

Assessing safety culture in DOE facilities

EFCOG Meeting Handout

EFCOG/DOE Safety Culture Task Team
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Approved for use by John McDonald
Task Team Co-Chair

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1. INTRODUCTION

This document describes methods to assess safety culture and is intended to be a flexible resource for DOE contractors. The structure of this document presents an overview of safety culture assessment methods with additional information provided in attachments. References are provided if more information is needed. This document should be used with a companion EFCOG resource document that describes tools to improve safety culture.

2. ASSESSING SAFETY CULTURE

Assessment of an organization's safety culture provides a measure of the effectiveness of the ISMS. Therefore, periodically assessing organizations to identify enhancements or adjustments that could strengthen the safety culture will have the effect of increasing the implementation and improving the effectiveness of ISM.

3. METHODS OF ASSESSING SAFETY CULTURE

Various activities can be used to assess an organization's safety culture. These include direct observations, assessments, Causal Factors or Root Cause Analysis, surveys, interviews, review of key safety culture related processes, performance indicator monitoring and trending, and VPP type assessments.

- A. **Direct observations of work place behavior** may provide objective information regarding the effectiveness of training, management effectiveness, accountability, and behavior expectations. Observed management behaviors may indicate whether a supervisor is receptive to concerns and supports and rewards employees for raising concerns.

Direct observation of employees in the work environment can provide valuable insights into the employees' buy-in to the ISMS and their questioning attitude and willingness to challenge perceived unsafe behavior.

One advantage of these direct observations is that you can watch the culture as it enacts itself, thus it is possible for the observer to confirm results obtained from interviews and/or surveys. Observations provide new information on cultural phenomena, but they cannot be quantified and used for statistical purposes. Be careful as there is the risk of over-generalization from too few observations.

- B. **Causal Factors Analyses or Root Cause Analyses** are useful tools to evaluate an organization's safety culture because they start with façade of a strong safety culture being stripped away because obviously a serious incident or accident is being investigated. Key to successfully assessing safety culture using these techniques are good investigation lines of inquiry. Some suggested lines of inquiry are provided in Attachment 4.
- C. **Surveys** can be useful tools and complement other tools used to assess safety culture. The extent of such surveys will vary depending on the size and organizational structure of the contractor. Survey results can indicate employee

beliefs, attitudes, and satisfaction with key attributes and suggests ways to strengthen the safety culture. Pre-survey communications can be a very important aspect of such tools. Survey considerations are included in Attachment 5.

D. **Face-to-face interviews** have a significant role to play in assessment of culture. They are commonly used as a means of providing data that will assist survey design or to explore qualitatively the issues emerging from the written survey. An advantage of the interview is that the respondent can use his or her own words and expressions. It also allows for a greater flexibility in questioning, with the possibility for follow-up questions, making it easier to get to the deeper meanings and to clarify ambiguities in meaning. A difficulty with interviews is that they are not directly comparable with one another. They are also relatively time consuming, usually based on only a limited sample. This can make it difficult to generalize results for the whole organization. Interviews can provide more depth than normally available using a survey. Interview considerations are included in Attachment 6.

E. **Review of key safety culture related processes** such as:

- Those used for fixing problems (e.g., the corrective action program)
- Alternative processes for raising concerns (e.g., employee concerns program, ombudsman, DPO)
- Human resources for work environment concerns, disciplinary action, etc.
- Legal cases for Department of Labor cases, etc.
- DOE assessment findings or observations
- Lessons learned processes including use of both internal and external operating experience
- Whether or not employees feel free to identify issues using the various processes available to them, whether or not these processes are viewed as effective, and why or why not
- Effectiveness of the root cause analyses for significant issues and the effectiveness of associated corrective actions
- Use of self-assessments
- Worker participation in work planning and feedback

Review of key safety culture related processes is typically done by reviewing documentation. Organizations within the DOE generally possess an extensive hierarchy of documentation. For example, an important component of a sound safety culture is clear roles and responsibilities. A review of documents will give some indication of whether these are satisfactory.

Employees may have been involved in the preparation of certain documents that are relevant to their work. This demonstrates that the organization recognizes that

employee involvement is desirable in achieving better performance at work, and in achieving better safety at work.

Safety culture cannot be assessed by only reviewing documentation but the documentary evidence can reinforce information gained from other methods of assessment.

- F. **Performance indicators** provide regular feedback on the health of an organization's safety culture as opposed to assessments which represents a snapshot in time. Although no single indicator is sufficient in itself to identify the state of the safety culture, monitoring trends in various safety culture performance indicators as a function of time may provide insights into strengths and weaknesses. The complexity and number of useful performance indicators depend on the size and organizational structure of the organization. A practical way forward is to identify a portfolio of indicators that measure the important characteristics of a positive safety culture as provided in the three focus areas of this document. Attachment 7 contains considerations and examples of culture related performance indicators. (See reference 5)
- G. **VPP assessments** may be a source of information regarding the culture of an organization. The assessments generally include a high level of worker participation which can provide a different perspective than typical assessments. VPP assessment criteria include certain cultural aspects related to The Team Focus Areas such as employee involvement which could provide valuable insights into organizational safety culture. For more information, refer to reference 3.
- H. **Stream analysis** is a tool used by the commercial nuclear industry and some DOE contractors as a means of understanding the organizational drivers for a dysfunctional culture. The tool follows the work of Dr. Jerry Porras, and is accompanied by a proprietary program to assist management in characterizing and relating organizational drivers. For complex organizations, the tool is useful in helping the management team understand the three to five main drivers of dysfunction within their organizations. INPO and participating DOE contractors can be consulted on how to implement this tool.
- I. An **HPI Self Assessment** may provide insight into an organizations culture using various techniques and interviews to obtain data. This technique is described in detail in Reference 6.

Note: References 1 and 2 were used to develop most of the activities identified in Section 3.

4. INDUSTRY EXPERIENCE ON SAFETY CULTURE ASSESSMENT

Safety culture assessments have been conducted both domestically and internationally. It is important to learn from others on what to watch out for when conducting a culture

assessment. Some lessons learned on safety culture assessment from related industries are discussed in Attachment 8 and Reference 1.

5. POST ASSESSMENT CONSIDERATIONS

Strengthening safety culture can take years. It is important to recognize this and have appropriate methods in place to ensure worker involvement, communication of results, actions are completed as expected, and follow-up assessments are conducted. Communication of results and follow-up with the workforce is an important part of the assessment process that is often overlooked. Attachment 9 and Reference 1 contain considerations after the assessment is completed.

REFERENCES

1. IAEA TECDOC-1321 entitled “Self-assessment of safety culture in nuclear installations” IAEA Key Practical Issues in Strengthening Safety Culture (2002), INSAG-15
2. IAEA TECDOC-1329 entitled “Safety culture in nuclear installations” Guidance for use in the enhancement of safety culture
3. DOE VPP Website <http://www.hss.energy.gov/healthsafety/wsha/vpp/>
4. DOE M450.4-1, Integrated Safety Management System Manual
5. NRC REGULATORY ISSUE SUMMARY 2005-18, Guidance for Establishing and Maintaining a Safety Conscious Work Environment
6. HPI Implementation Tools Project Website http://efcog.org/wg/ism_pmi/ism_pmi_hpi/EFCOG_DOE_HPI_Tools.htm

Attachment 1
ISMS Safety Culture Focus Areas and Associated Attributes

- Leadership
 - Clear expectations and accountability
 - Management engagement and time in field
 - Risk-informed, conservative decision making
 - Open communication and fostering an environment free from retribution
 - Demonstrated safety leadership
 - Staff recruitment, selection, retention, & development
- Employee/Worker Engagement
 - Personal commitment to everyone's safety
 - Teamwork and mutual respect
 - Participation in work planning and improvement
 - Mindful of hazards and controls
- Organizational Learning
 - Performance monitoring through multiple means
 - Use of operational experience
 - Trust
 - Questioning attitude
 - Reporting errors and problems
 - Effective resolution of reported problems

Attachment 2

TASK TEAM ATTRIBUTE/ISMS CROSSWALK

The attributes provided below were obtained from the ISM Manual (DOE M 450.4-1, Reference 4) by cross-walking the ISM attributes against the three safety culture focus areas. The Team provides these attributes to help organizations develop lines of inquiry to determine if they see the signs they would expect to see if they indeed had a strong safety culture. It is up to the sites to determine their specific measures of a strong safety culture. The attributes are derived directly from the ISM Manual to avoid providing additional attributes and possibly causing confusion. The Team determined that sufficient attributes already exist in published DOE documents.

Leadership

Clear expectations and accountability

- Line managers provide ongoing reviews of performance of assigned roles and responsibilities to reinforce expectations and ensure that key safety responsibilities and expectations are being met.
- Personnel at all levels of the organization are held accountable for shortfalls in meeting standards and expectations related to fulfilling safety responsibilities. Accountability is demonstrated both by recognition of excellent safety performers as well as identification of less-than-adequate performers. In holding people accountable, in the context of a just culture, managers consider individual intentions and the organizational factors that may have contributed.
- Willful violations of requirements are rare, and personnel and organizations are held strictly accountable in the context of a just culture. Unintended failures to follow requirements are promptly reported, and personnel and organizations are given credit for self-identification and reporting of errors.

Management engagement and time in field

- Line managers are in close contact with the front-line; they pay attention to real-time operational information. Maintaining operational awareness is a priority. Line managers identify critical performance elements and monitor them closely.
- Line managers spend time on the floor. Line managers practice visible leadership in the field by placing “eyes on the problem,” coaching, mentoring, and reinforcing standards and positive behaviors. Deviations from expectations are corrected promptly and, when appropriate, analyzed to understand why the behaviors occurred.
- Managers set an example for safety through their personal commitment to continuous learning and by their direct involvement in high-quality training that consistently reinforces expected worker behaviors.

Risk-informed, conservative decision making

- Individuals are systematic and rigorous in making informed decisions that support safe, reliable operations. Workers are expected and authorized to take conservative actions when faced with unexpected or uncertain conditions. Line managers support and reinforce conservative decisions based on available information and risks.
- Individuals are intolerant of conditions or behaviors that have the potential to reduce operating or design margins. Anomalies are thoroughly investigated, promptly mitigated, and periodically analyzed in the aggregate. The bias is set on proving work activities are safe before proceeding, rather than proving them unsafe before halting. Personnel do not proceed and do not allow others to proceed when safety is uncertain.

Open communication and fostering an environment free from retribution

- Individuals promptly report errors and incidents. They feel safe from reprisal in reporting errors and incidents; they offer suggestions for improvements.
- A high level of trust is established in the organization. Reporting of individual errors is encouraged and valued. A variety of methods are available for personnel to raise safety issues, without fear of retribution.

Demonstrated safety leadership

- Line managers (from the Secretary to the DOE cognizant Secretarial Officer to the DOE Field Office Manager to the Contractor Senior Manager to the front-line worker) understand and accept their safety responsibilities inherent in mission accomplishment. Line managers do not depend on supporting organizations to build safety into line management work activities.
- Line managers have a clear understanding of their work activities and their performance objectives, and how they will conduct their work activities safely and accomplish their performance objectives.
- Line managers demonstrate their commitment to safety. Top-level line managers are the leading advocates of safety and demonstrate their commitment in both word and action. Line managers periodically take steps to reinforce safety, including personal visits and walkthroughs to verify that their expectations are being met.
- The organization demonstrates a strong sense of mission and operational goals, including a commitment to highly reliable operations, both in production and safety. Safety and productivity are both highly valued.
- Line managers are in close contact with the front-line; they pay attention to real-time operational information. Maintaining operational awareness is a priority. Line managers identify critical performance elements and monitor them closely.

Staff recruitment, selection, retention, & development

- The organization values and practices continuous learning, and requires employees to participate in recurrent and relevant training and encourages educational experiences to improve knowledge, skills, and abilities. Professional and technical growth is formally supported and tracked to build organizational capability.
- Training to broaden individual capabilities and to support organizational learning is available and encouraged – to appreciate the potential for unexpected conditions; to recognize and respond to a variety of problems and anomalies; to understand complex technologies and capabilities to respond to complex events; to develop flexibility at applying existing knowledge and skills in new situations; to improve communications; to learn from significant industry and DOE events.
- People and their professional capabilities, experiences, and values are regarded as the organization’s most valuable assets. Organizational leaders place a high personal priority and time commitment on recruiting, selecting, and retaining an excellent technical staff.
- The organization maintains a highly knowledgeable workforce to support a broad spectrum of operational and technical decisions. Technical and safety expertise is embedded in the organization. Outside expertise is employed when necessary.
- The organization is able to build and sustain a flexible, robust technical staff and staffing capacity. Pockets of resilience are established through redundant resources so that adequate resources exist to address emergent issues. The organization develops sufficient resources to rapidly cope and respond to unexpected changes.

Employee/Worker Engagement

Personal commitment to everyone’s safety

- Responsibility and authority for safety are well defined and clearly understood as an integral part of performing work.
- The line of authority and responsibility for safety is defined from the Secretary to the individual contributor. Each of these positions has clearly defined roles, responsibilities, and authorities, designated in writing and understood by the incumbent.
- Individuals outside of the organization (including subcontractors, temporary employees, visiting researchers, vendor representatives, etc.) understand their safety responsibilities.
- Organizations know the expertise of their personnel. Line managers defer to qualified individuals with relevant expertise during operational upset conditions. Qualified and capable people closest to the operational upset are empowered to make important decisions, and are held accountable justly.

Teamwork and mutual respect

- Open communications and teamwork are the norm. People are comfortable raising and discussing questions or concerns. Good news and bad news are both valued and shared.

Participation in work planning and improvement

- Individuals understand and demonstrate responsibility for safety. Safety and its ownership are apparent in everyone's actions and deeds. Workers are actively involved in identification, planning, and improvement of work and work practices. Workers follow approved procedures. Workers at any level can stop unsafe work or work during unexpected conditions.

Mindful of hazards and controls

- Organizational safety responsibilities are sufficiently comprehensive to address the work activities and hazards involved.
- Work hazards are identified and controlled to prevent or mitigate accidents, with particular attention to high consequence events with unacceptable consequences. Workers understand hazards and controls before beginning work activities.
- Individuals are mindful of the potential impact of equipment and process failures; they are sensitive to the potential of faulty assumptions and errors, and demonstrate constructive skepticism. They appreciate that mindfulness requires effort.

Organizational Learning

Performance monitoring through multiple means

- Line managers maintain a strong focus on the safe conduct of work activities. Line managers maintain awareness of key performance indicators related to safe work accomplishment, watch carefully for adverse trends or indications, and take prompt action to understand adverse trends and anomalies.
- Performance assurance consists of robust, frequent, and independent oversight, conducted at all levels of the organization. Performance assurance includes independent evaluation of performance indicators and trend analysis.
- Line managers throughout the organization set an example for safety through their direct involvement in oversight activities and associated performance improvement.
- The organization actively and systematically monitors performance through multiple means, including leader walk-arounds, issue reporting, performance indicators, trend analysis, benchmarking, industry experience reviews, self-

assessments, and performance assessments. Feedback from various sources is integrated to create a full understanding.

- Line managers are actively involved in all phases of performance monitoring, problem analysis, solution planning, and solution implementation to resolve safety issues.

Use of operational experience

- Operating experience is highly valued, and the capacity to learn from experience is well developed. The organization regularly examines and learns from operating experiences, both internal and in related industries.
- Organization members convene to swiftly uncover lessons and learn from mistakes.

Trust

- A high level of trust is established in the organization. Reporting of individual errors is encouraged and valued. A variety of methods are available for personnel to raise safety issues, without fear of retribution.
- Credibility and trust are present and continuously nurtured. Line managers reinforce perishable values of trust, credibility, and attentiveness. The organization is just – that is, the line managers demonstrate an understanding that humans are fallible and when mistakes are made, the organization seeks first to learn as opposed to blame. The system of rewards and sanctions is aligned with strong safety policies and reinforces the desired behaviors and outcomes.

Questioning attitude

- Line managers are skilled in responding to employee questions in an open, honest manner. They encourage and appreciate the reporting of safety issues and errors. They do not discipline employees for the reporting of errors. They encourage a vigorous questioning attitude toward safety, and constructive dialogues and discussions on safety matters.
- Individuals cultivate a constructive, questioning attitude and healthy skepticism when it comes to safety. Individuals question deviations, and avoid complacency or arrogance based on past successes. Team members support one another through both awareness of each other's actions and constructive feedback when necessary.

Reporting errors and problems

- A high level of trust is established in the organization. Reporting of individual errors is encouraged and valued. A variety of methods are available for personnel to raise safety issues, without fear of retribution.

Effective resolution of reported problems

- Organizational systems and processes are designed to provide layers of defenses, recognizing that people are fallible. Prevention and mitigation measures are used to preclude errors from occurring or propagating. Error-likely situations are sought out and corrected, and recurrent errors are carefully examined as indicators of latent organizational weaknesses. Managers aggressively correct latent organizational weaknesses and measure the effectiveness of actions taken to close the gaps.
- Results from performance assurance activities are effectively integrated into the performance improvement processes, such that they receive adequate and timely attention. Linkages with other performance monitoring inputs are examined, high-quality causal analyses are conducted, as needed, and corrective actions are tracked to closure with effectiveness verified to prevent future occurrences.
- Processes are established to identify and resolve latent organizational weaknesses that can aggravate relatively minor events if not corrected. Linkages among problems and organizational issues are examined and communicated.
- Frequent incident reviews are conducted promptly after an incident to ensure data quality to identify improvement opportunities.
- Vigorous corrective and improvement action programs are in place and effective. Rapid response to problems and closeout of issues ensures that small issues do not become large ones. Managers are actively involved to balance priorities to achieve timely resolutions.
- Expertise in causal analysis is applied effectively to examine events and improve safe work performance. High-quality causal analysis is the norm. Causal analysis is performed on a graded approach for major and minor incidents, and near-misses, to identify causes and follow-up actions. Even small failures are viewed as windows into the system that can spur learning.
- Performance improvement processes encourage workers to offer innovative ideas to improve performance and to solve problems.

Reference: DOE M450.4-1, Integrated Safety Management System Manual

Attachment 3

INITIAL ASSESSMENT CONSIDERATIONS

Building ownership

An important step before starting an assessment is to invest time in building commitment among in the organization. It is common for a survey to run into problems because of lack of support. An assessment may be perceived as threatening by many individuals. Senior managers may feel threatened by potential revelations about organizational attitudes or morale. Line managers may fear that the assessment will reveal their managerial shortcomings. Employees may be concerned about the use or lack of use that may be made of the findings. To be effective, an assessment must be seen to have the support of senior management. If such support is not evident, this will encourage opposition from those who feel threatened by the process or the potential findings. There needs to be formal communication early in the process to middle managers, the workforce and trade unions on the objectives and how the results will be used. A letter from the head of the organization can be used to allay any concerns to each employee stating the purpose, the procedures that will apply, and how the results will be used.

Employee Involvement

Because of the need to build ownership and the complexity of assessing safety culture, it may be beneficial to include representatives from key areas of the organization on the assessment team. Individuals should have the appropriate skills and motivation to participate.

Initial data collection

Initial data collection has a number of purposes:

- To ensure that the objectives are appropriate
- To understand the context within which the assessment will be conducted
- To confirm the intended scope of the assessment
- To ensure the assessment focuses on important issues

Data collection is best conducted by means of loosely structured interviews or group sessions. For any kind of substantial assessment, group sessions are preferable. The groups should comprise a broad representation of the population, although at this stage there is no need to have a statistically representative sample. Each group should comprise about 10–12 individuals. Some thought should be given as to how you combine different employee groups within the organization, e.g. managers and non-managers, people from different functions, experienced employees and newcomers etc. The role of the data collector in these groups is to introduce the purpose of the assessment, to seek the group's views on the issues, and to act as a facilitator for the discussions.

There may be value in identifying artifacts, espoused values, and basic assumptions using the Three Level Model. This may identify areas where the assessment should probe in more depth to identify areas of misalignment that are hurting organizational

effectiveness. This exercise is best conducted with the assistance of a facilitator who understands the concept of culture, and who is not a member of the organization that is undertaking the cultural self-assessment. To do this, take each safety culture characteristic in turn, and identify the particular artifacts, espoused values and basic assumptions that are relevant to that characteristic. Some artifacts, espoused values and basic assumptions will be associated with more than one safety culture characteristic.

To identify artifacts, identify artifacts that characterize the organization. Ask people to recall what they noticed when they first joined the organization, and whether what they noticed is still present. Write down all the items that are identified. Do not restrict the identification of artifacts at this stage to safety-related artifacts, although you may wish to place an asterisk against any in this category to facilitate later identification.

Identify some of the espoused values that the organization holds. Some may already have been mentioned when identifying artifacts. When this happens, list them under espoused values. Espoused values are often stated in formal documents such as strategic plans where they may be included when vision and mission statements are given. Again at this stage do not restrict contributions to safety-related espoused values, but you can highlight any that are in this category.

Identify how the espoused values may be linked to the various artifacts that have been listed. For example, teamwork may be an espoused value, but at the artifact level the reward system is based on competition between individuals. When there is an inconsistency between what is observed at the artifact level and espoused values, you have probably identified an area for additional assessment.

By identifying the inconsistencies and conflicts between overt behavior, policies, rules, practices and the espoused values, you will gradually identify the deeper levels of the organizational culture. You may begin to see patterns among the basic assumptions that are driving the system, and which explain the presence of most of the artifacts that you have listed. If you think that there may be cultural sub-groups that have their own basic assumptions, you can test this by forming groups that will reflect possible differences.

Assess the pattern of basic assumptions that you have identified in terms of how they help or hinder you in accomplishing safety goals. Since culture is very difficult to change, concentrate on identifying the assumptions that can help you. Try to see your culture as a positive force to be used rather than a constraint to be overcome. If you identify particular assumptions that you consider to be real constraints on improving safety, they should receive additional assessment.

Assessment Criteria

Examples of assessment criteria relative to Task Team Focus areas are:

Leadership:

- SRB evaluates safety impact of organizational changes
- Effectiveness of change is monitored so as not to erode trust or safety
- Management plant walk-throughs result in safety improvements
- Reviews performed by corporate and external industrial & nuclear oversight groups are of appropriate depth and breath
- Personnel/Teams are rewarded for safety behaviors and achievements
- Senior management incentive programs reward actions which promote long term plant safety and performance

Employee/Worker Engagement

- Alternate avenue processes to raise issues are effectively utilized
- Motive is never ascribed to an employee raising an issue
- Effectiveness of corrective actions to address HIRD concerns

Organizational Learning

- Problem identification and resolution effectiveness assessments/surveys are conducted regularly.
- Issues are documented, tracked and trended in the Problem Reporting System and resolved in a timely and effectively manner
- Operating experience is effectively used to prevent events

References:

IAEA TECDOC-1321 entitled “Self-assessment of safety culture in nuclear installations”
IAEA Key Practical Issues in Strengthening Safety Culture (2002), INSAG-15

IAEA TECDOC-1329 entitled “Safety culture in nuclear installations” Guidance for use
in the enhancement of safety culture

Attachment 4

LINES OF INQUIRY FOR SAFETY CULTURE ASSESSMENTS IN CFAS

Example lines of inquiry are provided below¹ as culture evaluation criteria which can be used in a Causal Factors Analysis (CFA). The results of these lines of inquiry need to be reviewed against the organization's expectations of ISM. Pending the outcome of this evaluation, the organization may take corrective actions to attempt to improve its safety culture.

A. Norms (What is done during every day operations). Lines of inquiry include:

A norm is a behavior that typically occurs in a specified situation. Norms include language, traditions, rituals, customs, and similar behaviors. For example, saying grace before a meal is a norm in some families.

- Observing the degree to which procedures are followed for all operations (technical and administrative) as evidenced by the procedures being out and read by the operator
- Determining the degree of questioning of assigned work
- Evaluating the ability and willingness to recognize and report events
- Observing how knowledgeable the worker is of the barriers put in place to protect him and his co-workers
- Evaluating the degree and consistency of considering human performance error precursors and barriers in pre-job discussions before work is begun
- Determining the consistency and quality of pre-job briefs in that they include physical walk-downs of the job site while planned work is being discussed

B. Institutions (How things are done in the organization). Lines of inquiry include:

Institutions are the formal structures and processes by which an organization carries out its activities across the entire organization in a consistent fashion.

- Evaluating the degree and effectiveness of training
- Evaluating the use and effectiveness of Work Planning and Control
- Determining the degree to which the Safety Management process is used in everyday work
- Evaluating the degree to which the Operating Experience Program is read and used by workers and management in everyday work planning
- Determining the coverage and effectiveness of self-assessments and management assessments in identifying problems before they reach the event stage
- Observing the level degree of ownership of the Organization's process
- Evaluating the willingness and thoroughness to take and follow through with all corrective actions identified in assessments and causal analysis investigations

¹ Courtesy of Dr. William R. Corcoran and B & W Pantex

C. Physical Items (Visible signs around the Organization). Lines of inquiry include:

Characteristic physical items are those tangible entities that are characteristic of a culture. These items may have a variety of origins and purposes, but all are typical of the culture in which they are found. An important subset of physical items includes signs, symbols, totems, and similar meaningful objects.

- Observing the proper use of warning/caution signs (displayed while the hazard is present and removed when hazard is removed to reduce complacency)
- Observing whether proper procedures are provided to the worker which actually work and provide the necessary level of protection (have the worker demonstrate the use of the procedure to perform the work)
- Observing the existence and use of administrative and engineering controls
- Evaluating the effective use of a corrective action tracking system such that items are verified implemented and effective before closeout is completed
- Determining the existence of safety analysis reports for the various operations performed, evaluating their practicality, evaluating their readability/understandability to the worker and the knowledge of the worker and management of the content of the reports
- Observing the proper selection and use of personal protective equipment (PPE)

NRC Evaluation of Safety Culture

A. Problem Identification and Resolution

Corrective Action Program – Lines of inquiry include:

- Evaluating whether issues potentially impacting nuclear safety are promptly identified, fully evaluated, and have timely actions taken commensurate with significance
- Evaluating whether the organization implements corrective actions with low threshold for identifying issues

Operating Experience – Lines of inquiry include:

- Evaluating whether the organization systematically collects, evaluates, and communicates relevant operating experience to affected stakeholders in a timely manner
- Evaluating whether the organization implements and institutionalizes operating experience through changes to procedures, equipment, and training programs

Self and Independent Assessments – Lines of inquiry include:

- Evaluating whether assessments are of sufficient depth, are comprehensive, are objective and are self-critical
- Evaluating whether the organization periodically assesses effectiveness of oversight programs

B. Human Performance

Decision-making – Lines of inquiry include:

- Evaluating whether the organization uses systematic process to make risk-significant decisions by formally defining, communicating, and implementing decision authority
- Evaluating whether the organization uses conservative assumptions and requires demonstration that proposed action is safe rather than proven unsafe

Resources – Lines of inquiry include:

- Evaluating whether the organization ensures personnel, equipment, procedures and other resources are available and adequate to assure nuclear safety
- Evaluating whether complete, accurate, and up-to-date design documents such as as-builts, procedures, and work packages are available

Work Control – Lines of inquiry include:

- Evaluating whether the organization appropriately plans work by incorporating job-site conditions, organization structures, systems, and components, human-system interfaces

Work Practices – Lines of inquiry include:

- Evaluating whether the organization communicates human error prevention techniques such as pre-job briefs, peer checking, and proper documentation of work

C. Safety Conscious Work Environment

Environment for Raising Concerns – Lines of inquiry include:

- Evaluating whether an environment exists in which employees feel free to raise concerns to their management, their customers, or external regulators, without retaliation; and employees are encouraged to raise such concerns
- Evaluating whether behaviors and interactions encourage free flow of information related to nuclear safety issues, differing professional opinions, and identifying issues in the corrective action program and through self-assessments

Preventing, Detecting, and Mitigating Perceptions of Retaliation – Lines of inquiry include:

- Evaluating whether the organization has a policy prohibiting harassment and retaliation for raising nuclear safety concerns exists and is enforced
- Evaluating whether all persons are aware that harassment and retaliation for raising safety concerns will not be tolerated

D. Organizational Issues

Accountability – Lines of inquiry include:

- Evaluating whether the organization maintains accountability for important safety decisions with systems and sanctions, aligned with safety policies, and the organization reinforces behaviors and outcomes to reflect safety as an overriding priority

Continuous Learning Environment – Lines of inquiry include:

- Evaluating whether the organization provides adequate training and knowledge transfer to ensure technical competency

Organizational Change Management – Lines of inquiry include:

- Evaluating whether management uses a systematic process for planning, coordinating, and evaluating the safety impacts of decisions related to major changes in organizational structures and functions, leadership, policies, programs and resources.

Safety Policies – Lines of inquiry include:

- Evaluating whether policies require and reinforce that individuals have the right and responsibility to raise nuclear safety issues through available means to include avenues outside their chain of command.

Attachment 5

SURVEY CONSIDERATIONS

Advantages/Disadvantages

The written survey can provide a number of benefits:

- Information can be obtained that is representative of the whole or parts of an organization
- The information can be quantified and results compared between groups, and over time
- They are also relatively easy to administer minimizing work disruption and encouraging a high response rate
- Provides clear data, which can be rapidly analyzed
- Respondents can remain anonymous encouraging them to express critical views without fear of adverse consequences
- Provides a precise and reliable reflection of the total population

Potential drawbacks to the written survey are:

- Answers to questions may not reveal the full depth of unconscious assumptions that underpin beliefs, values and attitudes
- Poorly worded questions can produce misunderstanding, or inadvertently prompting the more socially acceptable answer
- With questions generally limited to certain categories, it is also difficult to obtain information about the various aspects of a situation. This can make ambiguities difficult to deal with.
- Authoritative statistics can be misleading
- It is a relatively blunt instrument

Potential Topics

The following are potential topics for surveys:

- Awareness of company policies and practices on raising concerns and avenues available for raising concerns
- Management behaviors encouraging the workforce to raise concerns
- Workers' willingness to raise concerns
- Effectiveness of the processes available (normal and alternative) for raising concerns
- Management's ability to detect and prevent retaliation for raising concerns
- Behaviors associated with specific culture related attributes

Question format

There are various ways to structure survey questions apart from the agree/disagree format. Survey questions can be divided into two broad categories:

- those exploring attitudes or opinions
- those seeking some form of factual information

The following are some considerations in generating survey questions:

- The format of questions throughout the survey need not always be the same.
- There are benefits in having some variety to discourage “automatic” responses to questions. This can result in respondents consistently hovering around the midpoint of a repetitive series of scales. By varying the format of questions, it is possible to encourage respondents to pause momentarily before addressing each question. Each specific question will then be better considered on its individual merits.
- There should be a balance between encouraging respondents to view each question independently and avoiding an overall format that appears unduly disruptive or confusing.
- Phrase questions about a topic in a form that a “disagree” response that would be considered positive will help identify respondents who complete the survey in a mechanical and unthinking way.
- To help overcome the weaknesses of the purely quantitative survey, employee surveys can be a mixture of closed multiple-choice questions, and questions that seek a narrative response from the respondent. The advantage of this approach is that it maintains many of the benefits of the quantitative survey, while also providing a means of explaining more complicated issues. It will also be more difficult to analyze these responses.
- People will often assume a common understanding of words or phrases where no such commonality exists.
- One issue should be addressed with one question.
- Problems can arise when the phrasing of the question implies an assumption that is not justified by the evidence available to you.
- Allow for the possibility that the respondent does not know.
- A question may lead the respondent towards a particular answer. Positive statements about a particular aspect of an organization may suggest to a respondent that a positive attitude to this issue is preferred. A mixture of positive and negative statements which do not suggest any particular preference helps prevent tendency to answer questions a certain way. Neutral wording in a question should also be used.

Building the survey

The following should be considered when constructing the survey:

- It is important that senior managers and line managers maintain their commitment to the survey by being involved in the design or selection of the survey instrument.

- The longer and more detailed the survey, the more likely you are to encounter resistance from potential respondents. There needs to be a balance. It is recommended that the number of questions be in the range 50 to 80.
- Some personal information about the respondent may be required to assist with the analysis. The information may be about a department, to which the respondent belongs, grade, age gender, length of service. Care must be taken to avoid collecting information that will reveal the respondent's identity, e.g. there may be one female engineer aged 25 in a department. The relative importance of personal information will depend on the issues under consideration.
- A series of questions can be developed for each attribute. To avoid creating a lengthy survey, it is suggested that about 15–20 attributes be selected, and about four questions or statements generated for each selected characteristic. The Task Team Focus Areas and associated attributes should be used to select the subset of characteristics that will be used to generate questions.
- Make sure that there are clear instructions that indicate how the survey is to be completed. Provide some specific examples of how a question should be completed. The most effective surveys are those where respondents are able to proceed easily through the survey from the first question to the last, and are not required to skip a number of questions.
- Lay out the survey as attractively as possible. It is often possible, for a relatively small cost, to make dramatic improvements to the design that may, in turn, have a very significant impact on the level of response.

Piloting the survey

Piloting will reveal unclear or confusing terminology, ambiguity in question design, or the unjustified assumption that employees will be aware of some issue. Pilot the survey with about 12 to 15 individuals. The pilot group should ideally be representative of the population that will eventually participate in the survey.

Conducting the survey

The survey may be of the total population or a selected sample. In the case of a sample, consideration needs to be given to the size of the sample. The size should be sufficient to provide results that are statistically significant, but also more importantly, the size of the sample must be such that the findings have credibility with employees. Most organizations when they decide to conduct a survey of their safety culture, survey all of their employees. Should you decide to use a smaller size sample, you need to be aware of the need for a reasonably sized sample in the smallest sub-group that you wish to investigate. Generally, you need at least 30 respondents in the smallest sized sample. The basic rule is that the more finely you wish to slice the survey findings, the larger the sample that you will require. Surveys that have to be completed outside work, and returned by mail, generally have a low return rate. Providing an allotted period of time at work for completion of the survey can result in the highest response rates.

References:

IAEA TECDOC-1321 entitled “Self-assessment of safety culture in nuclear installations”
IAEA Key Practical Issues in Strengthening Safety Culture (2002), INSAG-15

IAEA TECDOC-1329 entitled “Safety culture in nuclear installations” Guidance for use
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Attachment 6 INTERVIEWS

Care needs to be taken when preparing questions for use in interviews. Interview questions are generally open. In preparing for an interview, a series of questions should be prepared for each topic. The order in which the questions will be asked should be considered. Follow-up questions should be prepared for use after the respondent has given a first answer to the main question. These follow-up questions can be general or specific. The most important requirement in an interview survey is that each respondent should have an adequate understanding of every question, and that the question is asked in a nondirective manner.

The primary advantage of face-to-face interviews is that they provide a relatively efficient means of collecting highly complicated information relating to individual attitude or perception. Interviews are most likely to be used to collect highly detailed information from a relatively small group of respondents. The major weakness of the interview is that the content of the responses does not lend itself to precise quantifiable analysis, except at a crude level. Other weaknesses of the interview are its relative inefficiency as a tool for collecting information from larger populations, and the loss of respondent anonymity. Respondents may be less willing to talk openly even when the interview is conducted by a third party who is independent of the organization for which the respondent works.

Interviews may involve varying degrees of structure. The fully structured interview, where respondents are asked a series of closed multiple-choice questions is uncommon, as this is essentially a quantitative survey completed orally. It has few benefits except ensuring a response in situations where self-completion may be unpopular. More common are semi-structured interviews, where the interviewer has a defined schedule of open questions that they use consistently for each respondent. This approach provides the opportunity to explore individual attitudes and opinions in detail, but also provides a basis for comparison between responses, and for some collective analysis. Totally unstructured interviews are less commonly used but may be appropriate when an organization wishes to explore a broad issue such as “morale” or “motivation”. Care needs to be taken that the resulting information is not so diverse as to be effectively useless to the organization. At the practical level, most people find it easier to respond to questions or statements than to engage in open-ended discussion.

If an organization wishes to explore a broad issue, it may well be more effective to collect information in a group session rather than in individual face-to-face interviews. Group sessions have the advantage in that the interaction of the group can often prompt and sustain discussions without a high level of input from the interviewer. Members of the group will share their experiences, views and attitudes about the topic in question, prompting responses from each other. The interviewer’s role is to facilitate discussion, and to record the key points that emerge from the discussion. The primary purpose of a focus group discussion is to encourage genuine open discussion of an issue. It provides a

means of collecting data that is not constrained or limited by the preconceptions of those conducting the survey. Open-ended group discussions are likely to be particularly valuable during the early stages of a survey process to ensure that the user of the survey has an accurate and comprehensive understanding of the relevant issues. Group sessions can ensure that no additional topics have emerged that were not covered by the survey.

The strength of the focus group interview is also its weakness. In conducting the session, the interviewer relinquishes virtually all control over its form, content and development. Because of this, the output of the session is unlikely to be susceptible to collective analysis. At a more practical level a group session, like the face-to-face interview, is inevitably a less anonymous process than a written survey. Participants may be concerned about expressing critical views. This can be partially overcome by using an external third party to conduct the sessions, and analyze the output.

References:

IAEA TECDOC-1321 entitled “Self-assessment of safety culture in nuclear installations”
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Attachment 7

PERFORMANCE INDICATORS

General Considerations

Performance indicators provide continuous feedback on the health of the safety culture as opposed to assessments which represent snapshots of the culture at the time the assessment is conducted.

Care needs to be taken in selecting safety culture indicators to avoid over-emphasizing any particular aspect. The multilevel nature of safety culture means that a broad range of indicators, some of which may be more subjective in form than others, is necessary to gain useful information about the state of safety culture in an organization. The multilevel nature of culture and the tacit nature of some of the levels (basic assumptions) increase the difficulty of measurement. Monitoring trends in various characteristics of safety culture with performance indicators may provide insights into cultural strengths and weaknesses. The complexity and number of useful performance indicators may depend on the size and organizational structure of the contractor.

Advantages/Disadvantages

Some of the potential advantages and disadvantages of using indicators to measure safety culture are shown below.

Advantages

- The use of indicators allows trends to be detected.
- Managers pay greater attention to what is being measured and the use of safety culture indicators will increase their interest in the concept.
- Safety culture is an important aspect of organizational life hence it should be treated like other important aspects and measured.

Disadvantages

- Safety culture is complex and no obviously satisfactory measures exist, thus any attempt at measurement must be indirect.
- Some elements of safety culture such as basic assumptions may be unconsciously held and present great difficulties for measurement.
- Managers may feel that they have little influence over trends in safety culture indicators when they have limited understanding of the concept of safety culture and the period of time needed to effect a change in safety culture.

Example Performance Indicators

Some examples of indicators that may be useful, when grouped in a portfolio of indicators, in measuring the overall state of safety culture are shown below. The examples are listed under the different levels of culture in line with the Three Level model of culture developed by Edgar Schein and under the three Task Team Focus Areas. For the cultural level examples, relevant safety culture characteristics are shown in brackets along side the example. Other examples could be given but the important point to note is that a portfolio of indicators is needed to describe the state of the safety culture in an organization.

Artifacts

- Percentage of corrective actions not completed within planned time-scale (a measure of proper resource allocation, top management commitment to safety).
- Safety audit scores (a measure of safety performance, self-assessment).
- Safety attitude scores (a measure of employee involvement, motivation and job satisfaction).
- Percentage of tasks having risk assessment in pre-work planning (a measure of a systematic approach to safety).

Espoused values

- Frequency of senior manager plant tours (demonstrates high priority to safety).
- Number of safety inspections (demonstrates high priority to safety).
- Percentage of managers trained in root cause analysis (organizational learning).

Basic assumptions

- Frequency of reporting of near misses (view of mistakes).
- Number of safety improvement teams (view of people).
- Percentage of employees who have a basic understanding of the safety culture concept and its importance (properly designed plant is inherently safe).

Leadership Focus Area:

- Number of deferred capital improvements
- Number of PM/CM backlog
- Average age and number of temporary modifications
- Average age and number of instruments out of service
- Average overtime hours per person by department
- Number of root causes due to non conservative decision making

Worker Involvement Focus Area:

- Percentage of Alternate Process resolutions that meet timeliness goals
- Percentage of personnel who have received initial & refresher HIRD training
- Number of contractor & DOE allegations of chilling effect
- Number and type of concerns raised to Alternate Processes and DOE
- Number of Harassment, Intimidation, Retaliation, and Discrimination (HIRD) allegations
- Annual number of substantiated HIRD allegations

Learning Organization Focus Area:

- Number of repeat equipment failures in maintenance important to safety systems
- Percentage of risk significant equipment that is assessed periodically (e.g. system health reports)
- Percentage of operating experience reports completed on time by department
- Percentage of Operational Experience evaluations that result in safety improvements or corrective actions
- Number of condition reports written to review systems and procedures against Operational Experience
- Number of departmental/cross functional self-assessments performed each year
- Number of repeat findings in self-assessments
- Percentage of recommendations implemented as result of self-assessments
- Number of corrective action program backlog (by significance level) both evaluations and corrective actions
- Number and significance of repeat events
- Number of good practices and lessons learned identified from benchmarking activities that are internally communicated or selected for further action
- Number of work planning deficiencies entered into the CAP
- Percentage of pre-job reviews found unacceptable from quality assurance field observations
- Percentage of post job reviews which identify good practices and improvements for the job
- Percentage of self identified problem reports versus those that are self-revealing or identified by external organization
- Percentage of events that are the result of violations (including administrative violations)

Reference

NRC REGULATORY ISSUE SUMMARY 2005-18, Guidance for Establishing and Maintaining a Safety Conscious Work Environment

Attachment 8

CULTURE ASSESSMENT LESSONS LEARNED

Co-operative approach to the assessment of safety culture

In many instances the assessment and development of safety culture involves the cooperation between the target organization, government organizations and psychological research experts. The involvement of psychological research experts helps ensure the theoretical soundness of assessment techniques and the correct interpretation of results. It is helpful to involve policy makers and regulators in any project aimed at developing safety culture. This will ensure the political and technical support necessary for the successful accomplishment of the project.

Assessment of subcultures

Organizations are not always culturally homogeneous and it is important to consider subcultures when assessing safety culture. The characteristics of the different sub-cultures may differ. The assessment should consider sub-cultural differences, e.g. maintenance, technical support, etc.

Safety culture documentation

Some organizations have produced documentation to assist the organization with implementation of safety culture activities. Documents can be useful references for the preparation of assessments. During recent years with the increasing use of modern computer communication some organizations have created internal web sites devoted to safety culture for the benefit of their employees. Some organizations in the nuclear industry have created web sites for public access and this provides a channel for communicating educational safety culture information to a wide range of people. EFCOG has created such a Website at http://efcog.org/wg/ism_pmi/EFCOG_DOE_safety_culture.htm.

Customizing Assessment Methods

Methods for assessing safety culture are being used internationally. A lesson learned is that selected assessment methods need to be customized to the particular organization before use. For example, in order to develop a meaningful survey, information from interviews or focus groups may identify specific safety concerns that should be evaluated. This information, together with a model of safety culture, can be used to develop survey questions. The survey should be tested in a pilot study before being administered to the intended sample population.

Initial training on safety culture

An essential part of the improvement process may be to train employees in skills to enhance safety culture. It may make sense to conduct some training prior to the first assessment if the organization has not been exposed to safety culture related activities prior to that point. Workshops can be used to train staff. It was important to give specific training to senior managers as these individuals were generally from the older age range and considered more resistant to change. It may be important to train middle managers in team building and improving communication skills.

Situational approach to the assessment of safety culture

Many assessments of safety culture are based on questions that attempt to gain information on norms, and then assume that behavior will be consistent with these norms. The problem with this approach is that there is a complexity of norms, some of which may be competing. It is therefore difficult to know which norm will prevail in a particular situation. To overcome this difficulty a situational approach to the assessment of safety culture can be used. This method is based on obtaining information on an individual's reaction to a particular scenario. The scenario has been developed from real events as described by those involved in them. The response of an individual to the dilemmas presented in the scenario can reveal what the underlying norms are, and provide a more confident basis for predicting behavior. This situational approach to assessing safety culture is a useful complement to other assessment techniques.

Experience with surveys

It is helpful to those thinking of conducting a survey to be aware of some of the problems encountered by others that have experience of surveys. It is recommended that advice be sought from people with expertise in developing surveys before embarking on a survey to avoid or minimize problems such as those listed above. A poorly constructed survey will fail to deliver reliable results and undermine confidence of people in the benefit to be gained from the use of such methods. Typical problems encountered include:

- survey was carried out at same time as major activity when people were very busy;
- too many questions;
- questions were poorly formulated and open to misinterpretation;
- instructions for completing the survey were inadequate;
- people did not feel that their anonymity was protected (this is a particular problem with sample groups when gender, age and skill information is requested);
- the purpose of the survey is not explained;
- feedback of results takes too long;
- no pilot survey carried out to confirm that proposed survey is suitable before full survey undertaken.

References:

IAEA TECDOC-1321 entitled "Self-assessment of safety culture in nuclear installations"
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Attachment 9

POST ASSESSMENT CONSIDERATIONS

Initial evaluation

Findings may be subjected to a root cause analysis to identify the reasons why weaknesses in safety culture exist in the organization. Employees are normally consulted in this process, perhaps using a small number of focus groups. This approach allows a discussion of the need for improvement and enables employees to make practical suggestions on how improvements may be achieved. Employees are more likely to be committed to the implementation of improvements if they have been intimately involved in generating ideas for that improvement. Focus group allows you to pick apart the findings to ensure that you fully understand them. The follow-up can also be a very effective mechanism for looking at potential responses to findings. The focus group will not only help the organization understand the significance of findings, but also begin to identify and develop possible initiatives or actions to help deal with the issues. If the assessment has been based on focus groups or interviews, you will already have a high level of qualitative information, and it may not be necessary to conduct a follow-up to clarify issues. In evaluating the results of the safety culture assessment it is important to balance the results by identifying organizational and safety culture strengths and weaknesses. Improvement strategies should utilize these strengths. The successful implementation of improvement plans is more likely if there are tangible benefits to individuals or groups from the change. These benefits need not necessarily be financial but could be increased opportunity to gain skills, increased recognition or greater decision-making powers.

Action plan

After the identification of improvement actions it is important that these actions be given priority and incorporated into an improvement strategy. Many issues may be covered, and these may need to be addressed by various actions. It is important that a plan is prepared, incorporating these actions, and a process put in place to monitor the implementation. Senior managers should regularly review progress and communicate the extent of progress to employees.

Employee Feedback

It is important to prepare people for change by making the results of the assessment known to all employees in the organization and presenting the results in an understandable and interesting way. The motivation for making the changes necessary to improve the safety culture needs to be made explicit. It is important that employees perceive the improvement plan as realistic; plans may be challenging but not so challenging that they lower employees' expectations of successful achievement. Feedback is important in ensuring that participants understand the results of the survey, and in demonstrating that their responses have contributed to the overall process. Results should be communicated to employees as quickly as practicable. Failure to feed back survey results is not only discourteous, but can be damaging to the organization. The form of the feedback will depend on the nature of the assessment, the culture of the organization, and the expectations of employees. The most common approach is to

produce a simple summary report that can be distributed to all employees. Feedback to individual divisions or functions their results with some indication of how they compare with the aggregate response may be provided.

Time to realize benefits from improvement action

Considerable time may be needed before the desired changes in safety culture are realized. When a long period of time is needed for the desired benefit to be obtained, a series of milestones where some tangible progress may be evident is desirable. Achieving these milestones will help motivate employees. It is important to establish that there is management commitment at all levels for the program and that sufficient resources will be available. To achieve sustained improvement over what may be prolonged time periods the following will be of help:

- Continued management commitment and support for the improvement program;
- Providing refresher training and seminars on safety culture to ensure that employees do not forget what the improvement program is trying to achieve;
- Including safety culture issues in the audit program;
- Ensuring that newcomers to the organization are aware of the safety culture aspects of their role in the organization;
- Include safety culture attributes in the selection criteria for new recruits or promotion of employees;
- Ensure that the safety management system supports safety culture and that its requirements are compatible with safety culture principles;
- Include safety performance and safety culture attributes in the criteria used to evaluate employees, particularly managers;
- Be aware of safety culture developments in other organizations and exchange information on practices;
- Integrate safety culture issues in the business planning process to emphasize the business importance of the concept.

Assessing progress

Progress in implementing actions needs to be measured so that feedback can be given to those persons accountable for the implementation, and to confirm that the implementation is being effective. The common methods of evaluating progress in implementing actions are:

- audit
- key performance indicators
- peer review
- observation
- surveys

References:

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