

"Performance Metrics—Leading Indicators Deliver Sustainable Results"

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Introduction

There is no question that an effective safety and loss control program not only enables an organization to meet its moral and legal obligations to provide a safe and healthy workplace, but also enables an organization to deliver shareholder value and achieve financial objectives by preventing losses from occurring. The challenge is to identify and establish a set of performance metrics which enables an organization to measure the effectiveness of the safety and loss control program. Many organizations measure and report the OSHA Incidence Rate or Lost Time Injury Frequency Rate as the measure of safety performance improvement. These metrics only measure the failure rate of the safety and loss control program, and do not provide any measurement of the effectiveness of the program or monitoring of the program to ensure shortcuts are not eroding the safety process controls which prevent incidents from occurring.

This paper will provide practical illustrations of how continuous improvement methodologies (i.e. Six Sigma, Lean Manufacturing, and 5S, etc.) can be integrated with traditional safety management systems (such as incident reporting, behavior safety and risk assessment) to measure safety performance and deliver sustainable improvement.

Organizational Framework for Sustainable Results

Successful process improvement initiatives which deliver sustainable business results all have one common fundamental element—Leadership Commitment. Companies which have been successful with integrating Total Quality Management (TQM) systems, LEAN Manufacturing programs, Six Sigma quality process control systems and other business improvement processes into the culture of the organization, had to begin by engaging leadership early in the process to obtain buy-in to the changes required to drive step change improvement.

Engaging leadership to obtain buy-in is also the first step in any safety improvement process. Leadership demonstrates their commitment by removing the real (time and resources) and perceived (attitudes come from the top down) barriers that impede performance. An effective way to engage leadership is to establish “The What,” which is a vision for the future state of safety within the organization. The vision statement establishes the safety values of the organization and serves as the framework for building a culture of “this is the way we operate.” Refer to Exhibit 1 below for an example of a safety vision statement.

<i>“The What” – Safety Vision</i>	<i>“The How” – Safety Policy</i>
Zero Harm Charter	ABC Company Safety Policy
<p>At ABC Company we are committed to achieving Zero Harm. This means zero injuries and zero environmental damage.</p> <ul style="list-style-type: none"> • We commit and contribute. • We value everyone equally. • We respect ourselves. • We think first of Zero Harm. • We continuously improve. • We share. • We respect the environment. 	<p>ABC is committed to providing and maintaining a safe and healthy work environment and to preventing injuries or illness to our employees, customers, suppliers, contractors and community --- safety everywhere. Everyday.</p> <ul style="list-style-type: none"> • Continuously improve safety systems. • Monitor and measure performance. • Sustain regulatory compliant processes. • Provide training programs. • Consultative and proactive approach to risk management. • Minimize waste, conserve resources and protect the environment. • Apply best practices. • Recognize excellence in performance.

“Exhibit 1. The What”

“Exhibit 2. The How”

Once leadership has bought into “The What,” a roadmap for “How” the vision will be achieved requires leadership endorsement. “The How” is generally an organization’s safety policy statement which establishes the framework for development of an effective safety management system (SMS) to deliver sustainable performance improvements. The safety policy in Exhibit 2 above establishes a minimum performance standard to comply with regulatory requirements, provides for a monitoring and measurement system, requires the engagement of employees at all levels of the organization, sets the expectation for transfer of best practices and provides for a reward and recognition system.

By establishing a vision for safety within the organization and providing a roadmap for the processes and controls necessary to achieve the vision, it is now possible to generate a strategic plan to deliver improvement in safety performance which is endorsed and supported by leadership. To deliver on the strategic plan and deliver the desired performance improvement, it is necessary to develop performance metrics which measure: the effectiveness of processes to prevent losses from occurring; the outcomes of loss prevention processes; and the progress made over time to achieve the strategic plan.

Identifying the Metrics for Achieving Excellence

Achieving operational excellence and operating at a “world class” level of safety performance is not easy. Maintaining operational excellence requires a commitment to continuous improvement. Before excellence can be achieved, it is necessary to identify the way in which performance is to be measured and managed. In the late 1980s, noted management consultant Tom Peters popularized the saying “What gets measured gets done.” In subsequent years, that adage has served as the credo for many an organization. However, the saying comes up a little short on explaining how 'what' got done should be measured to ensure that it was done properly or that the 'what' improved over time.

Let's consider Tom Peter's adage again, but this time with a simple follow-up question appended. *What gets measured gets done, but how do we know if it was done effectively?* In other words were the results achieved productively, efficiently, safely, and by continuously improving?

Unfortunately, far too many organizations focus the bulk of their measurement activities on achieving lagging outcome results. In so doing, assumptions are often being made that these results were achieved through the proper implementation of processes and methods.

Measuring only 'what gets done' is outcome measurement. Measuring what gets done, how it got done, and whether or not it is improving over time is true performance measurement. Achieving performance excellence requires the management of outcomes, process application, performance improvement, effectiveness, efficiency, safety, quality and appropriate levels of internal controls. If performance excellence is to be managed and ultimately achieved, its pursuit requires the combined use of three sets of metrics:

- Outcome Metrics
- Process Metrics
- Progress Metrics

Metric / Indicator	Definition	Management Systems	Examples
Outcome <i>Lagging Indicator</i>	Measure of the output or result from processes usually occurring over a period of time	OSHA Reporting Incident Investigation	OSHA Incident Rates DART Incident Rates Lost Time Incident Rates
Process <i>Leading Indicator</i>	Measure of the application of inputs and methods that influence outcomes	Six-Sigma / Lean / 5S Risk Assessment Behavior Safety Observations	Housekeeping Audits Risk Profile Number % Compliance with Safe Behaviors
Progress <i>Improvement Indicator</i>	Measure of subsequent improvement as compared to an original performance baseline	Continuous Improvement Risk Assessment Behavior Safety Observation	% Improvement vs. Baseline R3 % Risk Reduction Score % Compliance with Safe Behaviors

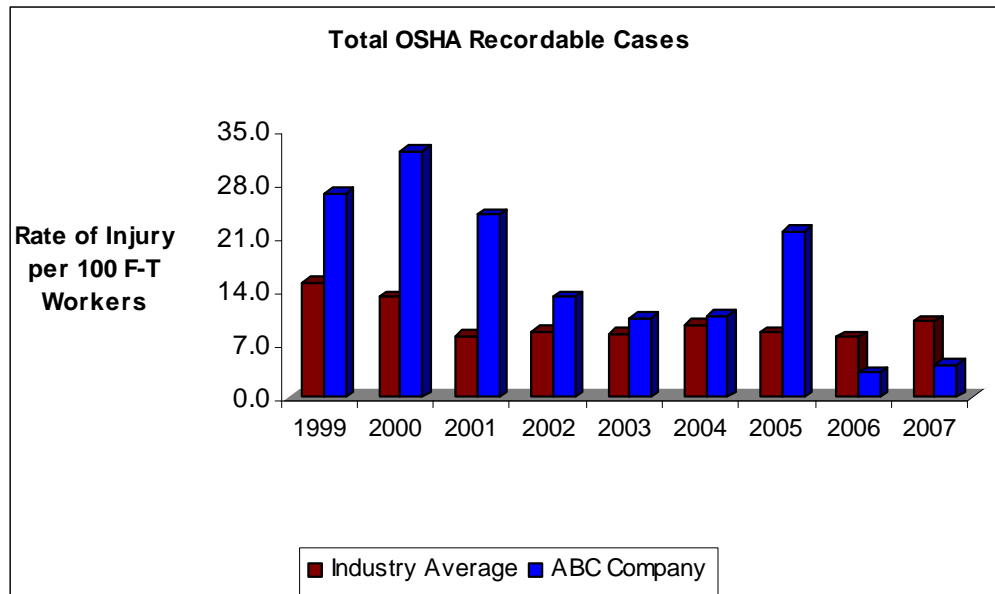
“Exhibit 3. Safety Performance Metrics Sets”

A disciplined approach to measuring safety performance requires use of all three of these metric sets (refer to the table in Exhibit 3). When used collectively, these metric sets provide the framework for systematic measurement of sustainable safety processes which deliver continuous improvement over time.

Outcome Metrics

Outcome metrics are perhaps the most widely used set of measures, and typically describe what is produced, achieved, or obtained. Outcome metrics are commonly used by organizations to describe success or failure, and are affected by a variety of factors. The OSHA Incident Rate, commonly used by many companies to measure safety performance, is one example of an outcome metric.

Outcomes are results produced from processes that have been applied over time, and they can be influenced by a great number of variables. Outcome metrics are considered to be *lagging or downstream* metrics. As a result, prescribing improvement strategies based on outcome metrics alone, is generally reactive, and does not ensure that the actual processes influencing the outcomes will be improved. The graph in Exhibit 4 compares ABC Company’s safety performance against the OSHA Incident Rate for ABC Company’s industry. With the exception of years 2000 and 2005, ABC Company’s performance followed the Industry trend - decreasing when the Industry incident rate decreased, and increasing when the Industry incident rate increased.



“Exhibit 4. Outcome Metric – OSHA Incident Rate Comparison”

While this outcome metric shows ABC Company’s improvement in safety performance over time, this metric offers very little insight into why ABC Company achieved significant improvement in 2006 and why safety performance is suddenly trending better than the Industry. Measuring the contributing factors that are actually influencing outcome metrics requires the use of process metrics.

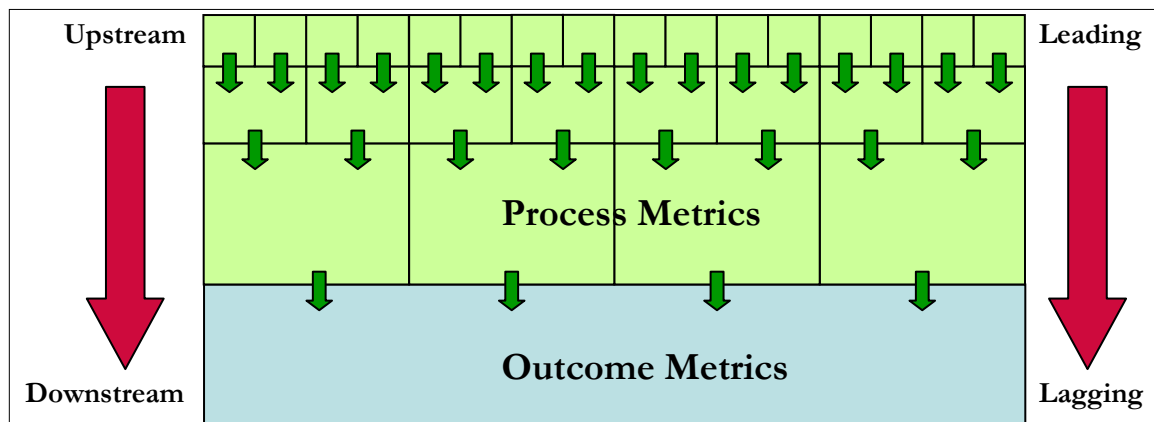
Process Metrics

Webster’s Dictionary defines process as: “*a particular course of action intended to achieve a result.*” In the context of performance, a process is a set of coordinated tasks and activities, conducted by both people and equipment that will lead to accomplishing the intended result.

Processes have inputs, methods and outputs. Inputs are pre-requisites that must be in place before the methods can be put into practice. When processes are properly designed, and the correct inputs and methods are properly applied, the desired outputs created are measurable and consistent. When processes are improperly designed, or deteriorate over time (such that there are discrepancies in required process inputs or methods) unintended outputs can be created. Unintended outputs equate to performance errors, and in terms of safety performance, these may ultimately result in employee injuries.

Ensuring that processes are properly designed and applied to achieve the intended results, requires *leading or upstream* measurement. While the numbers of variables that can influence outcomes are vast, it is possible to identify certain key indicators that are predictors of output. Since these indicators are generally process inputs and methods required to produce the outcomes, the metrics used to describe them are called *process* metrics. There is a considerable array of process indicators that may influence any given process. In addition, there are processes that influence other processes which, in turn, affect the outcomes obtained. The result is a cascading influence of process metrics which affect the results or outcome metrics. In this sense,

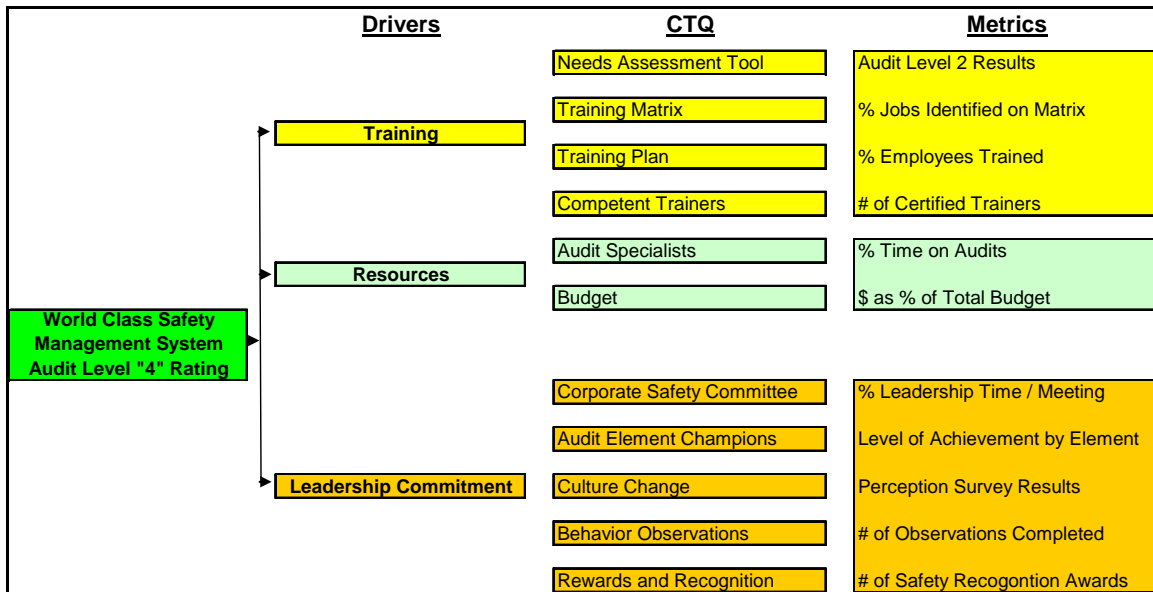
process measures are *leading or upstream* indicators of intended outcomes. The figure in Exhibit 5 below illustrates the “cascading” nature of these metric sets.



“Exhibit 5. Relationship of Process Metrics and Outcome Metrics”

Identifying which process metrics to measure can be challenging. There are many continuous improvement process methodologies such as Six-Sigma, Lean Manufacturing and Total Quality Management. These quality process improvement methodologies provide depth and detail with regard to selecting key process metrics that can be statistically determined to influence outcomes. The intent of this article is not to endorse one particular process improvement methodology, but to demonstrate how effective a safety and loss prevention program can be when the safety program metrics are aligned with the process improvement methodologies utilized by the business. For example, when ABC Company implemented Six-Sigma as the continuous improvement methodology of the business, the organization embraced and integrated measurement systems such as process capability, process control charts, failure modes and effects analysis and defects per million opportunities. Metrics were developed to measure the organization’s capability to reduce process variation and meet customer expectations.

The safety department at ABC Company recognized that applying the same process improvement methodology utilized by the business would enable safety processes to be measured more effectively, and would enable the safety department to present performance information to the business in a language the business understood. The stratification matrix in Exhibit 6 illustrates some of the key drivers and critical to quality (CTQ) components of an effective safety management system required to achieve world class performance. For each CTQ, metrics can be established, which by definition are leading metrics as they measure the process inputs which deliver the outcomes or results.



“Exhibit 6. Example of Safety Process Drivers and Leading Indicator Metrics”

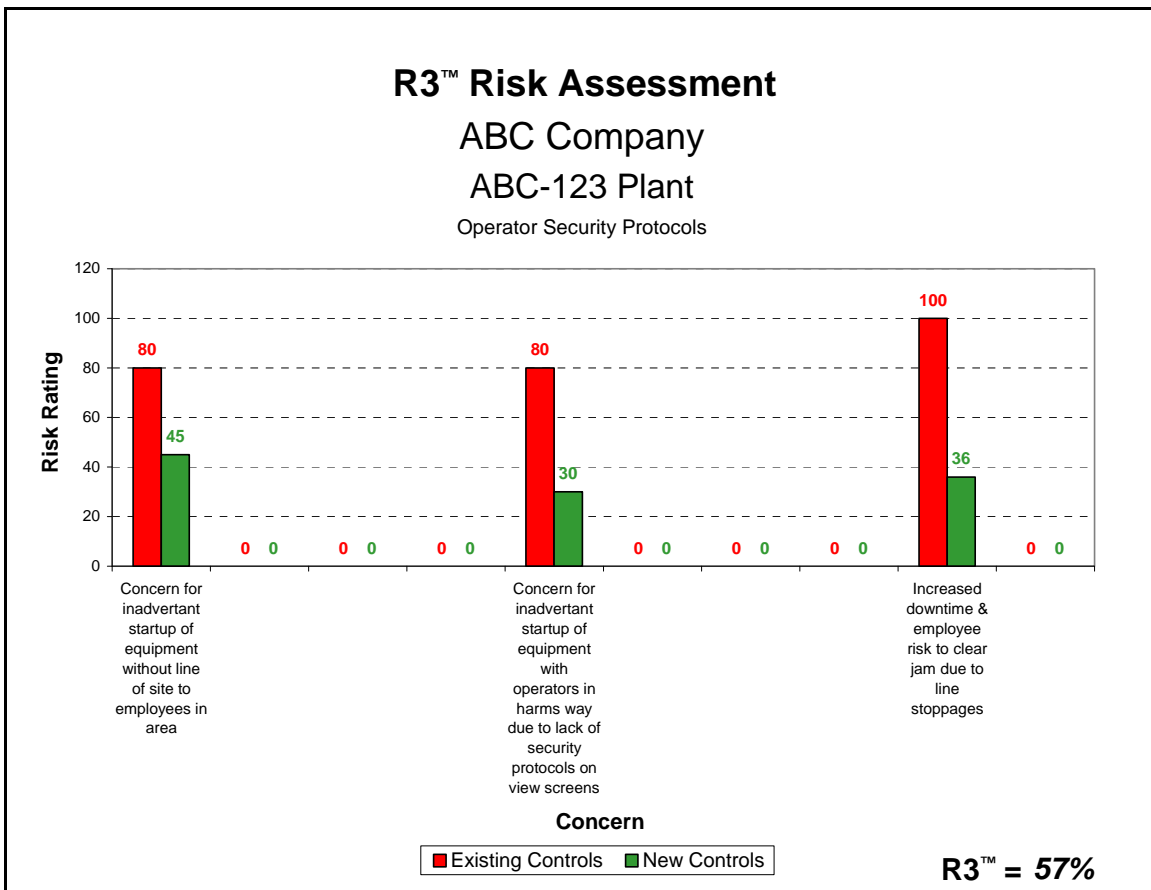
It is important to note that outcome measures have a tendency to flow out of everyday business endeavors. These measures are available without much investment to get them. Process measurement involves some expense of effort or resource, and rigorous discipline in the collection and analysis of process data is required. Utilizing process metrics provides insight and fact-based data to better understand what is influencing the outcome metrics and why.

Progress Metrics

Where comparisons of before and after performance are anticipated, and this is practically inevitable, a third metric set is needed. *Progress metrics* are used to measure the efficiency and extent of improvement achieved over time. All improvement endeavors have a starting point; a definable level at which change or improvement begins. This starting point is the performance baseline. This *baseline* level defines the current state of performance or the point chosen to begin the improvement process. Likewise, there is an optimum or objective level for the improvement, which can be defined as the *future state* or the level of performance to be achieved. While various progress metrics can be developed to measure improvement in safety performance, let’s explore two examples of process metrics utilized by ABC Company to influence safety outcomes and measure performance – risk assessment methodology and behavior safety observations.

One of the key principles in ABC Company’s safety vision statement is “We think first of Zero Harm.” This value statement establishes the premise that individually and collectively, the organization seeks to identify, evaluate and mitigate potential risks which can cause a loss to occur. The risk assessment methodology used by ABC Company to identify, evaluate and mitigate potential risks is the Residual Risk Reduction (R3™) process developed by Liberty Mutual (*Professional Safety* 2005). Risk assessment is a leading indicator and a measure of relative risk within process steps that have a high potential to lead to an incident, causing a loss to occur, if control measures (process improvements) were not implemented.

ABC Company has developed a training program which teaches front line employees how to conduct and document risk assessments using the R3 process. These assessments are usually performed by a team of employees. The risk assessment team observes the process which has been identified as requiring improvement; documents the process steps and conducts a baseline assessment to identify and measure the potential risk exposures within the process. Next the team develops new controls to reduce risk and the potential for a loss to occur; conducts a subsequent assessment to measure the effectiveness of the recommended improvements; reviews the assessment with plant leadership; and develops a corrective action plan to implement the recommendations developed. The sample R3 assessment conducted by ABC Company in Exhibit 7 below indicates a 57% reduction in residual risk (R3) could be achieved if all the recommended improvements are effectively implemented. This progress metric represents a significant improvement in the system risk versus the original baseline measure, which translates to a greater than 50% reduction in the opportunity for an incident to occur.

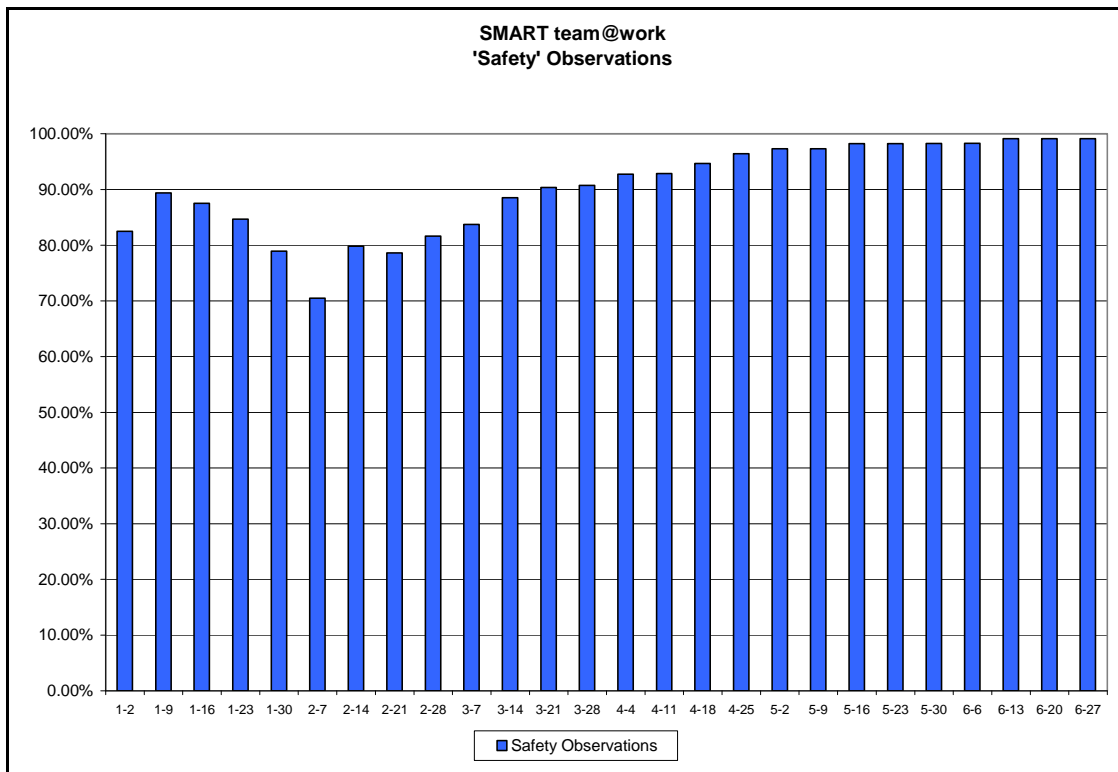


“Exhibit 7. Sample R3 Risk Assessment”

One of the statements in ABC Company’s safety policy is “Monitor and measure performance.” This statement implies that safety processes and practices are measurable and are monitored to evaluate effectiveness to deliver the desired performance over time. Documented safety and loss control policies, even if they are considered to be world class, are only effective if practiced and utilized consistently. After analyzing incident and injury data to determine why

injuries were occurring, ABC Company recognized that while everyone was aware of the safety procedures, employees routinely performed work tasks improperly, thereby increasing the risk of being injured.

ABC Company assembled a team of employees to identify what was causing injuries to occur and what they could do to prevent injuries from occurring. During a brainstorming session, the team identified systemic gaps in the safety and loss control program as well as causes of lack of compliance with the existing safety and loss control processes. To address the lack of compliance issues, the team identified specific measurable actions that each individual could take to reduce risks and the opportunity for injury to occur. These actions were then categorized into five focus areas – Safety, Maintenance, Awareness, Readiness and Training (SMART). The team documented the actions which, if followed, would keep employees from being injured. Since each action was specific and measurable, the team developed observation forms to measure the percentage of safe actions performed in each of the five focus areas. The chart in Exhibit 8 shows how the team measured compliance with safe work practices and serves as the feedback loop to employees demonstrating how well the location is performing against expectations to follow safe work practices. If performance dipped to an unacceptable level, the team analyzed the data collected from the observation forms to develop corrective actions to improve performance. This is evidenced by the significant drop in compliance to 70% in the week of 2-7, followed by incremental and sustained improvement beginning the week of 3-7.



“Exhibit 8. Sample Behavior Safety Observation Feedback Chart”

Progress metrics can be used to measure the continuous improvement of both outcomes and process. Progress measurement tracks incremental improvement in results as compared against the baseline, and the progress towards achieving the desired state of performance.

Summary

To deliver excellence in safety performance requires the establishment and monitoring of a set of performance metrics which enables an organization to measure the inputs of the safety and loss control process (leading indicators) which deliver the outcomes or results (lagging indicators). Since it is challenging to identify leading indicators of safety performance, the best approach is to adapt the continuous improvement methodologies used by the business to baseline the current state and establish a vision for the future state of safety performance within the organization. Process measures and progress measures enable the effectiveness of safety and loss control processes be measured and monitor the progress made over time.

By utilizing a combination of process metrics, progress metrics and outcome metrics, instead of saying “*What gets measured gets done*”, perhaps it is more appropriate to say “*What gets effectively measured delivers sustainable results.*”

Bibliography

CHEP USA. Safe behavior observation process (2001). *SMART team@work – Leader’s Guide*.

George, Michael L., Rowlands, David, Price, Mark, and Maxey, John. (2005). *The Lean Six Sigma Pocket Toolbook*, New York, NY: McGraw-Hill.

Liberty Mutual Group. Non-published Loss Control Resource Materials. (2003). *Performance Leadership - Three Metric Sets*.

Pande, Peter S., Neuman, Robert P., and Cavanagh, Roland R. (2000). *The Six Sigma Way: How GE, Motorola, and Other Top Companies Are Honing Their Performance*, New York, NY: McGraw-Hill.

Peters, Thomas, J. (1987). *Thriving On Chaos: Handbook for a Management Revolution*, New York, NY: Alfred A Knopf.

Tolbert, George D. (2005, Nov.). “Residual Risk Reduction: Systematically Deciding what is ‘Safe.’” *Professional Safety*, 25-33.