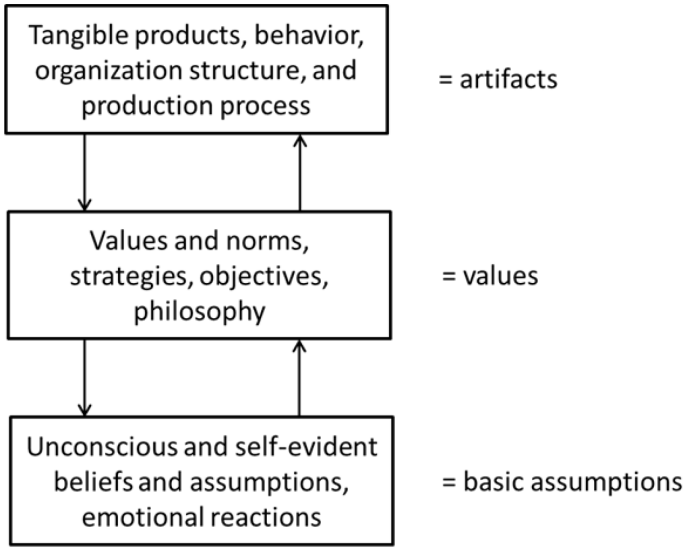
The accident showed:

- The importance of having a questioning attitude
- Safety culture weaknesses leading to technological failures
- The importance of a robust corrective action program.

[Davis Besse Reactor Vessel Head Degradation Information]

Organizational Culture

The Levels of Organizational Culture



TIP: The NRC approach to oversight of safety culture focuses, for the most part, on artifacts and values.

NRC's Safety Culture History

1989	• Commission Policy Statement: Nuclear Power Plant Operations
1996	• Commission Policy Statement: Freedom to Raise Safety Concerns Without Fear of Retaliation
2002	• Davis-Besse Reactor Head Degradation Event • NRC Reviewed Reactor Oversight Process (ROP) to more fully address safety culture
2006	• Regulatory Issues Summary - ROP
2008	• Commission Direction to consider a Safety Culture Policy Statement (SCPS)
2011	• Commission Approves Draft SCPS and Final Safety Culture Policy Statement published in June, 2011.

Safety Culture Definitions

Concept of safety culture:

NRC policy on safety culture:

1989 Policy Statement on Conduct of Operations

"

June of 2011, **Safety Culture Policy Statement**

contains the agency's definition of safety culture

Contains 9 traits

10 trait, Decision making was added to the ROP after the Common Language Initiative

The definition 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."

Safety culture has two general areas.

- The management of the organization creates the framework for SAFETY
- Everyone on site implements safe working attitudes and methods.

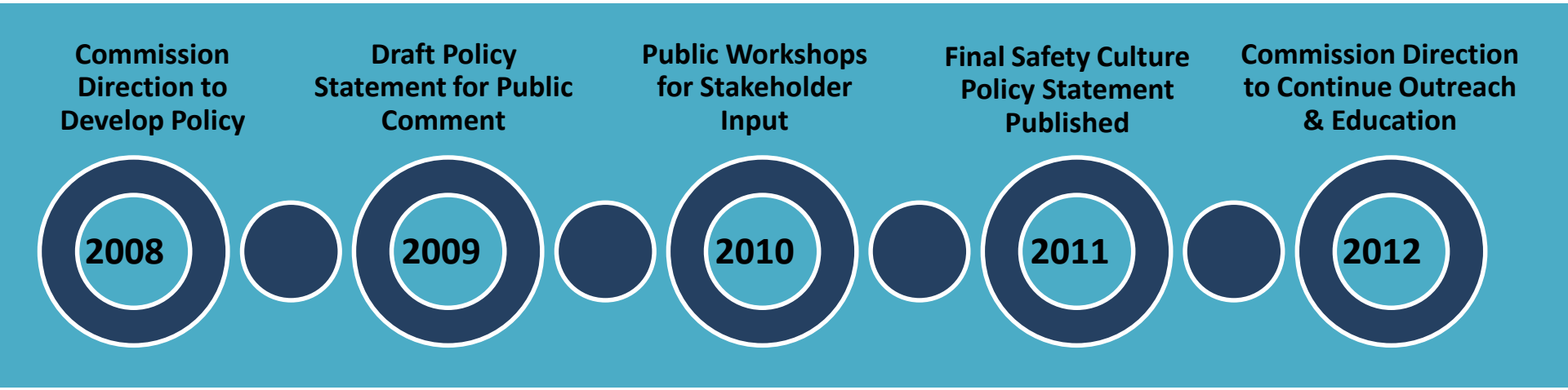
TIP: Historically, there has been confusion between the terms **"safety culture"** and **"safety conscious work environment (SCWE)."**

Guidelines for Establishing and Maintaining a Safety Conscious Work Environment

Safety Culture Policy Statement

*Sets forth the Commission's **expectation** that individuals and organizations performing regulated activities establish and maintain a positive safety culture commensurate with the safety and security significance of their actions and the nature and complexity of their organizations and functions*

Timeline



Safety Culture Policy Statement Traits

- Personal Accountability
- Questioning Attitude
- Effective Safety Communication
- Leadership Safety Values and Actions
- Decision making
- Respectful Work Environment
- Continuous Learning
- Problem Identification and Resolution
- Environment for Raising Concerns
- Work Processes

NRC Initiatives Related to Safety Culture

SRM/SECY-04-0111 (August 2004), "Recommended Staff Actions Regarding Agency Guidance in the Areas of Safety Conscious Work Environment and Safety Culture," and SRM/SECY-05-0187 (December 2005), "Status of Safety Culture Initiatives and Schedule for Near-Term Deliverables," provided the following direction:

- Enhance the ROP treatment of cross-cutting issues
- Ensure inspectors are properly trained
- Develop a process for determining the need for conducting a specific safety culture evaluation
- Ensure modifications to the ROP are consistent with the following ROP development principles: Transparent, Understandable, Objective, Predictable, and Risk-informed and performance-based.

Post Davis-Besse enhancements to ROP:

- Enhancements to the treatment of substantive cross-cutting issues
- Revisions to Inspection Procedure (IP) 71152,
- Implementation of a Web-based training course on the Columbia Space Shuttle accident
- Enhancements to the ROP baseline inspection program and plant assessment processes.
- Enhancement of IP 95002 and 95003 for plants in columns 3 and 4 of the ROP Action Matrix.

Safety Culture Policy Statement

- Outlines the Commission's expectations for fostering a healthy safety culture for ALL NRC licensees and vendors

Common Language Initiative:

- Industry requested initiative
- Workshop participants comported INPO's, IAEA's and NRC's safety culture language into a new common language
- NUREG-2165, "Safety Culture Common Language" was published in early 2014
- Incorporated into the ROP cross-cutting areas

Safety Culture Aspect Development

The new Safety Culture aspects

Developed in an effort to capture the important characteristics of safety culture which are observable to the NRC staff during inspection and assessment of licensee performance

Aspects and examples developed

New aspects replace the older cross-cutting components

Development process of the aspects :

- 4 facilitated workshops were held with agency experts, INPO and NEI representatives, and a member of the public.
- Workshop participants took existing INPO, NRC and IAEA language and used a mapping exercise to group them and merge them together using the existing Policy Statement traits. The workshop participants also developed a tenth trait that is not included in the Policy Statement; “Decision making.”
- Definitions and examples of each trait were then developed.
- INPO has updated all guidance documents and the NRC has published NUREG-2165 to capture the language for all program offices to use.
- NRR developed a working group who determined which parts of the Common Language would be applicable to power reactors, and could also be feasibly added into the ROP for use by the inspectors.

The aspects and their definitions are currently provided in Inspection Manual Chapter (IMC) 0310 , “Aspects within the Cross-Cutting Areas," The definitions are listed in the next section of this module.

Treatment of Safety Culture in the ROP

This section will help you to understand the treatment of safety culture within the ROP.

- IMC 0310 – “Aspects within the Cross-Cutting Areas.”
- How are the aspects used?
- Safety culture aspect definitions
  - Human Performance
  - Problem Identification and Resolution
  - Safety Conscious Work Environment (SCWE)
  - Supplemental Aspects
- Identification of cross-cutting aspects and cross-cutting themes of inspection findings
- Criteria for substantive cross-cutting issues
- Criteria for substantive cross-cutting issues - continued
- Safety culture assessment

IMC 0305, “Operator Reactor Assessment Program”

Purpose

- Integrate the NRC's inspection, assessment, and enforcement programs
- Operator Reactor Assessment Program evaluates overall safety performance

Objectives

- Collect information from inspection findings and performance indicators (PIs)
- Arrive at an objective assessment of licensee safety performance using PIs and inspection findings.
- Assist NRC management in making timely and predictable decisions regarding appropriate agency actions used to oversee, inspect, and assess licensee performance.
- Provide a method for informing the public and soliciting stakeholder feedback on the NRC’s assessment of licensee performance.
- Provide a process to follow up on areas of concern.

Treatment of safety culture

- Provides guidance on the cross-cutting areas, which are comprised of safety culture aspects
- IMC 0310 contains definitions of safety culture and the safety culture aspects
- Offers options, with specific criteria, to allow the NRC to request a licensee to have an assessment of their safety culture performed.

Definitions

IMC 0310, “Aspects Within the Cross-Cutting Areas," provides the following definitions

Cross-Cutting Area: Fundamental performance attributes that extend across all of the Reactor Oversight Process cornerstones of safety.

- Human Performance
- Problem Identification and Resolution
- Safety Conscious Work Environment (SCWE)

Cross-Cutting Aspect: Performance characteristics of a finding that is the most significant causal factor of the performance deficiency.

Different cross-cutting aspects of the Human Performance cross-cutting area

- Resources available and adequate to support nuclear safety
- Field Presence: Leaders are commonly seen in the work areas of the plant.
- Change Management: Leaders use a systematic process for evaluating and implementing change

Cross-Cutting Theme: Multiple inspection findings (four or more) with causes that share the same cross-cutting aspect.

Safety Culture: 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.

Definitions continued

***Safety Conscious Work Environment (SCWE)**:

Employees feel free to raise safety concerns

Concerns are promptly reviewed and given the proper priority

Resolved with timely feedback to employees.

***Substantive Cross-Cutting Issue**:

A cross-cutting theme evidenced by more than three current inspection findings in the cross-cutting areas of human performance, and problem identification and resolution.

At least one finding exists or the NRC has issued correspondence addressing SCWE cross-cutting issues.

Issues must be more than an isolated instance, or have impacted, directly or indirectly, more than a single individual.

In all cases, the NRC must identify a concern with the licensee's scope of efforts or progress in addressing the cross-cutting theme.

See IMC 0305, "Operating Reactor Assessment Program," Section 06.07 for more details.

How are the Aspects Used?

Routine baseline inspections

- Twenty-three aspects make up the cross-cutting areas.
- Applied **in the context of** evaluating potential cross-cutting aspects of findings when determining the causes of performance deficiencies. The aspects **should not** be used as an inspection checklist.

Cross-Cutting Area	Human Performance	Problem Identification & Resolution	Safety Conscious Work Environment
Cross-Cutting Aspect	• Resources • Field Presence • Change Management • Teamwork • Work Management • Design Margins • Documentation • Procedure Adherence • Training • Bases for Decisions • Challenge the Unknown • Avoid Complacency • Consistent Process • Conservative Bias	• Identification • Evaluation • Resolution • Trending • Operating Experience • Self-Assessment	• SCWE Policy • Alternate Process for Raising Concerns • Free Flow of Information

How are the Aspects Used?

(Cont)

Supplemental and reactive inspections

Additional twelve aspects to be considered

- Incentives, Sanctions and Rewards
- Strategic Commitment to Safety
- Roles, Responsibilities, and Authorities
- Constant Examination
- Leader Behaviors
- Standards
- Job Ownership
- Benchmarking
- Work Process Communications
- Expectations
- Challenge Assumptions
- Accountability for Decisions

Safety Culture Aspect Definitions: Human Performance (H)

Descriptions of these aspects:

- Provide cross-cutting aspects

-Inform the identification of causal themes

Human Performance (H)

Resources: Personnel, equipment, procedures, and other resources are available and adequate

Field Presence:

Leaders are commonly seen in the work areas of the

Deviations from standards and expectations are corrected promptly

Senior Managers ensure supervisory and management oversight of work activities

Change Management: Leaders use a systematic process for evaluating and implementing change

Teamwork: Individuals and work groups communicate and coordinate their activities

Work Management: The organization implements a process of planning, controlling, and executing work activities

Design Margins: The organization operates and maintains equipment within design margins.

Special attention is placed on maintaining fission product barriers, defense-in-depth, and safety related equipment.

Human Performance Continued

Documentation: The organization creates and maintains complete, accurate, and up-to-date documentation.

Procedure Adherence: Individuals follow processes, procedures and work instructions.

Training: The organization provides training and ensures knowledge transfer.

Bases for Decision: Leaders ensure that the bases for operational and organizational decisions are communicated in a timely manner.

Challenge the Unknown: Individuals stop when faced with uncertain conditions.

Avoid Complacency: Individuals recognize and plan for the possibility of mistakes, latent issues, and inherent risk

Consistent Process: Individuals use a consistent, systematic approach to make decisions.

Conservative Bias: Individuals use decision making practices that emphasize prudent choices over those that are simply allowable.

Safety Culture Aspect Definitions: Problem Identification and Resolution (P)

Identification: The organization implements a corrective action program with a low threshold for identifying issues.

Evaluation: The organization thoroughly evaluates issues to ensure that resolutions address the cause and extent of conditions

Resolution: The organization takes effective corrective actions to address issues

Trending: The organization periodically analyzes information from the corrective action program and other assessments in the aggregate

Operating Experience: The organization systematically and effectively collects, evaluates and implements relevant internal and external operating experience

Self-Assessment: The organization routinely conducts self-critical and objective assessments

Safety Culture Aspect Definitions: Safety Conscious Work Environment (SCWE) (S)

SCWE Policy: The organization effectively implements a policy that supports individuals' rights and responsibilities to raise safety concerns

Alternate Process for Raising Concerns: The organization effectively implements a process for raising and resolving concerns that is independent of line management influence

Free Flow of Information: Individuals communicate openly and candidly

Supplemental Cross-Cutting Aspects (X) Definitions

Other considerations:

Incentives, Sanctions and Rewards: Leaders ensure incentives, sanctions and rewards are aligned with nuclear safety policies

Strategic Commitment to Safety: Leaders ensure plant priorities are aligned to reflect nuclear safety as the overriding priority

Roles, Responsibilities, and Authorities: Leaders clearly define roles, responsibilities, and authorities

Constant Examination: Leaders ensure that nuclear safety is constantly scrutinized

Leader Behaviors: Leaders exhibit behaviors that set the standards for safety

Standards: Individuals understand the importance of adherence to nuclear standards

Job Ownership: Individuals understand and demonstrate personal responsibility

Benchmarking: The organization learns from other organizations to continuously improve

Work Process Communication: Individuals incorporate safety communications in work activities

Expectations: Leaders frequently communicate and reinforce the expectation that nuclear safety is the organization's overriding priority

Challenge Assumptions: Individuals challenge assumptions and offer opposing views when they think something is not correct.

Accountability for Decisions: Single-point accountability is maintained for nuclear safety decisions

Check your Safety Culture Aspects Knowledge

Select the appropriate answer for each question or enter the answer in the blank provided. When you are done, click the button to submit your answers, register your answers and find out your score.

1. Which of the following is NOT associated with a cross-cutting area?

A. Environment for raising concerns

B. Resources

C. Evaluation

2. Which of the following is associated with a cross-cutting area?

A. Incentives, Sanctions and Rewards

B. Change Management

C. Work Process Communication

3. Which of the following is associated with the cross-cutting area of Human Performance?

A. Challenge the unknown

B. SCWE Policy

C. Self Assessment

4. Which of the following is associated with the cross-cutting area of Problem Identification and Resolution?

A. Work Practices

B. Evaluation

C. Bases for Decisions

5. Where are the safety culture aspects and their definitions located?

A. IMC 0612, “Power Reactor Inspection Reports”

B. IMC 0310, “Aspects within the Cross-Cutting Areas.”

C. IMC 0305, “Operating Reactor Assessment Program”

D. IP 71152, “Identification and Resolution of Problems”

Identification of Cross-Cutting Aspects and Cross-Cutting Themes of Inspection Findings

During the inspection activity, the finding (and any subsequent developments associated with the issue) must be reviewed

- Inspectors are not expected to document a cross-cutting aspect for each and every inspection finding
- The inspectors should identify the cause(s) that provides the most meaningful insight into the performance
- Inspectors should make this decision based on available causal information.
- There should typically be only one principal cause and one cross-cutting aspect associated with each finding
- Cross-cutting aspect(s) are documented in accordance with IMC 0612, "Power Reactor Inspection Reports"

Cross-cutting aspects are evaluated to determine if a cross-cutting theme exists

An SCCI is opened if

(1) a cross-cutting theme exists

(2) the NRC staff has a concern with the licensee's scope of efforts or progress in addressing the cross-cutting theme

The cross-cutting aspects are described in IMC 0310, "Aspects Within the Cross-Cutting Areas."

The findings should be examined to identify cross-cutting themes

Criteria for Substantive Cross-Cutting Issues

The criteria for identification of a substantive cross-cutting issue are:

Human Performance and Problem Identification and Resolution: A substantive cross-cutting issue would exist if **ALL** of the following criteria are met.

More than three green or safety significant inspection findings

Cross-cutting theme from more than one cornerstone

Agency concern

Cross-cutting performance deficiency is defined as having satisfied the previous two criteria.

In evaluating whether this criterion is met, the regional offices should consider if any of the following situations exist:

- The licensee had not identified or recognized the cross-cutting theme affected other areas and had not taken any actions to address it. **OR**
- The licensee recognized the cross-cutting theme affected other areas but failed to schedule or take appropriate corrective action. **OR**
- The licensee recognized the cross-cutting theme affected other areas but waited too long in taking corrective actions. **OR**
- The licensee has implemented a range of actions to address the cross-cutting theme

Criteria for Substantive Cross-Cutting Issues (continued)

Safety Conscious Work Environment (SCWE): A substantive cross-cutting issue would exist if any of the following criteria are met.

- Green or safety significant inspection finding in the current 12-month assessment period with documented cross-cutting aspect in the area of SCWE. Observations or violations that are not findings should not be considered in this determination. **OR**
- Licensee has received a chilling effect letter. **OR**
- Licensee has received correspondence from the NRC which transmitted an enforcement action with a severity level of I, II, or III, and which involved discrimination, or a confirmatory order which involved discrimination.

Criteria **MUST** also be met:

- Associated impact on SCWE was not isolated **AND**
- Agency has a concern with the licensee's scope of efforts or progress

NOTE: For the purpose of meeting this criterion, not isolated is defined as "an impact where the sphere of influence spans beyond one individual, such that multiple individuals, involving different groups within the organization or levels of the organization are affected." Consideration should be given to the roles, responsibilities, and job functions of the impacted individuals.

Safety Culture Assessment

The NRC can request a licensee to have an assessment of their safety culture performed if the licensee meets any of the following conditions:

Recurring Substantive Cross-Cutting Issue

- The NRC may request that a licensee perform an assessment of their safety culture when the same substantive cross-cutting issue with the same cross-cutting theme has been identified in three or more consecutive assessment letters.

Degraded Cornerstone Column of the Action Matrix

- The NRC may request that a licensee perform an independent assessment of their safety culture if the NRC identified through the conduct of Supplemental Inspection Procedure 95002, "Inspection for One Degraded Cornerstone or Any Three White Inputs in a Strategic Performance Area," and the licensee did not recognize, that one or more aspects of safety culture caused or significantly contributed to the risk significant performance issues. This will be discussed further later in the module.

Multiple/Repetitive Degraded Cornerstone Column of the Action Matrix

- The NRC expects that a licensee in the Multiple/Repetitive Degraded Cornerstone Column of the Action Matrix will have a third party assessment of their safety culture performed.

Treatment of Safety Culture in the Baseline and Supplemental Inspection Programs

This section will cover the treatment of safety culture.

- IMC 0612, "Power Reactor Inspection Reports"
- IMC 0612 guidance on cross-cutting aspects of findings
- Summary: 4 step method for identifying cross-cutting aspects
- Findings with potential SCWE cross-cutting aspect
- IP 71152, "Identification and Resolution of Problems"
- IP 93100, “Safety Conscious Work Environment Concern Follow-up”
- IP 40100, “Independent Safety Culture Assessment Follow-up”
- IP 71153, "Follow-up of Events and Notices of Enforcement Discretion"
- IP 93800, "Augmented Inspection Team"
- IP 93812, "Special Inspection"
- IP 95001, "Inspection for One or Two White Inputs in a Strategic Performance Area"
- IP 95002, "Inspection for One Degraded Cornerstone or Any Three White Inputs in a Strategic Performance Area"
- IP 95003, "Supplemental Inspection for Repetitive Degraded Cornerstones, Multiple Degraded Cornerstones, Multiple Yellow Inputs, or One Red Input"
- Graded response
- Take away

IMC 0612, “Power Reactor Inspection Reports”

Objective is to ensure inspection reports:

- Screen inspection results
- Clearly communicate significant inspection results in a consistent manner to licensees
- Document the basis for significance determination and enforcement action
- Provide inspection results as one input

IMC 0612 Guidance on Cross-Cutting Aspects of Findings

The cross-cutting aspect is an attribute of a finding not a finding in an of itself.

All Greater-Than-Green and all non-licensee identified findings are screened for cross-cutting aspects.

All findings with a cross-cutting aspect must meet the following requirements:

- Evaluated as more than minor
- Significant contributor to the inspection finding
- Reflective of current licensee performance
- The cause of the finding is related to one of the three cross-cutting areas

Inspectors should provide enough information in inspection findings to enable regional management to determine whether a cross-cutting theme exists

For every finding that has a cross-cutting aspect, inspectors should document the reasons why that cross-cutting aspect is a significant contributor to the finding

- The documentation should have the following format: "This finding had a cross-cutting aspect in the area of _____ because _____"

The NRC identifies an SCCI to inform the licensee that the NRC has a concern with the licensee's performance in the cross-cutting area and to encourage the licensee to take appropriate actions before more significant performance issues emerge.

Summary: 4 Step Method for Identifying Cross-Cutting Aspects

Step 1: Identify the most significant contributing cause of the finding.

Step 2: Determine whether that cause relates to recent licensee performance.

Step 3: In the safety culture aspect list, find the aspect that describes licensee performance that would have prevented or precluded the performance deficiency represented by that cause.

Step 4: Develop a statement to describe that aspect as the cross-cutting aspect of the finding, in the format:

"This finding had a cross-cutting aspect in the area of _____ because _____"

Findings with Potential SCWE Cross-Cutting Aspect

Additional review may be needed

Be alert for:

- Allegations: If inspectors determine that a broader SCWE issue exists that is not associated with the finding, such information would be considered an allegation
- Wrongdoing: Inspectors should be cognizant of indications of willfulness

A SCWE Finding Review Group will review findings

- Regions are encouraged to hold discussions with the Review Group
- Review Group will review potential findings and the proposed SCWE cross-cutting aspects prior to
- (1) any SCWE related fact finding
- (2) exiting with the licensee
- (3) documentation of the finding in an inspection report.

When faced with a finding with a potential SCWE cross-cutting aspect, contact your branch chief for guidance and assistance.

IP 71152, “Identification and Resolution of Problems”

Purpose is to assess a licensee's problem identification and resolution, accomplished through:

- Daily, routine review
- Quarterly samples
- Semiannual trend reviews
- Biennial team inspection

Treatment of safety culture:

In Inspection Requirements, directs inspectors to:

- Be aware of safety culture aspects.
- Inspect and assess corrective actions program, licensee use of operating experience, and licensee self-assessments and audits.
- Review a licensee’s self-assessment of safety culture

In Inspection Guidance, directs inspectors to:

- Include inspection of samples of operating experience and self-assessments and audits.
- Conduct samples of self-assessments and audits and alternate processes for raising concerns
- Conduct review of a self-assessment of safety culture

In Inspection Guidance, provides for the inspectors:

- Performance attributes for treatment of operating experience and effective self-assessments.
- Documentation instructions to address all of problem identification and resolution.
- Description of problems that may impact a SCWE.
- Sample questions for assessing SCWE

IP 93100, “Safety Conscious Work Environment Concern Follow-up”

- Purpose of the procedure:
  - To inspect the safety-conscious work environment (SCWE) attribute of a licensee’s safety culture.. Insights gathered during this inspection would be considered during the mid- or end-of-cycle assessment meetings conducted
  - The SCWE cross-cutting area is sampled during the biennial problem identification and resolution team inspection
  - When directed by management, SCWE-related issues of concern identified during IP 71152 can be examined in more depth
- Objectives:
  - Determine if indications of a chilled work environment exist.
  - Determine if employees are reluctant to raise safety or regulatory issues
  - Determine if employees are being discouraged from raising safety or regulatory issues

IP 40100, “Independent Safety Culture Assessment Follow-up”

- Purpose of the inspection procedure:
  - Provides guidance for following up on a U.S. Nuclear Regulatory Commission (NRC) request for a licensee to perform an independent safety culture assessment.
  - The NRC can ask a licensee to perform an independent safety culture assessment for the following situations:
    - (1) a conclusion is reached during an inspection that the licensee did not adequately evaluate the contribution of a safety culture trait to the performance issue, or
    - (2) a licensee has not adequately addressed a repetitive substantive cross-cutting issue (SCCI), which may be indicative of underlying organizational issues with safety culture implications.

IP 71153, “Follow-up of Events and Notices of Enforcement Discretion”

Purpose to provide inspector response to site and Licensee Event Report (LER) reviews.

Treatment of safety culture:

<u>In Inspection Requirements, directs inspectors to</u>:

- Retain observations related to apparent performance issues and contributing factors

<u>In Inspection Guidance, directs inspectors to</u>:

- Provide any information on potential contributing factors that may assist the follow-up assessment
- Include any issues noted with aspects of safety culture
- Information is provided for follow-up by IIT, AIT, SI, or ROP inspection(s).

IP 93800, “Augmented Inspection Team”

Purpose of the procedure is to review an event with a larger, more experienced team based on the significance of the event.

Treatment of safety culture:

In Inspection Guidance, directs inspectors to:

Emphasize fact finding including:

- Conditions preceding the event
- Systems response
- Event precursors,
- Quality assurance considerations
- Safeguards considerations
- Event chronology
- Equipment performance,
- Human factors considerations
- Radiological considerations
- Safety culture aspect considerations

In Inspection Documentation, directs inspectors to:

Document probable contributing causes of the event or degraded condition related to the safety culture aspects.

- Due to the sensitive nature of AITs, areas where no findings are identified should be documented in greater detail than required
- The results of this inspection may be used to inform a subsequent supplemental inspection (IP 95001, IP 95002, or IP 95003) based on the final significance determination of any findings associated with the event.
- The AIT leader should provide any information on potential contributing factors, including safety culture issues, to the team leader of any related supplemental inspection.

IP 93812, “Special Inspection”

Purpose is to direct the lowest level of event assessment by a team.

Treatment of safety culture:

In Inspection Guidance, directs inspectors to:

Emphasize fact finding including

- Conditions preceding the event
- Systems response
- Precursors
- Quality assurance considerations,
- Safeguards considerations
- Chronology
- Equipment performance
- Human factors considerations
- Radiological considerations
- Safety culture aspect considerations

In Inspection Documentation, directs inspectors to:

Document probable contributing causes of the event or degraded condition related to the safety culture aspects.

- Due to the sensitive nature of SIs, areas where no findings are identified should be documented in greater detail than required
- The results of this inspection may be used to inform a subsequent supplemental inspection (IP 95001, IP 95002, or IP 95003) based on the final significance determination of any findings associated with the event.
- The SI leader should provide any information on potential causes or contributing factors, including safety culture issues, to the team leader of any related supplemental inspection.

IP 95001, “Inspection for One or Two White Inputs in a Strategic Performance Area”

Purpose is to provide assurance that:

- The root causes and contributing causes of risk significant performance issues are understood.
- The extent-of-condition and extent-of-cause of risk significant performance issues are identified.
- Licensee corrective actions to risk significant performance issues are sufficient to address the root and contributing causes, and to prevent recurrence.

Treatment of safety culture:

<u>In Inspection Requirement, directs inspectors to</u>:

Determine that the root cause evaluation, extent-of-condition, and extent-of-cause appropriately considered the safety culture aspects described in IMC 0310

<u>In Inspection Guidance, directs inspectors to</u>:

Determine whether a weakness in a safety culture aspect was a root cause or contributing cause.

- If so, verify the licensee addressed that weakness through appropriate corrective actions.
- If a weakness in a safety culture aspect was a root cause or contributing cause AND the licensee did not recognize and address that cause, this is a weakness in their evaluation, and the licensee may be subject to additional agency actions.

IP 95002, “Inspection for One Degraded Cornerstone or Any Three White Inputs in a Strategic Performance Area

Purpose to

- Provide assurance that the root causes and contributing causes are understood
- Assess the extent-of-condition for individual and collective risk significant performance issues
- Provide assurance that licensee corrective actions to risk significant performance issues are sufficient

Treatment of safety culture:

<u>In Inspection Objectives, directs inspectors to</u>:

Independently determine whether any safety culture aspect caused or contributed significantly to risk significant performance issues.

<u>In Inspection Requirements, directs inspectors to</u>:

Determine that the root cause evaluation appropriately considered safety culture aspects.

- Independently perform an evaluation.
- NRC may request that the licensee complete an independent assessment of safety culture.

<u>In Inspection Guidance, provides</u>:

- Guidance for making the determination required above.
- A note that failure to consider a safety culture aspect is not necessarily a violation.

IP 95003, “Supplemental Inspection for Repetitive Degraded Cornerstones, Multiple Degraded Cornerstones, Multiple Yellow Inputs, or One Red Input”

Purpose

- Provide the NRC additional information
- Provide an independent assessment
- Independently assess the adequacy of the programs and processes
- Independently evaluate the adequacy of programs and processes
- Provide insight into the overall root and contributing causes of deficiencies
- Determine if the NRC oversight process provided sufficient warning
- Independently assess the licensee's safety culture and evaluate the licensee's assessment of its safety culture.

Treatment of safety culture:

Contains a boundary condition to be met before inspection begins:

The licensee has completed a third party assessment of their safety culture.

In Inspection Requirements, directs inspectors to:

- Perform a review of the licensee's third party safety culture assessment
- Conduct the NRC's independent assessment of safety culture

IP 95003 inspection teams will receive "just-in-time" training before performing the inspection.

Quiz: Test your Procedure Knowledge

Test your knowledge of the procedures presented. Match the following IPs with their associated inspection requirement:

1. IP 95001, "Inspection for One or Two White Inputs in Strategic Performance Area"
2. IP 95003, "Supplemental Inspection for Repetitive Degraded Cornerstones, Multiple Degraded Cornerstones, Multiple Yellow Inputs, or One Red Input"
3. IP 95002, "Inspection for One Degraded Cornerstone or Any Three White Inputs in a Strategic Performance Area

A. Independently assess safety culture of the site by assessing the licensee's independent assessment of safety culture and completing the NRC assessment of the licensee's safety culture.

B. Independently determine whether safety culture aspects caused or contributed significantly to the risk-significant performance issues.

C. Verify that the licensee's root cause evaluations, extent-of-condition evaluation, and extent-of-cause evaluation appropriately considered and addressed safety culture issues.

Graded Response

Supplemental procedures represent a graded response to plant performance issues

IP 95001, "Inspection for One or Two White Inputs in a Strategic Performance Area“

- Verify that the licensee’s root cause evaluation, extent-of-condition, and extent-of-cause appropriately considered all of the safety culture aspects.

IP 95002, "Inspection for One Degraded Cornerstone or Any Three White Inputs in a Strategic Performance Area“

- Independently determine whether a weakness in a safety culture aspect was a root or contributing cause; may request that the licensee complete an independent assessment of safety culture.

IP 95003, "Supplemental Inspection for Repetitive Degraded Cornerstones, Multiple Degraded Cornerstones, Multiple Yellow Inputs, Or One Red Input“

- Review the licensee’s third party safety culture assessment.
- Conduct the NRC’s independent assessment of safety culture.

Take Away

In conducting inspection activities, inspectors should strive for:

- Consistent implementation of the Inspection Manual Chapters and Procedures.
- Improved predictability and consistency in the identification of cross-cutting aspects and cross-cutting themes for inspection findings.
- Use of the ROP feedback process to identify opportunities for improvement.

Case Study #1

On December 16, 2004, control room operators performed a control board walkdown during a reactor power increase. The operators observed that the 11 steam generator steam line flow channel 1 instrument was reading approximately 10 percent (%) while channel 2 and all other steam generator channels were reading approximately 26%. About 7 hours elapsed during the power ascension from 10% power to 26% power when the discrepant instrument was identified. The licensee initiated troubleshooting activities to resolve the discrepant instrument indication. Operators and maintenance technicians immediately placed the failed steam line flow instrument bistable in a tripped condition.

The licensee's troubleshooting identified that the instrument transmitter equalizing valve was slightly open. Further investigation determined that the transmitter was last worked on December 8, 2004, to perform a sensor calibration. The unit was in hot shutdown conditions when the transmitter was returned to service. Instrument and calibration procedure IC-SC.RCP- 0028, "1FT-512 #11 Steam Generator Steam Flow Protection Channel I," provided detailed work instructions to properly return the instrument to service. The procedure also required independent verification of the closed equalizing valve.

The licensee's evaluation of this issue concluded that the transmitter equalizing valve was not properly closed on December 8, 2004. The inspectors judged that the control room operators identified the failed instrument in a timely fashion and took prompt action consistent with Technical Specification requirements.

Case Study #1 Continued

- Inspection Finding:

A self-revealing non-cited violation was identified when the 11 steam generator steam flow protection channel 1 instrument failed downscale due to an open instrument equalizing valve. The equalizing valve was left partially open at the conclusion of calibration activities contrary to procedure requirements. This finding was determined to be a non-cited violation of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings."

Case Study #1 Continued

Causes and Significant Contributors:

Maintenance personnel did not implement expected human error prevention techniques

- STAR – (Stop, Think, Act, Review)
- Independent Verification

Cross-Cutting Aspect:

The inspectors determined that the finding had a human performance cross-cutting aspect because maintenance technicians did not implement the expected human error prevention techniques STAR and independent verification.

Case Study #2

On September 9, 2004, at 1:06 a.m., the reactor tripped as designed from an unplanned turbine trip. All control rods fully inserted and all safety related systems were available and functioned as designed. The turbine trip was due to a generator differential and loss of field trip signals.

In followup troubleshooting efforts, engineers identified that an Alterrex exciter's brush assembly had failed. The engineers determined that the brushes were severely worn and degraded to a point that severe arcing occurred. Arching caused a gap between the brush and collector ring which resulted in a loss of generator field.

The licensee initiated a root cause evaluation to investigate the root cause and contributing causes, and to develop subsequent corrective actions. Two causes were identified: (1) vendor recommended daily operator inspections and weekly maintenance inspections were not implemented; and (2) lessons learned from a previous event in 1993 were not applied.

Case Study #2 Continued

Inspection Finding:

A self-revealing finding was identified when the reactor automatically tripped on September 9, 2004, in response to a generator protection trip.The licensee failed to incorporate vendor recommended daily and weekly inspections of the exciter brushes.

A brush failure resulted in a generator protection trip. The finding was not a violation of NRC requirements because the performance deficiency was associated with a non-safety related system.

Case Study #2 Continued

Causes and Significant Contributors:

- Vendor recommended daily operator inspections and weekly maintenance inspections were not implemented
- Lessons learned from a previous event in 1993 were not applied

Cross-Cutting Aspect:

The inspectors determined that the finding had a problem identification and resolution cross-cutting aspect because the licensee did not institutionalize operating experience, vendor recommended inspections, in the preventive maintenance program for the Alterrex exciter brush assembly.

Case Study #3

On September 16, 2004, the licensee initiated Condition Report 20203784, which identified that the moisture separator low level alarm was received and the 'A' moisture separator dump valve, LV-1039A, was noted on computer display system to be about 10% open while the associated valve controller was receiving an air signal to fully close the valve. The inspectors concluded that this was the point in time where the valve had been opened for sufficient duration to completely drain the 'A' moisture separator drain tank (valve open and moisture separator low level alarm). A condenser area entry was made on September 16 to investigate fittings associated with the air supply line. Engineering and operations personnel discussed this issue, and engineering responded formally on September 20, stating that there was not an immediate safety concern.

However, an operator, not satisfied with the September 20 response, initiated another condition report (20204256) that same day, stating that the prior condition report addressed only flow accelerated corrosion concerns. Specifically, it did not address potential impact to the condenser/baffle plate, and the potential impact to the condenser penetration which had cracked on an earlier occasion (1988) when this same dump valve had failed open for an extended period of time (resulting in elevated offgas flow due to increased in-leakage through the crack at the penetration to the condenser). Again, a formal engineering response, completed on September 22, did not address the entire concern. Only the first issue of potential internal condenser damage was addressed, and the response re-stated the original flow accelerated corrosion response.

Case Study #3

The responses to both condition reports stated that the affected valve and associated piping would be inspected during the upcoming refueling outage, scheduled to begin around the end of October 2004.

Neither evaluation considered that two-phase flow could be present from the moisture separator drain tank (operating pressure - about 160 psig) to the main condenser (operating pressure - vacuum conditions). The total length of piping from the moisture separator drain tank to the condenser is about 60 linear feet. This piping was not designed for the dynamic loading that would accompany two-phase flow. The disconnected hanger (H25), while likewise unknown at the time, was not available to mitigate the dynamic loading of the lines. The inspectors concluded that engineering's evaluations associated with the two condition reports were inadequate because the associated MWe reduction due to the leakage, the loss of water level in moisture separator 'A' and the difference in operating pressures in the moisture separator drain tank and the main condenser, should have led to the recognition that there was two-phase flow in the line upstream of LV-1039A.

After about 25 days (September 16 to October 10, 2004) of operation beyond the design loading capacity of the moisture separator drain tank piping, the 8-inch pipe failed near the condenser penetration, resulting in a steam leak, manual reactor scram, and loss of condenser vacuum.

Case Study #3

<u>Inspection Finding</u>:

A self-revealing finding of low to moderate safety significance was identified involving the failure to adequately evaluate and correct a degraded level control valve for the 'A' moisture separator drain tank, as required by the licensee's Corrective Action Program described in NC.WM-AP.ZZ-0002(Q), "Corrective Action Process." As a result, an 8-inch pipe in that system failed and caused a transient initiating event on October 10, 2004.

Case Study #3 Continued

<u>Causes and Significant Contributors</u>:

Licensee identified root causes:

- A rigorous process to apply effective decision-making principles to plant conditions that fall below licensing thresholds and/or are not clearly defined existing procedures did not exist.

- Operating procedures were inadequate to prevent extended operation of the moisture separator level control system in the condition of unstable two-phase flow.

Case Study #3 Continued

Causes and Significant Contributors:

Licensee identified contributing causes:

- A disconnected hanger was not discovered by any type of inspection, thereby allowing it to fret through instrument air tubing and causing LV-1039A to fail open.

- The condition of LV-1039A was not monitored to detect further degradation.

- Appropriate rigor was not applied to the evaluation of the abnormal condition. Engineering did not research into the previous failure and did not address it in the evaluation.

Cross-Cutting Aspect:

The inspectors determined that the finding had a problem identification and resolution cross-cutting aspect because the licensee failed to adequately evaluate the degraded level control valve, LV-1039A, for the 'A' moisture separator drain tank which resulted in the failure of an 8 inch pipe in the system due to operation in a condition outside of its design.

Course Test

Select the appropriate answer for each question or enter the answer in the blank provided. When you are done, click the button to submit your answers, register your answers and find out your score.

The definition of **cross-cutting area** is fundamental performance attributes that extend across all of the ROP cornerstones of safety.

- True
- False

SCWE refers to an environment in which employees feel free to raise safety concerns, both to their management and to the NRC, without fear of retaliation and where such concerns are promptly reviewed, given the proper priority based on their potential safety significance, and appropriately resolved with timely feedback to employees.

- True
- False

There are twelve safety culture aspects which are not related to the cross-cutting areas.

- True
- False

A substantive cross-cutting issue (SCCI) exists when a plant receives multiple findings with cross-cutting aspects.

- True
- False

Course Test (continued)

IP71152 directs inspectors to perform which of the following tasks:

A. Directs inspectors to be aware of cross-cutting aspects when selecting inspection samples.

B. Directs inspectors to review a licensee's self assessment or independent assessment of safety culture, if performed, during a biennial inspection or a quarterly sample in some cases.

C. Directs inspectors to inspect and assess corrective action program, operating experience, and self assessments/audits, during a biennial inspection.

D. Both B and C.

A **cross-cutting aspect** exists when the cause(s) of the performance deficiency was determined to be a significant contributor to the finding, related to one of the cross-cutting areas, and is indicative of current licensee performance.

- True
- False

Identifying a SCCI allows NRC to be able to take additional actions, such as asking the licensee to provide a response at the next annual public meeting, asking for a written response, or choosing to hold a separate meeting, to understand how the licensee is addressing problems related to the SCCI.

- True
- False

The ROP defines 35 safety culture aspects, twenty-three of these aspects are directly related to the ROP cross-cutting areas, and so they became cross-cutting area aspects and are to be reviewed under the baseline inspection program.

- True
- False