Safety Culture and Changes to the ROP

Inspector Counterpart Meeting
Training Session
May – June 2006

Training Purpose

To present more detailed information on changes to the inspection procedures and manual chapters and to provide follow up on the computer based training (CBT) materials, so that participants will have the necessary knowledge and understanding of the revisions to the ROP to enhance the treatment of safety culture so that we are able to apply the revised process effectively and consistently.

What is Safety Culture?
Why Do We Care?
How Did the Staff Develop Safety Culture Components that Can be Used Under the ROP?

Training Objective

The objective of this session is to become familiar with:

- The reason for NRCs current efforts in the area of safety culture;
- The concept of safety culture, where it came from, and its role in nuclear safety;
- What the NRC's safety culture components are and how they were developed; and
- The Commission's direction in the area of safety culture

Why Do We Care?

Davis-Besse

- Root Cause included elements of safety culture (http://www.nrc.gov/reactors/operating/ops-experience/vessel-head-degradation/news/2004/index.html)
- Nuclear safety focus
- Implementation of CAP
- Analysis of safety implications
- Procedure compliance

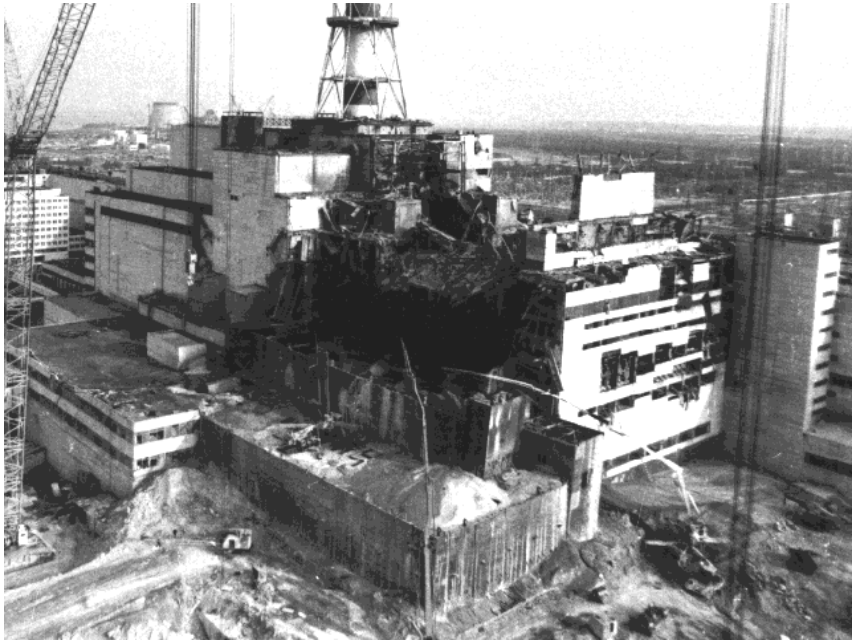
Columbia Space Shuttle

Columbia Space Shuttle

- Training on the Columbia accident is at http://nrr10.nrc.gov/rop-digital-city/electronic-read-sign.html
- The Safety Culture at NASA played a major role
- Importance of questioning attitude
- Safety culture weaknesses can lead to technological failures
- Importance of a robust CAP

Where did the Concept of Safety Culture Originate?

Chernobyl



NRC's 1989 Policy on Conduct of Operations

Safety culture-“the necessary full attention to safety matters,” and “the personal dedication and accountability of all individuals engaged in any activity which has a bearing on the safety of nuclear power plants…Management has the duty and obligation to foster the development of a ‘safety culture’ at each facility and to provide a professional working environment, in the control room and throughout the facility, that assures safe operations.”

INSAG-4 Definition

"Safety Culture is that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance."

Safety Conscious Work Environment

An environment in which employees are encouraged to raise safety concerns, are free to raise concerns both to their own management and to the NRC without fear of retaliation, where concerns are promptly reviewed, given the proper priority, and appropriately resolved, and timely feedback is provided to those raising concerns.

Commission Direction Based on Davis Besse

- Commission direction in the form of staff requirements memoranda, included:
  - Enhance the Reactor Oversight Process (ROP) treatment of cross-cutting issues to more fully address Safety Culture;
  - Ensure inspectors are properly trained;
  - Develop a process for determining the need for a specific safety culture evaluation of plants in a degraded cornerstone; and
  - Ensure modifications to the ROP are consistent with the ROP development principles

Development of the NRC's Safety Culture Components

- Information on what is important to safety culture was compiled from industry and international sources and based on experience of the working group members.
- Some goals were to ensure NRC's components:
  - Include only information that is within NRC's regulatory jurisdiction
  - Include only information that is readily available or applicable to most licensees
  - Include only information that is indicative of safety culture
  - Are unambiguous
- Extensive stakeholder input solicited
- Components were put into context of how they will be used in assessing findings

Safety Culture Components

- Corrective Action Program
- Operating Experience
- Self and Independent Assessments
- Decision Making
- Resources
- Work Practices
- Work Control
- Preventing, Detecting, and Mitigating Perceptions of Retaliation
- Environment for Raising Concerns
- Safety Policies
- Organizational Change Management
- Accountability
- Continuous Learning Environment

An Example

A maintenance crew identifies a safety-related issue that, if fixed correctly, would delay completion of the job. When the crew briefs management on the problem, management indicates that the crew should do what is necessary to complete the job on time. In order to meet the deadline, members of the crew decide to skip over some of the safety checks from the written procedure of the task. They believe that "cutting a few corners" to meet the deadline is acceptable because "that's how things are done around here." As a result, the piece of safety-related equipment fails.

Summary

- The Davis Besse event reemphasized the importance of safety culture and demonstrated that significant problems can occur as a direct result of safety culture weaknesses that aren't recognized and addressed early
- While the concept of safety culture has been used for about twenty years, the similarities in the root causes of events at Davis Besse and NASA illustrate that it is important to identify safety culture weaknesses.
- The Commission provided the staff direction to enhance the ROP to more fully address safety culture.
- The development of NRC's safety culture components was informed by industry and international information on safety culture.
- Goals in the development of the NRC's safety culture components included ensuring that the aspects of the components are within our regulatory jurisdiction, unambiguous, and contain information that can be obtained through the ROP

Operating Reactor Assessment Program

Training Objectives

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

I. Describe the changes to the cross-cutting areas;

II. Describe the changes to the criteria for substantive cross-cutting issues; and

III. Describe the circumstances when the NRC would consider requesting a licensee perform an assessment of their safety culture.

Terminology

Definitions for several terms were added to IMC 0305 to facilitate communication and improve understanding of the guidance.

Cross-Cutting Area

Fundamental performance attributes that extend across all of the Reactor Oversight Process cornerstones of safety.

The cross-cutting areas are:

- Human Performance;
- Problem Identification and Resolution; and
- Safety Conscious Work Environment.

Cross-Cutting Area Components

A component of safety culture that is directly related to one of the cross-cutting areas.

The Human Performance cross-cutting area components are:

- Decision-Making;
- Resources;
- Work Control; and
- Work Practices.

Cross-Cutting Area Components

A component of safety culture that is directly related to one of the cross-cutting areas.

The Problem Identification and Resolution cross-cutting area components are:

- Corrective Action Program;
- Operating Experience; and
- Self and Independent Assessments.

Cross-Cutting Area Components

A component of safety culture that is directly related to one of the cross-cutting areas.

The Safety Conscious Work Environment cross-cutting area components are:

- Environment for Raising Concerns; and
- Preventing, Detecting, and Mitigating Perceptions of Retaliation.

Other Safety Culture Components

- The components of safety culture that are not directly related to one of the cross-cutting areas. These include:
  - Accountability;
  - Continuous Learning Environment;
  - Organizational Change Management; and
  - Safety Policies.
- These components are considered in the Supplemental Inspection Program.

Cross-Cutting Aspect

Performance characteristics that comprise a cross-cutting area component.

Example

Each of the following bullets are different cross-cutting aspects of the Corrective Action Program (CAP) cross-cutting area component.

- The licensee implements a corrective action program with a low threshold for identifying issues. The licensee identifies such issues completely, accurately, and in a timely manner commensurate with their safety significance.

- The licensee periodically trends and assesses information from the CAP and other assessments in the aggregate to identify programmatic and common cause problems. The licensee communicates the results of the trending to applicable personnel.

Example (Cont.)

- The licensee thoroughly evaluates problems such that the resolutions address causes and extent of conditions, as necessary. This includes properly classifying, prioritizing, and evaluating for operability and reportability conditions adverse to quality. This also includes, for significant problems, conducting effectiveness reviews of corrective actions to ensure that the problems are resolved.
- The licensee takes actions to address safety issues and adverse trends in a timely manner, commensurate with their safety significance and complexity.
- If an alternative process (i.e., a process for raising concerns that is an alternate to the licensee's CAP or line management) for raising safety concerns exists, then it results in appropriate and timely resolution of identified problems.

Cross-Cutting Theme

Multiple inspection findings (i.e., four or more) with causes that share the same cross-cutting aspect.

Criteria for Substantive Cross-Cutting Issues

Human Performance and PI&R (Unchanged)

A substantive cross-cutting issue would exist if **all** of the following criteria are met:

1. There are more than 3 inspection findings in the current 12-month assessment period with documented cross-cutting aspects in the areas of Human Performance or Problem Identification and Resolution;

2. There is a cross-cutting theme; and

3. The Agency has a concern with the licensee's scope of efforts or progress in addressing the cross-cutting theme.

Criteria for Substantive Cross-Cutting Issues

The following additional guidance has been provided to facilitate the Agency's decision regarding Criterion #3.

- The licensee had not identified or recognized that the cross-cutting performance deficiency affected other areas and so had not taken any actions to address the cross-cutting theme. **OR**
- The licensee recognized that the cross-cutting performance deficiency affected other areas but failed to schedule or take appropriate corrective action. **OR**
- The licensee recognized that the cross-cutting performance deficiency affected other areas but waited too long in taking corrective actions. In this case, judgment and risk insights should be used to help prioritize the timing of licensee corrective actions to address the cross-cutting performance deficiency.

Criteria for Substantive Cross-Cutting Issues

Safety Conscious Work Environment (New)

A substantive cross-cutting issue would exist if the following criteria are met:

1. There is an inspection finding in the current 12-month assessment period with a documented cross-cutting aspect in the area of safety conscious work environment (SCWE); **OR**

2. The licensee has received a chilling effect letter; **OR**

3. The licensee has received correspondence from the NRC which transmitted an enforcement action with a severity level of I, II, or III, involving discrimination.

Criteria for Substantive Cross-Cutting Issues

Safety Conscious Work Environment (SCWE)

Additionally, both of the following criteria must also be met in order to have a substantive cross-cutting issue in SCWE:

1. The associated impact on safety conscious work environment was not isolated, **AND**

2. The Agency has a concern with the licensee's scope of efforts or progress in addressing the individual and collective performance deficiencies that satisfied the previous criteria for SCWE.

Safety Culture Assessment

The revised Reactor Oversight Process provides the provision for the NRC to request a licensee have an assessment of their safety culture performed when specific conditions are satisfied.

These conditions are associated with:

- Recurring Substantive Cross-cutting Issues;
- A licensee in the Degraded Cornerstone Column of the Action Matrix; and
- A licensee in the Multiple/Repetitive Degraded Cornerstone Column of the Action Matrix.

Recurring Substantive Cross-Cutting Issue

- NRC may request a licensee perform an assessment of their safety culture when a substantive cross-cutting issue with the same cross-cutting theme has been identified in three or more consecutive assessment letters.
- The request will typically be for the licensee to conduct a self-assessment.
- If the recurring substantive cross-cutting issue is associated with deficiencies in the identification or evaluation aspects of their PI&R program, the NRC may request that the licensee have an independent assessment performed.
- The purpose is to determine if weaknesses in the licensee's safety culture underlie the licensee's inability to address the recurring substantive cross-cutting issue.

Degraded Cornerstone Column

- The NRC may request a licensee have an independent assessment of their safety culture performed when the NRC identified through the conduct of Supplemental Inspection Procedure 95002, and the licensee did not recognize, that one or more components of safety culture caused or significantly contributed to the risk significant performance issues.

- The purpose of the request is to determine if weaknesses in the licensee's safety culture underlie the individual or collective performance deficiencies responsible for the Degraded Cornerstone or the licensee's failure to recognize that one or more components of safety culture caused or significantly contributed to the risk significant performance issues.

Multiple/Repetitive Degraded Cornerstone Column

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

- The purpose is to determine if weaknesses in the licensee's safety culture underlie the individual or collective performance deficiencies responsible for the Multiple/Repetitive Degraded Cornerstone.

Training Objectives

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

I. Describe the changes to the cross-cutting areas;

II. Describe the changes to the criteria for substantive cross-cutting issues; and

III. Describe the circumstances when the NRC would consider requesting a licensee perform an assessment of their safety culture.

Procedure Revisions:
IP 71152, 71153, 93812, & 93800

Training Objective

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

- Describe the changes to the affected inspection procedures.

IP 71152, “Identification and Resolution of Problems”

Procedure IP 71152

PURPOSE OF THE PROCEDURE: Assess a licensee's Problem Identification and Resolution through

- Daily, routine review of condition reports
- Quarterly samples of selected issues
- Semiannual trend reviews
- Biennial team inspection

Procedure IP 71152

PURPOSE OF THE CHANGE: Overall, to increase inspector awareness of safety culture as a factor in performance and align PI&R inspections with safety culture components in the cross-cutting area of PI&R which now explicitly includes Op Ex and self assessments/audits.

Procedure IP 71152

In Inspection Requirements:

- directed inspectors to be aware of safety culture components when selecting inspection samples.
- expanded the biennial inspection requirements to inspect and assess CAP, Op Ex and self assessments/audits.

Procedure IP 71152

In Inspection Requirements:

- added a requirement to review a licensee's self assessment or independent assessment of safety culture, if performed, during a biennial inspection or a quarterly sample if desired.

Procedure IP 71152

In Inspection Guidance:

- modified the guidance to include inspection of samples of Op Ex and self assessments/audits.
- made samples of self assessments/audits and alternate processes for raising concerns mandatory, when available, for the biennial inspections.

Procedure IP 71152

In Inspection Guidance:

- in the biennial inspection, included review of a self assessment of safety culture, if performed, and
- added performance attributes for treatment of operating experience and effective self assessments.

Procedure IP 71152

In Inspection Guidance:

- enhanced description of problems that may impact a SCWE.
- expanded documentation instructions to address all components of PI&R.
- replaced the SCWE questions with improved questions.

IP 71153, “Event Followup”

Procedure IP 71153

PURPOSE OF THE PROCEDURE:

Inspector response to the site and LER reviews

Procedure IP 71153

PURPOSE OF THE CHANGE:

Observe and gather information on event significance, causes, and contributing causes including potential issues with components of safety culture.

Procedure IP 71153

WHERE THE CHANGES WERE MADE:

- INSPECTION REQUIREMENTS

  02.01 Event Follow Up

  e. Retain observations related to apparent performance issues and contributing factors for potential follow-up by the IIT, AIT, SI, or appropriate Reactor Oversight Process (ROP) baseline inspection.

Procedure IP 71153

Specific Guidance

- 03.01 Event Follow Up

  e. Inspectors should provide any information on potential contributing factors that may assist the follow up assessment of an event to the team leader for the followup inspection. These factors should include any issues noted with components of a safety culture.

Procedure IP 71153

Specific Guidance

- 03.01 Event Follow Up

  e. continued.

  The information is provided for followup by IIT, AIT, SI, or ROP inspection(s). The staff assigned to review the event as the agency response are responsible for documentation in accordance with the procedure governing the activity.

IP 93812, “Special Inspection ”

Procedure IP 93812

PURPOSE OF THE PROCEDURE:

This procedure directs the lowest level of event assessment by a team.

Procedure IP 93812

PURPOSE OF THE CHANGE:

Include the components of safety culture when reviewing probable contributing causes to an event. Forward the information to a follow-up inspection leader.

Procedure IP 93812

WHERE THE CHANGES WERE MADE:

- INSPECTION GUIDANCE:

  03.01 Scope of SI Response

  b. Emphasize fact finding, i.e., fully understanding the circumstances surrounding an event and probable cause(s), including….

Procedure IP 93812

…conditions preceding the event, chronology, systems response, equipment performance, precursors, human factors considerations, quality assurance considerations, radiological considerations, safeguards considerations, and safety culture component considerations (as defined in IMC 0305, paragraphs 06.07c. and d.).

Procedure IP 93812

03.02 Documentation

b. Probable contributing causes of the event or degraded condition, where applicable:

6. Safety culture component issues

Procedure IP 93812

03.02 Documentation

Due to the sensitive nature of SIs, areas where no findings are identified should be documented in greater detail than required by IMC 0612. The results of this inspection may be used to inform a subsequent supplemental inspection (95001, 95002, or 95003) based on the final significance determination of any findings associated with the event.

Procedure IP 93812

03.02 Documentation

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 93800, “Augmented Inspection Team”

Procedure IP 93800

PURPOSE OF THE PROCEDURE:

Review an event with a larger more experienced team based on the significance of the event

Procedure IP 93800

PURPOSE OF THE CHANGE:

Include the components of safety culture in reviewing potential contributing causes to an event.

Procedure IP 93800

WHERE THE CHANGES WERE MADE:

INSPECTION GUIDANCE

03.01 Scope of AIT Response.

b. Emphasize fact finding, i.e., fully understanding the circumstances surrounding an event and probable cause(s), including conditions preceding the event, event chronology…

Procedure IP 93800

WHERE THE CHANGES WERE MADE:

03.01 Scope of AIT Response.

b. ….systems response, equipment performance, event precursors, human factors considerations, quality assurance considerations, radiological considerations, safeguards considerations, and safety culture component considerations (as defined in IMC 0305, paragraphs 06.07c. and d.)

Procedure IP 93800

03.02 Documentation.

b. Probable contributing causes of the event or degraded condition, where applicable:

6. Safety culture component issues

Procedure IP 93800

03.02 Documentation.

Due to the sensitive nature of AITs, areas where no findings are identified should be documented in greater detail than required by IMC 0612. The results of this inspection may be used to inform a subsequent supplemental inspection (95001, 95002, or 95003) based on the final significance determination of any findings associated with the event.

Procedure IP 93800

03.02 Documentation.

The AIT leader should provide any information on potential contributing factors, including safety culture issues to the team leader of any related supplemental inspection.

Changes Made to IMC 0612 and the Supplemental Inspection Procedures (95001, 95002, 95003)

Training Objectives

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

- Describe the changes to the affected inspection procedures;
- Describe the changes to the guidance on documenting inspection results; and
- Describe the progressive engagement in safety culture provided by supplemental inspections.

Changes Made to IMC 0612

IMC 0612, “Power Reactor Inspection Reports”

Added note to 05.03 (“Screen for Greater than Minor”)

> “Determining that a cross-cutting aspect is associated with a finding does not in itself indicate that the finding is more-than-minor.
>
> The more-than-minor determination may be made only as described above, and does not depend in any way on the existence or non-existence of an associated cross-cutting aspect.”

IMC 0612, "Power Reactor Inspection Reports"

06.03.c(5) ("Findings Related to Cross-Cutting Areas"), tells when to document cross-cutting aspects:

"If

- a finding is evaluated as being more than minor and
- the cause of the finding reflects performance that is recent and
- [the cause of the finding] is directly related to one of the three cross-cutting areas…

then describe the cross-cutting aspect of the finding…"

IMC 0612, "Power Reactor Inspection Reports"

In this section, we clarified what "recent" means:

"If

- a finding is evaluated as being more than minor and
- the cause of the finding reflects performance that is recent (generally, within the previous two years) and
- [the cause of the finding] is directly related to one of the three cross-cutting areas …

then describe the cross-cutting aspect of the finding…"

IMC 0612, “Power Reactor Inspection Reports”

Also to 06.03.c(5), added documentation guidance:

> “Inspectors should provide enough information in the inspection report to enable regional management … to determine whether a cross-cutting theme exists.
>
> … for every finding that has a cross-cutting aspect … document the reasons why that cross-cutting aspect is associated with the finding, using language that parallels the descriptions of the cross-cutting area components in IMC 0305, Section 06.07.c.
>
> For examples, see IMC 0612, Appendix F.”

IMC 0612, Appendix F, "Examples of Cross-cutting Aspects"

- Appendix F examples show how to document cross-cutting aspects.
- Appendix F is still under development.
- To identify cross-cutting aspects, use a 4-step method:
  1. Identify the most-contributing cause of the finding.
  2. Determine whether that cause relates to recent licensee performance.
  3. In the component list, find the component aspect that describes licensee performance that would have prevented or precluded the performance represented by that cause. Note the area.
  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* _____*."* (Use words and phrases from the aspect text.)

Changes Made to Supplemental Inspection Procedures (95001, 95002, 95003)

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

Purpose is to provide assurance that:

- root and contributing causes are understood;
- extent of condition and extent of cause are identified; and
- corrective actions are sufficient to address the root and contributing causes, and to prevent recurrence.

Enhanced to verify that the licensee appropriately considered and addressed safety culture components.

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

To 02.02.e, added a requirement:

- Determine that the root cause evaluation, extent of condition, and extent of cause appropriately considered all of the safety culture components.

To 03.02.e, added guidance:

- Determine whether a weakness in a SC component was a Root Cause or Contributing Cause.
- If so, verify the licensee addressed that weakness through appropriate corrective actions.

If a weakness in a SC component was a Root Cause or Contributing Cause AND the licensee did not recognize and address that cause, this is a substantive weakness in their evaluation.

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

Purpose is to:

- provide assurance that the root causes and contributing causes are understood for individual and collective risk significant performance issues
- independently 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 to address the root causes and contributing causes, and to prevent recurrence

Added new objective 01.03:

To independently determine whether any safety culture component caused or contributed significantly to risk-significant performance issues

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

Added requirements to new 02.05:

- Determine that the root cause evaluation appropriately considered safety culture components
- If a weakness in a safety culture component was a Root Cause or Contributing Cause to the deficiency AND the licensee’s evaluation did not recognize that cause or contribution, then the NRC may request that the licensee complete an “independent” assessment of safety culture

To 03.05

- Added guidance for making the determination required by 02.05
- Added a note that failure to consider a safety culture component isn’t necessarily a violation

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

This procedure will continue to:

- provide an assessment of the extent of risk-significant issues
- assess the adequacy of the licensee’s PI&R programs and processes
- evaluate the adequacy of other programs and processes in the affected strategic performance areas
- provide insight into the overall root and contributing causes of identified performance deficiencies
- determine if the NRC oversight process provided sufficient warning to significant reductions in safety

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

Added a new boundary condition:

- Before the NRC begins this inspection, the licensee has completed … an independent assessment of their safety culture.

Added a new objective:
01.05 To independently assess the licensee's safety culture.

Added new requirements:
02.07 Review the Licensee's Independent Safety Culture Assessment

02.08 Prepare for the NRC's Independent Safety Culture Assessment

02.09 Conduct the NRC's Independent Assessment of Safety Culture

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

Added new guidance:

03.07 Review the Licensee’s Independent Safety Culture Assessment

03.08 Prepare for the NRC’s Independent Safety Culture Assessment

03.09 Conduct the NRC’s Independent Assessment of Safety Culture

IP 95003 Inspection team members will receive detailed “just-in-time” training on inspection methods and techniques

The changes made to the supplemental procedures represent a graded response to plant performance issues relative to safety culture

IP 95001:

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

IP 95002:

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

IP 95003:

- Review the licensee's independent safety culture assessment
- Conduct the NRC's independent assessment of safety culture

Case Studies

Training Objectives

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

I. Consistently identify and document cross-cutting aspects of inspection findings.

How do these changes impact the inspection staff?

What remains the same?

- The basic inspection process is unchanged.
- Prior to completion of an inspection, the inspector should determine:
  - Was there a performance deficiency?
  - What requirement or standard was not met?
  - How was the requirement or standard not met?
  - When was the requirement or standard not met and for how long?
  - How, when, and by whom (licensee or NRC) was the performance deficiency discovered?

What remains the same? (Cont.)

- Prior to completion of an inspection, the inspector should determine: (Cont.)
  - What is the apparent significance of the issue (actual or potential consequences, potential for impacting regulatory process, willfulness)?
  - What information is necessary to complete the SDP (if applicable)?
  - What was the cause(s) for the performance deficiency?
  - What corrective actions have been taken or are planned?
  - Did the licensee place the issue in its corrective action program?

What remains the same? (Cont.)

- Characterization of significance of inspection findings remains unchanged

What changed?

- Characterization of the cross-cutting aspect of inspection findings
  - The causes for the performance deficiency are compared to the cross-cutting aspects described in IMC 0305
  - The cause that provides the most meaningful insight into the performance deficiency is identified
- Documentation
  - Describe the cross-cutting aspect of the inspection finding using language that parallels the description in IMC 0305

Method

- Divide into four groups
- Each group select a spokesperson
- Each group review one of the four case studies
- For the assigned case study, the group should develop
  - An inspection finding
  - A list of likely causes and significant contributors
  - A description of the associated cross-cutting aspect
- Group spokesperson present results

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

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

Causes and Significant Contributors:

Maintenance personnel did not implement expected human error prevention techniques.

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

Case Study #1

Cross-Cutting Aspect:

The finding had a cross-cutting aspect in the area of human performance 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

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

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

Case Study #2

Cross-Cutting Aspect:

The finding had a cross-cutting aspect in the area of problem identification and resolution 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

Causes and Significant Contributors:

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

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.

Case Study #3

Inspection Finding:

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

Cross-Cutting Aspect:

The finding had a cross-cutting aspect in the area of problem identification and resolution 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.

Case Study #4

On November 15, 2005, pipe fitters were instructed to cut out and sand a section of the RWCU system piping. Although the piping was known to be internally contaminated, the job was conducted "clean" (non-contaminated), and therefore the RWP did not require that workers wear personnel contamination clothing. After cutting through several sections of piping to remove it, the workers left the radiologically protected area. When exiting the area, the workers alarmed the personal contamination monitors at the radiologically protected area (RPA) egress. The licensee found significant skin contamination on one of the workers, and another worker received an intake of radioactive material above the licensee's administrative limits.

Licensee follow up confirmed that the RWP for the job did not require personal protective clothing. Discussions with the health physicist who developed the RWP indicated that he determined that no protective clothing was necessary based on previous RWPs written for removal of the piping that did not require personal protective clothing and the fact that the contamination on the piping was internal. He also indicated that conflicting information existed regarding whether the workers would need to cut the piping to remove it or whether it could simply be unbolted. While he questioned whether protective clothing was needed based on the potential difference in the scope of the work, he did not raise the issue to radiation protection management because radiation protection supervisor had indicated in the shift turnover meeting that the piping must be replaced on that shift, that the number of questions raised regarding the job had delayed the work, and that questions regarding the safety of the work would be reflected in job performance reviews.

Case Study #4

Inspection Finding:

A finding of very low safety significance was identified for the licensee's failure to understand and plan the scope of radiological work to be performed. This is a performance deficiency associated with implementation of Technical Specification required procedures for planning and conduct of radiological work. These specifications are to be implemented via the RWP program. The program must provide measures to limit internal and external radiation exposures including protective clothing, respiratory protection, etc., as applicable based on evaluated radiological conditions.

Case Study #4

Causes and Significant Contributors:

- Inadequate radiation work permit which did not provide adequate instruction for the use of personal protective equipment for the specific job.

- The environment for raising concerns contributed to the inadequate radiation work permit, in that, behaviors and interactions did not encourage the free flow of information related to raising nuclear safety issues.

Additional Review Necessary

To determine whether the issue relates to an environment that is not conducive to raising concerns rather than an individual performance issue, the inspector should determine whether:

- The referenced discussion at the shift turnover meeting occurred.

- Other individuals who attended the shift turnover heard the statement made by the manager and whether other individuals perceived the statement to discourage the raising of safety concerns.

Additional Review Necessary (Cont.)

- If information exists which indicates that a statement was made which discouraged the raising of safety concerns, the inspector should obtain information regarding whether the perception that the management behavior discouraged individuals from raising safety issues exists beyond:
  - the individuals at the meeting;
  - the work group associated with individuals who attended the meeting;
  - the level of the organization of the individuals at the meeting; and
  - the department where the individuals who attended the meeting work.

  Consideration should be given to the roles, responsibilities, and job functions of the impacted individuals in determining whether the issue is isolated.

Additional Review Necessary (Cont.)

- The licensee was aware of the behavior which discouraged the concerns. If so, whether the actions taken by the licensee were of adequate scope and depth to address the issue.

Additional Reviews Should Not Involve

- Interviews with large numbers of employees from several plant departments
- Interviews with individuals regarding the SCWE not associated with the finding

Case Study #4

Cross Cutting Aspect:

The finding has a cross-cutting aspect in the area of safety conscious work environment because the supervisor's behavior and interaction with the workers adversely impacted the free flow of information related to nuclear safety which significantly contributed to the inadequate planning for the radiological work on the reactor water cleanup system.

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 and should be handled in accordance with Management Directive 8.8, “Management of Allegations.” Regional management should be consulted.
- Wrongdoing
  - Inspectors should be cognizant of indications of willfulness, such as individuals who deliberately violate plant procedures or direct others to violate procedures. Such issues should also be considered allegations and handled in accordance with Management Directive 8.8.

Take Away

- The basic inspection process remains unchanged
- Inspection follow-up should continue to be commensurate with the significance of the issue
- Inspectors should not use the list of cross-cutting aspects as an inspection checklist

Take Away (Cont.)

- NRC will not be evaluating a licensee's safety culture until their performance puts them in the Multiple/Repetitive Degraded Cornerstone Column of the Action Matrix
- If a substantive cross-cutting issue is identified, it will be with one of the three cross-cutting areas not safety culture
- The number of identified substantive cross-cutting issues is not expected to significantly increase or decrease due to the enhancements to the Reactor Oversight Process

What is success?

- Consistent implementation of the revised Manual Chapters and inspection 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