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When the Safety System Fails the Worker: Did We Do Our Job?…a Case Study

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Introduction

As safety professionals, we strive to implement a robust safety process in our organizations to maximize worker protection. We sell our philosophy and ideas to senior management, and then work with line management and the work force to develop and implement the safety process. Through this effort, we are likely to accomplish two major objectives. First, we obtain buy-in from line management and the workers, maybe even ownership for the safety process we implement. Second, we increase the likelihood that the hazards (and necessary controls) associated with the work activities performed by our workforce are identified and addressed by the safety process we implement. Our ambition is to maximize safety and health in the work place, and prevent injuries. Realizing this goal improves overall business operations.

Petersen suggested an accident is an indication of something wrong in the management system (Petersen, pg 15). Successful organizations operate with the safety process fully integrated into the management system. If the management system fails, the safety process has failed the worker. As safety professionals, we must ask ourselves whether we did our job adequately whenever the system fails. The better organizations strive for continuous improvement. As the safety expert, we need to foster the concept of continuous improvement of the safety process.

The overall success of safety processes, in terms of accident and injury prevention has improved since safety professionals have learned to involve line management and the workers in the process. Although we maintain the label of "safety expert", our role has shifted somewhat to that of a "facilitator" in the process. The role of the safety professional is to advise and counsel line management (Kohn & Ferry, pg 28). Line management owns safety! If you subscribe to this philosophy, our role of advisor to line management makes perfect sense. Most safety professionals no longer operate as the "safety cop". That role belongs to line management. Instead, our role falls into the category of "oversight" or facilitator. We observe systems, processes and work activities, and then convey our findings and observations to line management. We advise them with regard to what they need to do, and then we help them find workable methods to implement those solutions. Line management owns the responsibility to implement the process and to monitor safety on a daily basis. Safety professionals advocate safety and facilitate process implementation. We audit implementation of corporate policy at the operational level. We help line management meet their responsibilities with regard to safety.

Maximizing safety performance is achieved by maximizing the safety process. Robust safety processes serve as the model and are earmarked by vigorous support of both labor and management. Where a robust safety process exists, the safety professional enjoys interest and support on the part of management and workers. People are motivated to achieve success and willingly accept their roles and responsibilities. Work activities are appropriately planned. Hazards are identified and controlled to safeguard the worker. Work activities are reviewed on a regular basis to avoid the process becoming stale. Goals are established and communicated and serve as a basis on which performance can be measured. Performance is measured and results are communicated clearly. People throughout the organization understand their role and responsibilities and are accountable for meeting them.

Attributes of a Robust Safety Process

Robust safety processes can be achieved through multiple approaches to safety and health. Although it may be difficult to capture the varied approaches in a single definition, robust safety processes are characterized by the following:

- Strong, relentless commitment and support from senior management
- Technically competent, motivated safety professionals
- A culture that encourages self-reporting of incidents and near misses
- Successful implementation of process fundamentals including systems for hazard identification, analysis and correction, employee involvement at the grassroots level, accident investigation and employee training
- A system for coordinating work activity and safety across departments, contractors, etc
- Mechanisms facilitating worker feedback to management
- A desire to achieve "world class" status in safety

<u>Understanding These Attributes</u>
Senior management demonstrates support for the safety process in many ways. Financial support is important, but is far from being the only support necessary from senior management for success in safety. Robust processes are characterized by a senior management team that walks and talks the safety process. Senior management establishes safety-related goals and ensures they are clearly communicated at all levels in the organization. Management walkabout programs are used to get managers into the work space leading a team of people there for the purpose of evaluating safety and identifying non-compliances. Senior managers begin meetings with a safety topic. They review near misses as well as accidents that might have occurred, and participate in determining and implementing corrective actions. Senior management leads the celebration of safety process achievements. The process is managed with apparent rigor.

The safety and health staff must be technically competent and motivated to help bring the safety process to the highest level. These are the people senior management looks to for leadership and ideas. Robust processes are characterized by motivation – at all levels in the organization. The best processes are led by a tirelessly motivated management team that includes the safety professional. Successful safety professionals are able to meld their technical knowledge and common sense to develop effective, manageable solutions to the problems in the workplace.

Robust safety processes foster a caring culture that encourages people to self-report incidents and near misses for the purpose of ensuring they are properly investigated to prevent recurrence. These are not cultures of “blame”. Instead, individuals are appreciated for bringing concerns to management and they are encouraged to participate in the process to mitigate system or process shortcomings. Management communicates findings openly and takes definite actions to correct deficiencies.

Robust systems are built on a strong foundation of fundamentals. Many organizations implement the tools necessary to achieve a model process without ever realizing the achievement. The difference with the more successful efforts is in the quality of implementation, and the level of motivation demonstrated at the highest levels. Systems for hazard identification, analysis and correction are fundamental to a safety process. Robust processes involve employees at all levels in the organization and clearly establish responsibility for implementation at the manager level.

Management participation and accountability make it happen. Management resolve, or the attitude management has toward loss prevention is the ultimate driver of safety performance (Kohn & Ferry, pg 39). Formal management walkabout programs can be used as a means to identify hazards and non-compliant situations. The inspection team, in consultation with the safety professional, analyzes the hazard and develops corrective actions (including the identification of the individual responsible for mitigation). Individual findings are added to a tracking system where they can be monitored through completion of the corrective actions. Employee involvement is achieved in many ways. Grassroots safety committees are a good example. Other methods include worker participation in the management walkabout process and on teams formed to investigate near misses and accidents. In a robust process, accident investigations are done to determine what went wrong in the system, and to identify and implement mitigation measures that substantially reduce the chances of recurrence. Managers in a robust process strive to improve, they look for true causes associated with an event and spend time developing meaningful corrective measures. Results are shared with the work force to ensure everyone understands what went wrong and what has been put in place to prevent something similar from happening again. Employee training is a component of every safety program. In a robust process, employee training is tailored to meet the needs of the situation, and the need for workers to receive training is valued by managers similar to how they value other requirements they have responsibility for. Appropriate levels of planning occur to ensure training can be completed without jeopardizing schedule. Meager safety processes defer training, or postpone it, until it is convenient for them.

Robust safety processes include mechanisms for coordinating work across departments. In construction environments, work must be coordinated between contractors. The coordination of work activity is important to maximize safety. The need for work coordination presents itself any time someone is brought into an area they normally do not work in to complete a work task. For example, when a worker (or a team) from Facilities Maintenance is brought into a research lab to remove and replace floor tile, their safety may be at risk from potential hazards inherent to the room (such as exposure to a chemical process) they will be working in. Similarly, the crew may create additional hazards (for the work crew and room residents) during the completion of their work. Coordination, in this sense, means identifying these sets of hazards, and necessary controls, before the work is started. When determining necessary controls, the safety professional must consider hazards already present in the work area and those the workers may create when performing the work. In addition, consideration to room ventilation must be considered as appropriate for the job. Organizations with robust safety processes handle this process well. Internal mechanisms, such as work permits, bridging documents, etc., can be used to ensure the work team coming into an area is familiar with the hazards inherent to the space and that hazards associated with the work performed by the team (and associated impact) are identified and appropriately controlled. However this process is handled, the procedure must include the appropriate level of management participation, signature and hazard analysis. Organizations with robust safety processes effectively monitor the work activity to ensure the work is performed according to the controls established for the job.

Safety professionals understand the value of feedback coming from the worker. Individuals performing the work generally understand associated hazards and often present viable ideas to improve safety. Robust programs ask for employee feedback. Systems are established for employees to make suggestions and register concerns. Input goes directly to management for disposition. Formal systems can be pen and pencil or electronic. Either way, the key is to get the feedback to the responsible manager in a timely manner, and for that manager to act prudently on the feedback.

Organizations that maximize safety performance do not get there by chance. The management team wants to achieve "world class" performance and is committed to achieve that goal. Organizational culture is key. In such organizations, the culture is one where senior management demands the best in the safety process. They demand a visionary or world class process (Kohn & Ferry, pg 44). They recognize that getting there is a difficult process, and they are committed to working just as hard to maintain that level of performance.

As previously mentioned, many of the attributes found in a robust safety process are common in most safety programs. The difference is in the implementation of the process. Organizations implementing robust safety processes understand that regulatory compliance is a baseline approach to managing safety. Compliance can help the organization avoid fines from OSHA, but it may not control the occurrence of accidents (Gualardo, pg 208). Senior management must walk the talk. They must be an advocate for the process and tirelessly demonstrate their belief in it. As they do with other segments of the business, senior management must employ a desire for continuous improvement in the area of safety and health. Senior management must regularly convey, to the management team, the importance of maximizing safety. To be effective in this regard, senior management must talk in terms of "we", not "you". To do otherwise creates an "us versus them" environment and fails to promote continuous improvement. Senior management might delegate some of the responsibilities associated with the safety process, but the ownership of the process stays with them. They hold ultimate responsibility.

Single Point Failure – A Trap To Avoid

In any safety process, single point failures are a concern. It is a concern whenever "safety" is dependent on a single individual doing something in reaction to something else. Processes that require two or more people to ensure a specific task is completed are less likely to experience failure because that specific task was not done. For example, a procedure that requires an experimenter to survey a shipping package upon receipt and notify the safety professional only when radioactive levels exceed a pre-determined threshold rely solely on the experimenter to act as expected. Greater safety will be achieved by a procedure that requires the experimenter to survey the package upon initial receipt, followed by the safety professional performing additional surveying in the lab after the package is moved to its final destination. The desired procedure would require the experimenter to immediately notify the safety professional whenever his/her survey results exceeded specified levels, but "safety" is not dependent solely on his or her actions.. However, the single-point failure (experimenter failing to notify the safety professional when results are high) is avoided by requiring redundant surveys of the package.

The bridging document serves as another example of ways to avoid a single point failure. This document requires signatures from the work team leader and supporting management and management from the facility where the work will take place. Signatures occur after a safety briefing, addressing inherent and potential hazards associated with the work, takes place. It documents that all of the necessary work authorization protocol has been completed prior to beginning the work. It serves as a method for multiple organizations to communicate existing and potential hazards and controls before a work activity is authorized.

A Case Study – What Went Wrong

Safety professionals are dedicated to accident prevention. Serious accidents are cause for concern that the process implemented was less than adequate, and that the safety professional could have done better. In organizations with a robust safety process, senior management reacts to a serious accident in the same way that dedicated safety professionals do. The accident discussed below was a serious event. It occurred even though the organization had a robust safety process in place.

The maintenance department was tasked with replacing the smoke detectors located in the high bays in one of the buildings on the site, B-334. The detectors had not previously received biennial calibration as the code required due to the difficulty associated with accessing them. The detectors in question were attached to the ceiling about 33 feet above the floor (see Exhibit 1) and some detectors were located above or near HVAC duct. Fixed equipment and a pit in the high bay further complicated access to the detectors. The scope of work called for the replacement detectors to be a newer model that are self-checking and do not require the biennial calibration.

Exhibit 1.

The work team consisted of 3 people, the work team leader and 2 technicians. The work team leader completed documentation to authorize the work. A bridging document was used to coordinate the work (between the maintenance department and facility management) and, upon completion, it was reviewed with the Facility Point of Contact (FPOC) and signed. The only hazard noted on the bridging document was the need for the bridge crane to be locked out of service before work could begin.

The work team leader and the FPOC agreed that the use of a manlift would be the most feasible method for accessing the detectors in the building. The work team acquired a JLG 60 lift from the maintenance yard on the afternoon before they were to initiate work. The JLG 60 is an articulated boom manlift that operates on either gasoline or propane fuel. Although the organization had several different models of lifts on site, the JLG 60 was the only one available at the time this work was to be performed. The lift was larger than what the work team expected. Originally, the crew planned to begin work in the West bay of the building. Because the JLG 60 would not fit in the West bay, the crew decided to begin in the East Bay. No revisions were made to the safety documentation. The East bay is approximately 40’ wide by 50’ long by 33’ high and is equipped with its own ventilation system. The ventilation system is a recirculation system operating at a nominal design 1.3% outside air make-up rate.

The following day, the technician who would be operating the manlift began reviewing the operator manual for the lift to become familiar with this particular machine. The technician was qualified to operate the lift by training, however, she had not actually operated a manlift since completing the hands on portion of qualification training approximately 4.5 years earlier. Due to security requirements in this area, the technician was not allowed to practice operating the manlift in the yard outside of the building. Once the large doors to the East bay had been opened by security, the technician was authorized to move the manlift into the building. The technician was not comfortable maneuvering the manlift into the building. Another worker in the area, not part of this work team, was brought in to maneuver the lift into the building. Once the lift was in the building, the second operator did a check to verify that the boom would reach to the vicinity of each detector. At that point, the engine was shut off and the manlift was turned over to the work team.

The technician entered the manlift and prepared to maneuver it to the first detector head. The work team leader remained on the ground, acting as the assistant. The third member of the crew was stationed on the third floor and was assigned to monitor the fire alarm panel during the work process. The Facility Point of Contact, thinking that two armed security officers would be required if the large doors remained opened, and that the building ventilation system was adequate to operate the manlift indoors when fueled by propane, opted to have the large doors closed. The work team leader was told the manlift should be operated only as long as necessary to move the platform into position at the detector heads and then shut off while the detector heads were changed.

The technician donned a fall protection harness and lanyard and prepared to initiate work. Shortly thereafter, the technician encountered difficulty identifying various controls for the manlift. The decals and control panel labels were obscured by paint and defaced by weather exposure. The technician had such difficulty trying to access the first detector that the second operator was brought back to review the controls with her. At that point the technician maneuvered the manlift into position for the NW detector and completed the replacement. The engine, fueled by propane, was kept running during the work because of the need to frequently position the platform. As the technician began to access the second detector, about 1 hour into the job, she began to feel physiological symptoms of exposure including fatigue, irritability, thirst and butterflies. She mentioned this to the team leader and asked for a drink of water. As the team leader went for water, the technician began to lower the platform, eventually stopping the platform about 10 feet above the floor due to the railings around the pit (see Exhibit 2). The technician shut down the engine and sat on the floor of the platform. When the team leader returned with water, he realized there was a problem and used a nearby ladder to access the technician. He got the technician out of the basket and out of the building. The third member of the team was called out of the building. The technician was treated by on site paramedics and recovered fully. The first CO monitoring occurred approximately 30 minutes after the engine had been shut off and measured 854 PPM at floor level.

Exhibit 2.

What Went Wrong

This incident occurred even though the Organization has implemented a robust safety process.

Some of the failure points will be discussed below:

1. The bridging document was completed but only included the need to lock the bridge crane out of service. The document was not revisited when the work team determined the need to use a manlift indoors. Safety documentation must be considered dynamic and should be updated (revisited) when conditions or work methods change.
2. The original scope of work did not include the use of a manlift indoors. This decision was made due to difficulty accessing detectors located in the high bay from ladders. The decision was not clearly communicated to the maintenance supervisor or the H&S Team. Changes to work methods can impact safety and should be clearly communicated to management and the safety team whenever adverse impact to safety is possible.
3. The building Point of Contact was not familiar with the subject HVAC system and made an assumption that it was okay to operate the manlift with the doors closed. Assumptions can not

be allowed when consequences can impact safety. The Point of Contact is responsible to provide accurate input or ask for help when necessary.

4. The Facility Point of Contact made the decision to operate the manlift indoors with the doors closed based on a mistaken assumption that two armed guards would be required if the doors were kept open. He failed to investigate requirements fully. This assumption was based (in part) on the incorrect assumption that the use of a propane powered engine would be safe indoors. Tests following this incident proved the opposite.
5. The technician assigned to operate the manlift was qualified by training, but not by experience. Neither the technician or the work team leader recognized her lack of experience to be a potential hazard. Careful consideration must be given to the requirements for refresher training. Should an individual who completed training more than four years earlier, having not operated a manlift since training, be considered qualified to operate a manlift?
6. The EH&S Team supporting this area of the organization was never brought in to complete a hazard assessment for the work activity. No one from the facility or the work team recognized the need for a hazard assessment (by safety professionals) when the decision to use a manlift indoors was made. Again, changing conditions warrant reconsideration of the hazards and concerns. The safety process implemented at this organization requires a review of safety concerns when conditions change, people in a position to recognize this need failed to do so.

This incident was serious and easily could have progressed into a fatality. While the investigation committee determined the direct cause to be the *use of an internal combustion engine indoors with less than adequate safety controls,* there were several people (with opportunities) who failed to recognize the hazard before the work took place. The incident enlightened the organization, confident that their robust safety process was world class, and resulted in several recommendations to further improve the safety process.

Self-assessment Techniques Can Strengthen Your Process

Anyone can look at a process after an incident and identify where safety was less than adequate. We are also able to develop process enhancements that will strengthen the safety process. Unfortunately, in this scenario an incident has already occurred. One or more people may already have been seriously injured. Our efforts are too late for them. The ideal time to strengthen the safety process is before the incident occurs. Self-assessments are one way to do that.

Self-assessments serve an important purpose. In addition to evaluating process implementation against stated criteria, good self-assessments look at the overall adequacy of the process itself. Self-assessments focus on specific areas and help you, and your Organization, answer the questions, "how well am I doing what I've said I will do, and, does this process/policy have any single point failures?"

World Class Organizations develop a self-assessment program and manage it. The program identifies what topical areas will be assessed during the course of the year and requires written results. Either management or safety professionals may perform the actual assessments. Findings, or deficiencies are documented in a database and are tracked throughout corrective action. Senior managers ensure that corrective actions happen.

For example, an Organization may select the use and storage of compressed gas cylinders/systems as an area for assessment. Using OSHA requirements and their own H&S manual, a checklist can be developed to assess compliance in the Organization relative to the requirements associated with the use and storage of compressed gas.

To complete the assessment, members of the EH&S department may be selected to walk the areas they support to locate compressed gas in use. For each instance, the "In Use" form will be completed. When assessments are completed in all areas subject to the assessment, the results can be tabulated to yield a "snapshot" of compliance to stated requirements. As with other data, the results can be evaluated for trends in non-compliances and potential serious deficiencies. The assessment can also look at the guidance relative to the compressed gases program to evaluate overall adequacy. Sample areas of inquiry may include:

- Are all gases used at the facility adequately addressed in work control documents?
- Are sufficient storage capabilities provided for each cylinder size in use?
- Does the program adequately address "piped systems", i.e., pressure relief devices?

As warranted, special emphasis campaigns can be introduced to improve performance and enhance safety. If necessary, the EH&S manual can be revised, employee training can be modified, or work procedures can be changed to address the type of deficiencies observed during the self-assessment.

Relative to this incident, answering the question *did we do our job* is a complex task. The ES&H Team likely would have identified the hazard of CO had they been involved in a hazard analysis of the work activity. From this perspective, the question could be answered "yes" because the process was in place to be used; the work crew did not follow procedure resulting in a less than adequate hazard analysis being done.

However, remembering Petersen's assertion that "an accident is an indication of something wrong in the management system:, one can reach a different conclusion by looking for ways to improve the process based on facts learned through the investigation. Areas of "failure" could be cited in the following areas:

- The bridging document process was less than adequate in that a hazard analysis by the ES&H Team was not mandatory when changes were made to the scope of work.
- The training program was less than adequate in that "trained operators" could check out a manlift even though they lacked proficiency on the actual piece of equipment.
- The FPOC program was less than adequate in that standards of operational knowledge (i.e., FPOC lacked sufficient knowledge of the building HVAC system and specific security requirements associated with the building). FPOCs reported directly to the Organizations they supported versus a central Organization that would assess their knowledge base against identified requirements.

For each example listed above, as safety professionals, we are in a position to recognize the weaknesses and recommend solutions to management. Areas of less than adequate process development and implementation can be identified through proactive self-assessment.

Hazard Evaluation Techniques That Work

A variety of hazard evaluation techniques are available to the safety professional. Common techniques, including work area inspections, roundtable reviews of proposed work activities, and the Job Hazard Analysis are effective if done properly, and with employee participation.

Lawrence Livermore National Laboratory has developed an elaborate Work Authorization process that uses an Integration Work Sheet (IWS) to authorize work activities above those normally performed by the public. Members of the ES&H Team that support the area where the work will be performed are involved in the review of the IWS. In many cases, a roundtable is scheduled to facilitate this review. A roundtable includes the Responsible Individual (RI) and the appropriate ES&H Team professionals. The RI is knowledgeable with regard to the proposed work and associated equipment. During the roundtable, the RI explains the work proposal and the equipment, chemicals, gases, etc., that will be used. Team members have the chance to see the room and its infrastructure and they are given the opportunity to ask questions about the activity. Roundtables generally take an hour to complete and usually help the safety professionals expedite their review of the IWS. With knowledge of the proposed work and the room where the work would occur, the safety professional is likely to complete a thorough hazard assessment.

The IWS is a detailed work authorization document. Major topics addressed in the IWS include:

1. Scope of Work
2. Work period (start and completion dates)
3. Work locations
4. Management chain responsible for the work activity
5. List of workers assigned to the work activity
6. Specific hazards and necessary controls to safeguard workers
7. Maintenance and Inspection requirements
8. Emergency Response Plans and Procedures
9. Worker specific training requirements
10. Attached/referenced documents supplementing the IWS
11. Medical surveillance/certification requirements
12. Authorizing Signatures

Workers assigned to the activity are required to read and sign the IWS before they are authorized to perform the work activity.

This sort of work authorization system can be an effective tool for safety improvement. Similar to the more commonly used tools, the effectiveness of the IWS is dependent on how well they are done. If the scope of work is not complete, there may be potential hazards associated with the work that are not identified, therefore, not evaluated. Necessary safety controls may be overlooked. A primary function of the roundtable is to establish a clear, complete scope of work. Even a well thought out IWS, completed properly, is not an effective safety improvement tool if it isn’t used properly. Pre-start meetings, led by line management, involve the workers involved in the work activity and members of the ES&H Team. Line management reviews the IWS, focusing on hazards and controls and leads discussion about the work activity. These meetings are augmented with daily tail gate, or work team safety meetings.

The desire for continuous improvement is what drives an organization to world class safety. Safety professionals play an important role in the process. Robust programs require effective use of management techniques – planning, organizing, directing and controlling (Friend and Kohn, pg 221). Today's safety professional must be competent in all phases of management to effectively facilitate a world class safety process.

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