Enclosure 4

Nuclear Energy Institute/Institute for Nuclear Power Operations
Safety Culture Construct Validation Study

Summary

The results of the Nuclear Energy Institute (NEI)/Institute for Nuclear Power Operations (INPO) Safety Culture Construct Validation Study have two important implications. First, the study provided general support for the traits identified by the participants in the February 2010 workshop. Second, the study demonstrated that safety culture traits exhibited within power reactor organizations are meaningfully related to other measures of organizational effectiveness and, more importantly, to safety performance.

Background

In February 2010, the U.S. Nuclear Regulatory Commission (NRC) sponsored a public workshop in Rockville, MD, to develop a common definition of safety culture and a set of traits that describe a positive safety culture that would be meaningful to persons and organizations who engage in NRC-regulated activities. NEI volunteered to sponsor a validation study, to be conducted by INPO, of the traits recommended by the workshop participants. The NRC Office of Enforcement asked the Office of Nuclear Regulatory Research to perform an independent evaluation of INPO's research.

The validation study had several purposes. The first was to confirm research findings from other industries that the safety culture construct incorporates several distinct but related dimensions (i.e., traits) and, second, to identify those dimensions in the nuclear power industry. A third purpose was to assess the extent to which the dimensions of safety culture, or "factors," derived from the study are consistent with the safety culture traits that participants identified during the February 2010 workshop. The study also sought to determine the extent to which the safety culture factors derived from the study correlate with the other measures of organizational and equipment performance to which theory suggests they should be related. For example, researchers considered whether sites with lower scores on a measure of safety culture have higher numbers of allegations than sites that score more positively.

Results

The study's principle component analysis identified nine clearly interpretable factors, shown in bold in the left-hand column of the following table. The table shows the subfactors from the larger survey factors in the left-hand column in normal font. The table also shows the relationship of the factors and subfactors from the survey to the traits identified during the workshop.

Survey Factors and Subfactors	Workshop Traits
1. Management Responsibility for Safety	**Leadership Safety Values and Actions** in which leaders demonstrate a commitment to safety in their decisions and behaviors
1a. Respectful work environment	**Respectful Work Environment** in which trust and respect permeate the organization

Survey Factors and Subfactors	Workshop Traits
1b. Continuous improvement—combines items related to problem identification and resolution and organizational learning	**Problem Identification and Resolution** in which issues potentially impacting safety are promptly identified, fully evaluated, and promptly addressed and corrected commensurate with their significance
	Continuous Learning in which opportunities to learn about ways to ensure safety are sought out and implemented
1c. Performance indicators	
1d. Resources	
1e. Rewards	
2. Willingness to Raise Concerns	**Environment for Raising Concerns** in which a safety conscious work environment is maintained where personnel feel free to raise safety concerns without fear of retaliation, intimidation, harassment or discrimination
2a. Informally	
2b. Formally	
3. Decision-making	
4. Supervisor Responsibility for Safety	
4a. Communication	
4b. Presence/availability	
4c. Coaching	
4d. Alignment with management	
5. Questioning Attitude	
5a. Situation/problem awareness	
5b. Process use	**Work Processes** in which the process of planning and controlling work activities is implemented so that safety is maintained
5c. Plant knowledge	
6. Safety Communication	**Effective Safety Communication** in which communications maintain a focus on safety
7. Personal Responsibility for Safety	**Personal Accountability** in which all individuals take personal responsibility for safety
8. Prioritizing Safety	
9. Training Quality	

These results generally support the validity of the traits identified by workshop participants, although they also indicate that additional traits are also important to a positive safety culture in power reactor organizations. As the table shows, four of the survey factors (Management Responsibility, Willingness to Raise Concerns, Safety Communication, and Personal Responsibility) are consistent with traits identified in the February workshop. Two of the workshop traits (Respectful Work Environment and Work Processes) emerged as subfactors of the Management Responsibility and Questioning Attitude survey factors, respectively. In the survey results, the workshop traits of Problem Identification and Resolution and Continuous Learning were combined into one subfactor, Continuous Improvement, of the Management Responsibility factor. The survey revealed four additional factors (Decisionmaking, Questioning Attitude, Prioritizing Safety, and Training Quality) that workshop participants had not identified as separate traits important to safety culture.