SAFETY CULTURE - IS IT IMPORTANT?

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INTRODUCTION

Yes - it is important! First it was quality assurance, then total quality, and now the term is safety culture. Whatever you call it, a strong quality culture is important to your long term success in the nuclear industry.

The industry originally believed their "Quality" efforts could be focused on establishing a "QA Program." So, in 1970 the U. S. Code of Federal Regulations 10CFR50 Appendix "B" was issued defining the basic quality assurance (QA) requirements for the U. S. nuclear power industry. Everyone, including the U. S. Nuclear Regulatory Commission (NRC) thought this was great. Just establish a QA Program with its attendant procedures, checks and documentation to comply with this regulation and safe operations will be achieved. Not always true! Such programs often operated without the company infrastructure necessary to create and maintain an environment encouraging consistent high quality performance.

What next? In the mid-1980s to early-1990s many organizations embraced the concept of a total quality environment which emphasized quality results in all activities at all times. But it wasn't an easy task. Implementation of this concept required a major cultural change in order to establish the appropriate attitudes and priorities where quality was always the first consideration. To do this, management had to recognize its essential role in creating an environment where each employee felt empowered to identify and fix quality problems.

Still not there! Even with the added ingredient of a total quality environment, there were still recurring quality problems and the nuclear industry recognized there was a need to focus further effort on achieving safe operation and a low rate of problem occurrence. As a result, the industry, including the NRC, placed more emphasis on the need for a strong safety culture.

What can happen if the need for a strong safety culture isn't recognized? Take VECTRA Technologies, Inc. for example. VECTRA provided the NUHOMS® technology for dry spent fuel transportation and storage systems to the U.S. and foreign nuclear industries. The company had a majority of the U. S. market, but didn't recognize and react to early warning signs of impending significant problems. QA program implementation problems were being

identified by its own QA organization, its customers, and the NRC. Then in January 1997, the NRC issued a Demand for Information letter to VECTRA requiring them to demonstrate why fabrication activities shouldn't be halted until the problems were corrected. At that time, VECTRA elected to halt all fabrication activities on its own until it could assess the magnitude of its problems and implement the necessary corrective actions. VECTRA also initiated an effort to strengthen its safety culture. They engaged Performance Improvement International (formerly FPI International) to assist with evaluating operations and provide the methodology and training to strengthen the company's safety culture. Unfortunately this safety culture improvement came too late and VECTRA had to declare bankruptcy in late 1997. Company assets were purchased by Transnuclear Inc. (a U. S. subsidiary of the COGEMA Group) at the beginning of 1998. Transnuclear Inc. then established Transnuclear West Inc. (TNW) to carry forward the NUHOMS® technology. Today, 16 months after VECTRA halted fabrication, the new company (TNW) has embraced the concept of an improved safety culture and is moving forward to resume fabrication.

Two years ago VECTRA saw, but misinterpreted, the light at the end of the tunnel. That light wasn't bigger market share and improved business performance, it was a train coming in the other direction.

WHAT IS SAFETY CULTURE?

A Definition: safety culture is technically defined as the shared values, practices, and mission used by an organization to achieve safe operation with a low rate of problem occurrence. It is the foundation upon which a business structures and builds its operations. It defines and creates the company culture and shapes the working environment in order to achieve long term successful business operations. The NRC uses the International Atomic Energy Agency definition of safety culture which is, "an assembly of characteristics and attributes in organizations and individuals which establish that, as an overriding priority , safety issues receive the attention warranted by their significance." As such, safety culture is both attitudinal and structural in nature, and is demonstrated through management commitment to matching safety issues with appropriate procedures, programs and actions.

What does all this really mean? For the frantic stressed-out Americans, this means doing everything, doing it now, and somehow doing it all right at the same time. For the more relaxed French, establishing a strong safety culture means talking about it, figuring out the most important activities, and then getting them done and done right. These are different approaches, but both have the same goal of achieving strong, successful, long term business success.

Five Key Elements of Safety Culture: Five elements are fundamental to a strong safety culture and have a significant impact on future performance:

Strong Mission and Goals that define high management expectations and are demonstrated by priorities being vertically aligned, focusing on critical issues, and having organizations motivated for common achievement.

High Level of Knowledge and Skills for workers, supervisors, and managers that is demonstrated by minimizing knowledge and rule based errors, increased organizational productivity, and long term success and high professional standards.

Strong Lateral Integration that is demonstrated by improved quality of products that transcend departments and improved efficiency and quality of complex work processes. Lateral integration consists of two factors. One is lateral communication and the other is teamwork.

Simple Work Processes which are in harmony with worker knowledge and skills are demonstrated by reduced backlog, reduced human error rate, and improved staff morale.

Strong Self-Improvement Culture and programs that result by reducing human errors, reducing equipment errors, and reducing the organizational and programmatic failure rate. Self improvement culture is the driving force to correct organizational and programmatic problems.

An Analogy: All of us desire to have a safe comfortable home, and safety culture is analogous to the foundation of that home. The integrity of that home depends on two factors. One is how sound the existing structure is (organizations and programs) and the other is how sound the foundation is. However, soundness of the foundation alone does not determine the integrity of the home. The same is true that safety culture alone does not determine the safety performance of an organization.

When the foundation of your home is very sound, existing cracks in the home are found and repaired by you and new cracks will not develop because of that strong foundation. Over time, the number of cracks in the home decreases and the integrity of the home improves. However, if the foundation of your home is weak, the foundation will cause new cracks. Over time, the number of the cracks in the home will increase, despite your repair efforts, and the integrity of the home will degrade. Of course this analogy doesn't always prove true for those of us with homes in mud slide and earthquake prone California (even a strong safety culture can't beat Mother Nature no matter how hard you try).

Corrective Action: Identifying and correcting problems (corrective action) is essential to achieving a strong safety culture. In NRC Information Notice 96-28, the NRC issued guidance which suggests that utilizing the elements of a strong safety culture can ensure that corrective actions are adequate to prevent recurrence of problems. This notice emphasizes the importance of identifying problems before significant events occur, and of taking prompt, comprehensive corrective action when problems are identified.

WHY SAFETY CULTURE IS IMPORTANT

Business Performance: The VECTRA experience described earlier demonstrates what can happen in the absence of a strong safety culture or other form of pro-quality environment.

Regulations & Standards: U. S. Code of Federal Regulations 10 CFR 50, Appendix B, Criteria XVI requires that conditions adverse to quality be promptly identified and corrected.

The requirement also states that for significant conditions adverse to quality, a cause will be determined and corrective action will be taken to prevent recurrence. Translated into safety culture language this supports the earlier statement that corrective action is essential to achieving a strong safety culture.

Requirements specified in ISO 9000 are aimed primarily at preventing non conformity at all stages, from design to servicing. Specific implementation requirements in ISO 9000 are closely related to the five fundamental elements of a safety culture. ISO requires a strong management policy for the program and the designation of a management representative to ensure the requirements of the ISO standard are implemented and maintained *(Mission & Goals)*. The organizational requirements in ISO specify that "the responsibilities, authority and the interrelation of ALL personnel who manage, perform, and verify work affecting quality be defined" *(Knowledge & Skills)*. In the training section, the ISO standard defines the personnel qualification and training requirements. ISO requires compatibility of the design, the production process, installation, inspection and test procedures *(Lateral Integration)*. ISO also requires planning, process control and monitoring in all stages of quality affecting activities *(Simple Work Processes)*. And finally, the ISO standard emphasizes the corrective action program including root cause investigation, preventive actions, and effectiveness assessment *(Self-Improvement Culture)*.

Nuclear Plant Performance: Research into U. S. nuclear power plant performance shows there is a correlation between the level of safety performance and the SALP rating (Systematic Assessment of Licensee Performance) determined by the NRC. Of more significance, the rate of SALP improvement or reduction strongly correlates with the momentum of safety performance improvement or degradation. In other words, strong improvement in safety culture is an indicator of rapid improvement in SALP ratings. A strong safety culture reduces nuclear plant problems, which reduces media attention, which ultimately improves public acceptance of the plant itself.

SAFETY CULTURE - RECOGNIZING WHERE YOU ARE

Use of the Culture Index: Leading indicators must be used to determine safety culture trends and forecast real time performance in the future. These indicators have to be parameters that are reliable, can be quantitatively and objectively evaluated, and their positive effects have to come in the "future." The Culture Index is a leading indicator that identifies whether a company's safety performance is improving or degrading. To determine the Culture Index, data is collected and analyzed to calculate a score for each of the key safety culture elements for each major organization within the company. The scores are then consolidated to determine the combined score for the whole company.

The purpose of periodic leading indicator determination is to verify that the organization's safety culture is strong enough to further help the organization improve its future safety performance. Frequency of the checks depends on the possible speed of safety culture change. This change, in turn, depends upon two factors. One is the size of the organization and the other is the degree of disturbance which could impact the future safety performance. For example, if there are no major disturbances (such as a large reduction in force, major work process change or management change-out, etc.) that may impact future safety

performance, the frequency of periodic assessment of safety culture could be low. Also, if the organization is large, any culture change takes a long time to permeate the system, work practices, and management policies, and the frequency of periodic assessment of safety culture can be low. If there are no major disturbances, an assessment is recommended every six months for a small organization. If there are major changes taking place in a small organization, it is recommended every three months. For large organizations, with no major disturbances, an assessment be performed yearly and for large organization with major changes, it is recommended every six months. Regardless, assessments should be performed not less than annually to assure you are aware of your safety culture status.

Turnaround Cycle: Once a company recognizes it has significant problems, a considerable period time is required to turnaround performance. This turnaround is typically divided into five stages:

- Breaking down denial
- Struggling to survive
- Repairing and curing
- Stabilizing the company
- Recovery to a strong come back

For a small company (annual revenue under $100 million U. S.) the total time to turnaround poor performance is one to two years. For a large corporation, the turnaround time can be as long as four to five years. As a result, it is important for a company to periodically determine its Culture Index. This is particularly important during periods of declining business performance in order to initiate the necessary corrective action before more significant problems occur.

IMPROVING YOUR SAFETY CULTURE

Strong Mission and Goals: When an organization is found to be weak in its mission and goals, several symptoms are usually observed: important work is not attended to, few or no performance improvement initiatives are taken, a work prioritization system is weak or non-existent, individual performance is scattered, accountability is weak, and the staff does not know the management expectations. To improve, an organization needs to establish:

- Missions and goals for all groups with a staff greater than 30
- Behavior based expectations that are derived from the established mission and goals
- A strong accountability program that holds everybody accountable for their behaviors
- A work prioritization system that is consistent with the established organizational mission
- A tracking system that tracks the progress toward the goals.

High Level of Knowledge and Skills: When an organization is weak in knowledge and skills, the symptoms commonly observed are: decision making errors occur with high frequency, procedures are not detailed enough to help the workers, and mistakes in drawings and procedures are not detected and thus cause human errors. To improve, an organization needs to establish or improve:

- Co-worker coaching culture
- Pre-job briefing techniques
- Special review and supervisory requirements for first-time-evaluations, training and qualification
- A system to ensure selection of the right workers for the right jobs.

Strong Lateral Integration: When lateral integration is weak, several symptoms are usually observed: many problems result due to miss-communication, management in-fighting occurs, cross-department problems are not being solved, and inefficient processes which transcend departments occur. To improve, an organization needs to:

- Hold department-to-department lateral integration meetings for managers and supervisors
- Establish and define responsibility, authority, and accountability for all work processes and program managers
- Establish common mission and interests among all departments
- Hold a daily integration meeting among all departments
- Enhance personal trusts among interacting managers and supervisors through off-site activities.

Simple Work Processes: In an organization which does not simplify its work processes and programs constantly, the symptoms commonly observed are: high procedural non-compliance rate, low work morale, low individual productivity, and low work output. To improve, an organization needs to:

- Perform an evaluation to simplify the work processes
- Reduce the number of administrative programs to a minimum
- Reduce outdated or unneeded regulatory commitments
- Reduce unnecessary verifications and reviews
- Promote multi-skilling and multi-jobbing (i.e., training workers to have multiple skills and to handle multiple jobs)

Self-Improvement Culture: Symptoms of an organization without an adequate self improvement culture are: repeat human errors, organizational and programmatic failures, and management failures; weak or no performance monitoring and trending programs; defensive attitude when criticized; weak aptitude to learn lessons; minimum time spent in preventing problems; and complacency (thinking one's performance is better than the reality). To improve, an organization can:

- Establish a comprehensive performance monitoring and trending program
- Perform root cause analysis for significant events
- Perform common cause analyses periodically to detect and correct performance issues
- Perform preventive measures to prevent events
- Encourage workers to report all deficiencies and non-conformance conditions.

CONCLUSION

A strong and improving safety culture provides the foundation for building long term success for a company. It is a cultural change for most organizations and requires years not months to achieve. Short term successes are typically achieved and the smart companies build upon and communicate those successes. For long term success, these companies never deviate or become complacent about maintaining a strong safety culture.

There are several lessons learned from the nuclear industry that support the need to maintain a strong safety culture:

- Prevention of human errors costs less than dealing with the consequences
- Poorly designed processes cause the majority of human errors
- Quality supervision is a powerful tool in human error reduction
- Performance monitoring/trending and technology based root cause analysis are essential to human error reduction
- Human errors caused by misjudgment need special attention
- Procedural non-compliance needs a focused solution based on organizational psychology
- The benefits of a well designed accountability system are very significant
- Knowledge & skills, not more rules, are the last line of defense against problems.

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