A Practitioner’s Approach to Utilizing Leading Indicators to Drive Contractor Safety Performance

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Introduction

Many safety practitioners in industry spend a fair percentage of their time dealing with the measurement of safety performance. While some of the time may be rewarding and ultimately improve safety performance, one should ask how much of that time is truly value added to the extent that it is clearly linked to preventing people from getting hurt or becoming ill. The purpose of this paper is to simply communicate learnings from past successes and disappointments at ExxonMobil Development Company in the area of measuring safety. Other practitioners in the field of safety are encouraged to share their professional experiences. After all, it is these experiences that supply validity to the existing concepts and serve as an impetus for new concepts. Sharing one's professional experiences can clearly have a positive impact beyond the fences of your employer.

Why Measure Safety?

When one discusses safety with other professionals and groups of workers, the first thing that should be communicated is that safety is not about numbers. It is all about people and preventing them from getting injured or becoming ill. An organization should be measuring safety performance to understand whether they are doing those things that prevent accidents and illnesses, and whether those actions are truly effective in terms of actual injuries and illnesses. Ultimately the numbers will tell an organization whether they as a team are being effective. Theodore Ingalls summarized the reasoning for measurement very well in a recent article in Professional Safety. He stated that measuring performance 1) enables reasoned decisions and assessments, 2) allows comparison with previous (or others’) performance, and 3) compares actual performance with planned performance.

Safety professionals should have a goal of helping the management team and the workers drive the numbers of injuries and illnesses in the work place to zero (or as close to zero as realistically possible). Recognizing that the organization will not likely get to zero injuries overnight, their performance is typically reflected as a downward trending curve over time. Given this simplest of curves, it is then reasonable to assume that their goal is to take the resources and knowledge that they have and effectively drive the curve downward (see Figure #1).
Safety Metrics – Leading and Trailing Safety Indicators

Safety metrics fall into two basic areas:

- Leading indicators which are measurements linked to actions taken to prevent accidents, and
- Trailing (or lagging) indicators which are measurements linked to the outcome of an accident.

Figure #2 depicts Joe taking a fall. Those things that could have been done to prevent the slip, whether it be improving housekeeping, providing slip resistant soles, or training Joe to recognize the slipping hazard, could all be defined as leading indicators. Those measurements linked to the outcome of the event, whether it be type of injuries, OSHA recordability, or near miss reporting are all examples of trailing indicators. Both areas of safety metrics will be addressed in this paper.

Trailing Indicators… What’s Really Wrong With Them

The most common trailing indicators (e.g., total recordable index, lost time index, and number of days restricted or lost time) used by American industry are those driven by OSHA recordkeeping requirements. Because of differences in interpretation and application of the OSHA recordkeeping guidelines they may not consistently reflect performance over time or between competing work areas. Trailing indicators have an inherently low level of confidence because of the large numbers of variables (e.g., people impacting the decision to record, or not record, an incident) and associated negative connotations of reporting an incident.
The first thing wrong with trailing indicators is that they are inherently linked to bad news, and rarely does anyone want to be the bearer of misfortune. Most trailing indicators used by industry reflect an injury or illness which, rightfully so, is bad news. This is especially true if one is the manager responsible for the operation where the injury or illness took place. How many times have you witnessed someone in your safety organization or line management demonstrate an eagerness to communicate less than positive news upward along the management chain? What are the chances that some injuries or illnesses do not get reported upwards if performance evaluations, pay, or bonuses are linked to the trailing indicators? Is it fair to state that many companies in industry have policies in place that mandate communication of injuries and illnesses, and if it were not for these policies, senior management may never hear of the incident?

Another factor that reduces the level of confidence on trailing indicators is the confusion associated with the definitions of recordability. While OSHA takes the position of “if in doubt just record it,” many in the industry take the opposite position of “don’t record it unless one absolutely has to.” Have you ever wondered why? How many discussions (or heated arguments) have you heard regarding recordability?

A third significant factor that impacts the confidence level of the numbers is the variability associated with how the accident is managed. For example, remember Joe in Figure #2. Let’s say Joe slips, falls, and breaks his arm while in Work Area A. The Area A manager is relatively new to the business of accident management, and allows the Doctor to send Joe home for two weeks despite the fact that Joe is capable (and even willing) to perform restricted duty. If Joe had been working in Area B (who has an experienced/aggressive manager), he would have been assigned to a restricted duty assignment. The incident would not have been recorded as a days away from work accident, and Area B would be perceived as having a better safety record. While the outcome of this example was impacted by the area managers’ accident management skills, it could also have been impacted by Joe’s cooperation (or lack of cooperation). Have you ever witnessed an injured person not wanting to report an injury or illness because he did not want to ruin the group’s safety record?

Trailing Indicators… Making the Best of the Data That You Have

In “Business Metrics for Safety: A Quantitative Measurement Approach to Safety Performance” (PS, August 1998, pp. 41-44), O’Brien demonstrates that trailing indicators such as an OSHA recordable rate may not accurately reflect a company’s safety performance and may be misleading. Although trailing indicators may be misleading, safety practitioners and professionals should recognize that for many in industry trailing indicators are simply not going to go away. Management and much of industry recognize trailing indicators as the ultimate final measure of performance and expect the safety organization to monitor and manage the data. Given that fact, why not make the best of the data that one may have. When evaluating injuries and illnesses, one may consider performing two additional analysis: 1) a severity analysis, and 2) an “if not but for luck” analysis.

A severity analysis is an analysis based primarily on the severity of the incident and excludes the variability introduced by interpretation of the OSHA recordkeeping guidelines. Injury and illness classifications within the OSHA recordkeeping guidelines are very broad. Both a burn that creates a blister the size of a pinhead and a well-managed broken arm may simply be an OSHA medical treatment injury. Two significantly different levels of pain, yet the same classification. To perform a severity analysis, one must have access to or develop a severity index with classification levels linked to the level of pain/discomfort and lower productivity. Figure #3 is a simple severity index that was
developed by several safety coordinators within ExxonMobil Corporation, your team should be able to come up with one that works equally well for your organization.

Figure # 3

Severity Index

<table>
<thead>
<tr>
<th>Severity Scale</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 0 (0 Points)</td>
<td>First-aid only, no restricted duty (RD)</td>
</tr>
<tr>
<td>Level 1 (1 Point)</td>
<td>RD ≤ 2 days, prescription medication, “minor pain” injuries, minor rashes (e.g., typical OSHA recordable)</td>
</tr>
<tr>
<td>Level 2 (2 Points)</td>
<td>RD ≤ 10 days, serious bruises or abrasions, “real pain” i.e., cuts that require stitches</td>
</tr>
<tr>
<td>Level 3 (4 Points)</td>
<td>RD ≤ 30 days, fractures, other “significant pain” injuries requiring surgery or hospitalization (e.g., typical days away from work OSHA recordable).</td>
</tr>
<tr>
<td>Level 4 (8 Points)</td>
<td>RD &gt; 30 days, multiple serious injuries, amputations, life threatening injuries or partial long term disability</td>
</tr>
<tr>
<td>Level 5 (16 Points)</td>
<td>Complete disability (e.g., unable to return to work) or fatality</td>
</tr>
</tbody>
</table>

To perform a severity analysis, one simply assigns a severity rating for each injury or illness that occurs and then analyzes performance and trends based on severity rather than OSHA recordability (See Figure #4). This eliminates the variability associated with the OSHA recordability definitions. Whether it is OSHA recordable and how it shows up on the OSHA 200 log is irrelevant. Some of the variability linked to accident management skills (or the lack of) is also eliminated. Because some of the variability has been eliminated, the data allows for better comparison of statistics over time and between other operations also using the index. Lowering the overall variability of the numbers increases the overall level of confidence of the analysis. As with OSHA recordability, the key to success is trying to not manipulate the numbers to look better. The numbers should accurately represent what takes place rather than desired results.
### Figure #4

Analysis of Severity Data

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>(Least)</td>
<td>42</td>
<td>35</td>
<td>28</td>
<td>25</td>
<td>15</td>
</tr>
<tr>
<td>Level 2</td>
<td></td>
<td>27</td>
<td>15</td>
<td>16</td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>Level 3</td>
<td></td>
<td>16</td>
<td>20</td>
<td>11</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Level 4</td>
<td></td>
<td>16</td>
<td>6</td>
<td>5</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Level 5</td>
<td>(Most)</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total Count</td>
<td>104</td>
<td>79</td>
<td>63</td>
<td>56</td>
<td>51</td>
<td>Sum L1 to L5</td>
</tr>
<tr>
<td>Weighted Score</td>
<td>336</td>
<td>241</td>
<td>192</td>
<td>127</td>
<td>163</td>
<td>(#L1<em>1) + (#L2</em>2)... (#L5*16)</td>
</tr>
<tr>
<td>Average Score</td>
<td>3.2</td>
<td>3.1</td>
<td>3.1</td>
<td>2.3</td>
<td>3.2</td>
<td>Total Count / Weighted Score</td>
</tr>
<tr>
<td>% Level 4 or 5</td>
<td>18</td>
<td>11</td>
<td>13</td>
<td>4</td>
<td>16</td>
<td>(#L4s + #L5s) / Total Count</td>
</tr>
</tbody>
</table>

The severity index can also be utilized in conjunction with an “if not but for luck analysis.” An “if not but for luck analysis” is best defined as an analysis that looks at potential outcome of an event rather than actual outcome. Most safety professionals understand that the outcome of an accident is to some extent a reflection of luck or in some cases lack of it. Each accident that occurs has an actual outcome and unless the actual worst thing that could possibly happen does in fact happen, an “if not but for luck” outcome. For example, when Joe in Figure #2 takes that slip one understands that the outcome could be anything from a bruised ego, to a broken arm, to a significant disability. Figure #5 shows several accidents that occurred, and using the severity index in Figure #3 assigns both an actual outcome and an “if not but for luck” outcome. Notice in the third incident that the actual and “if not but for luck” outcome is actually the same. For any given event, sometimes the worst thing that can realistically happen does in fact happen. There will be some accidents where this is the case and they may not necessarily be fatalities or complete disabilities.
Figure #5

Example of Incidents and Assigned Severity

<table>
<thead>
<tr>
<th>Description</th>
<th>Actual Severity</th>
<th>“If Not But For Luck” Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 While backing out a joint of drill pipe, a contractor was struck in the chest by the breakout tongs and knocked backwards through the V door.</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>#2 After cleaning the upper deck, a deck hand complained of eye pain. Upon examination by a doctor, it was determined that the deck hand had a very small piece of rust in his eye.</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>#3 While tightening a bolt, the fitter’s hand slipped and struck the valve. The resulting injury required two stitches to close.</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>#4 An explosion occurred in a mud logging house. The mud logger suffered bruises and cuts, and was placed on restricted duty for approximately 15 days.</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

One of the keys to an “if not but for luck” analysis is to not overstate the potential outcome. While there is a slight statistical chance that every time Joe slips he may potentially die, it is not reasonable to make that assumption in the analysis. It is reasonable to state that if Joe slips and hits his head he may potentially die. Always remember that there may be someone looking for a reason to invalidate the analysis. If the potential results are overstated, it is guaranteed that the audience will discount the analysis and question the professional credibility of those who performed the analysis. The primary purpose of the analysis is to help management and the workers understand the relationship between luck and outcome, and motivate them to eliminate luck from the equation. One may ask how do we eliminate luck from the equation? We can eliminate luck from the equation by placing additional emphasis on system and/or worker safe behaviors (e.g., elimination of hazards, substituting less hazardous designs, additional or redundant engineering controls, worker training, more protective PPE, etc.).

Figure #6 highlights performance differences between actual and potential severity. Plots of this type highlight the number of serious disability and fatality cases that could have taken place “if not but for luck.” It can be a real eye opener for both the management team and the workers. As with typical trailing indicators such as OSHA total recordability, severity data (both actual and “if not but for luck”) can be plotted vs. time to show performance trends.
Leading Indicators – An Opportunity to Maximize Performance

Referring back to Figure # 2, leading indicators are simply the metrics associated with measurable system or individual behaviors linked to preventing accidents. Leading indicators are all about maximizing safety performance by measuring, reporting, and managing positive safe behaviors. Early on it was stated that the goal of the safety profession is to ultimately reduce the total number of injuries over time by driving the injuries vs. time curve in Figure #1 downward and to the left. To achieve this goal, safety resources must be focused on accident prevention processes rather than accident management processes. It is really pretty simple, the more accidents effectively prevented, the fewer accidents that require valuable time to manage, and ultimately more time to focus existing resources on accident prevention processes.

Businesses and industry typically establish goals and measures those things that are truly important such as cost, quality, schedule, and production rates. If safety is truly important and it is about preventing accidents, should industry and the safety profession not be measuring those key actions taken to prevent accidents? If the safety profession is not measuring those actions, how can the companies and businesses they represent understand whether those actions are up to their expectations? If one does not measure those key behaviors associated with preventing accidents, can one truly control them in an effective and efficient manner?

Getting Started with Leading Indicators

In getting started with leading indicators, there are three steps that one should undertake. First, one must try to understand the cause of accidents in their operations. Second, given the cause of those accidents, determine the key steps to preventing those accidents. Third, convert those key steps into measurable processes.

Analysis of ExxonMobil technical data demonstrates that multiple (e.g., not just one) unsafe behaviors are linked to 90+ percent of the accidents. Figure #7 summarizes why accidents happen at many of ExxonMobil's work locations.
Why Accidents Happen

Multiple Unsafe Behaviors Due To…

- Lack of knowledge or ability to recognize hazards
- Blurring of consequences
  - Failure to fully understand
  - Discounting
  - Denial
  - Flagrant disregard
- Blurring of priorities
- Inadequate/lack of appropriate tools
- Inadequate/lack of processes
- Failure to manage change
- Caused by others

…Leads to Management System Failures and Human Error

Understanding that most accidents are linked to unsafe behaviors, then the key to preventing accidents would be to focus on promoting safe behaviors as highlighted in Figure #8.

Keys to Preventing Accidents

Promote Safe System Behaviors and Individual Behaviors by...

- Providing employees with knowledge/skills to recognize potential hazards and associated consequences
- Providing employees with appropriate tools and resources
- Demonstrating management leadership and commitment
- Focusing on and implementing accident prevention processes
- Getting employees involved
- Implementing processes to assure
  1. Redundancy
  2. Checks and balances
  3. Failure elimination
The next step to developing leading indicators for a given site is to convert those key steps linked to preventing accidents into measurable processes. This can also be stated in terms of defining the measurable basis for the work location's current success, or determining those measurable actions that must be taken to improve performance. When developing leading indicators for a construction site, the five key questions in Figure #9 should serve as a starting point.

**Figure #9**

<table>
<thead>
<tr>
<th>Five Key Questions to Ask When Developing a Leading Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) What is the safe behavioral basis (either system or individual) for the site’s success,</td>
</tr>
<tr>
<td>2) Is it measurable,</td>
</tr>
<tr>
<td>3) If the site does more of it (or improves quality) will safety improve</td>
</tr>
<tr>
<td>4) If the site management team does not manage those safe behaviors, is the rate of safe behaviors likely to drop, and</td>
</tr>
<tr>
<td>5) If the rate drops will safety performance decline?</td>
</tr>
</tbody>
</table>

Looking at these questions in more detail, a safety professional working with the site management team should be able to develop multiple leading indicators for any work site. ExxonMobil Development Construction Company’s experience has shown that effective leading indicators are those metrics linked to safe behaviors, which are simply those actions taken by the site to prevent accidents. Some examples of safe behaviors include: safety training provided, safety communications performed, level of employees participation in or leading of tool box safety meetings, numbers of supervisors participating in safety walkthroughs, number of safety audits performed, number of safe behaviors observed, etc. The list of possibilities can be endless, but the ones chosen should be embraced by the site’s supervisory and worker safety teams. Ownership is everything!

Since it is a challenge to control (or manage) those things that one can’t effectively measure, the leading indicator must be measurable on a real time basis. If the indicator is not measurable, it will be difficult to establish a quantifiable goal and communicate progress towards a level of excellence. While measurement of safety attitudes on a real time basis is at best difficult, measurement of safe behaviors can be accomplished on a real time basis with a reasonable level of resources if the measurements are kept simple. The chosen leading indicators need to drive safety performance such that if a site does more of it (or improves relative quality), the impact will be an improvement in safety performance. For example, ExxonMobil Development Company encourages management participation in safety walkthroughs and recognizes them as a key element of safety success at many construction and installation sites. If one agrees that management participation in safety walkthroughs are a key element of success, then one should also agree that if the site increases the number of walkthroughs or improves the quality of the walkthroughs, safety performance at the site should be positively impacted. Another good example is the level of housekeeping at a site. If the level of housekeeping at a given site is a good barometer of safety at that site, then one should agree that if housekeeping is improved, then safety should be improve.
The leading indicator should be a measurement that benefits from the management process. Looking back at housekeeping, if housekeeping is already excellent because it is ingrained into the culture of the site, then the benefits of measuring housekeeping may be marginal and thus not an effective use of a site's resources or management's time. Those things that a site measures should reflect a safe behavior that the site safety team, managers, and workers believe is worthy of measure and needs the measurement process to keep the effort robust. If the rate drops and performance does not decline, then why focus resources on those measurements? Remember that most sites have limited resources and resources must not be wasted on processes that do not drive safety performance towards excellence.

Things to Avoid (and in some cases, our mistakes are your gains)

Measurements that have negative connotations should be avoided. It is difficult to envision any organization embracing, for an extended period of time, any process of reporting something that reflects negatively on either the team or an individual. Indicators (whether it be leading or trailing) with negative connotations reward individuals and groups for not reporting. A good example of an indicator with negative connotations is near misses. While near miss programs are very valuable, many near miss programs fail because of the negative connotations associated with reporting near misses. Given enough time, it becomes convenient to stop reporting near misses and sometimes the site may even be rewarded for reduction of reporting.

Near miss reporting should be considered a trailing indicator, since the only difference between a near miss and a fatality is many times simply luck (remember the "if not but for luck" analysis). Many in industry, including ANSI, have redefined near misses as “near hits.” For example, on any given day an individual may be at a construction site and experience a near miss (or “near hit”) when individual error and/or system failures take place resulting in a piece of steel falling off a scaffold from a height of 30 feet. The piece of steel hits the ground five feet from a worker, and other than increased anxiety the worker is not impacted. A few days later the same individual behavioral error and/or system failures take place resulting in another piece of steel falling off the scaffold. Rather than landing five feet from a worker on the ground, the piece of steel strikes a worker on the head, and the worker becomes an injury statistic. The only difference between the near miss and actual hit was luck. Before one defines near miss or near hit reporting as leading indicators as the following question: If an actual hit (e.g., injury) is considered a trailing indicator, then why would a “near hit” (or near miss) be defined differently. The safe behaviors associated with leading indicators have the potential to reduce both the numbers of near misses (or “near hits”) and actual hits.

A site may also want to avoid starting out with too many leading indicators. Remember that leading indicators may be a new concept for the site team to grasp, plus the extra administrative burden may overwhelm those responsible for compiling the data. Experiences with contractors working for ExxonMobil suggest that a site start with no more than four or five, and some sites may even consider starting out with just two or three if existing resources are really stretched thin. Sometimes in the safety business slow may be better if it leads to a higher level of acceptance and long-term success.

It may be to the site's advantage to avoid indicators and associated measurement processes that are too complex. A lot can be said for simplicity, plus keep in mind that while some forms of measurements may have meaning to the safety and/or management team, they may be meaningless to the workers. There have been a few articles published on leading indicators, and some of those articles promote some fairly complex indicators. Complexity of the measurement processes and reporting may increase both the chances of error and miscommunication.
Implementing leading indicators that, by dictate of the safety group or sometimes even offsite management, must be used at every site reduces the buy-in and ownership of both the local management team and the workers at the site. Ownership is everything. The site team should keep in mind that if it becomes a competition of numbers; the numbers themselves may take on more importance than the outcome. The sole purpose of using leading indicators should be to improve safety performance at the site. Competition can lead to inflation of the numbers, which is neither effective nor efficient.

**Case Study: Fabrication of Diana Project Topsides**

ExxonMobil Development Company recently completed fabrication of two structural steel decks and associated production facilities for an offshore oil and gas platform that will be situated in the Gulf of Mexico 160 miles from Galveston Texas. The 120’ by 120’ decks were fabricated in Brown & Root’s Greens Bayou Fabrication Yard (GBFY) in Houston Texas over an eighteen-month period in 1998 and 1999. Total weight of the decks and associated piping approached 16,000 tons and during the peak of construction, staffing levels reached in excess of 1200 workers. As a result of 1) management leadership and commitment, 2) worker involvement, and 3) focus on accident prevention processes, significant improvements were made in the safety performance of the GBFY over the first nine months of the project. The Brown & Root management team recognized the benefits of improved safety performance and communicated a desire to implement processes to sustain this performance level. The choice was made by the management team to implement the use of leading indicators. The safety team at Brown & Root analyzed success factors and proposed several leading indicators that will be discussed individually below.

**Quality of Morning Safety Meetings**

The construction team at Brown & Root starts each work shift off with a short tool box safety meeting. It was recognized that this safety meeting set the stage for the day’s safety performance and served as a key process in planning the work and communicating potential hazards. The quality of the meeting is a measure of thoroughness and participation. A scoring tool was used to evaluate meeting performance (e.g., quality of communication, attentiveness, worker participation, etc.) and the raw score plotted vs. time. As noted in Figure #10, relative quality of the morning meetings went from a score of 3.5 to almost 5. As a result of the scoring process, those leading the meeting were coached on more effective planning and presentation skills. The person scoring the meeting also coached the workers to participate in the toolbox meeting.

![Figure #10: Relative Quality of Morning Safety Meetings](image-url)
Housekeeping

Housekeeping was recognized as a barometer of safety at the fabrication site. With as many as 1200 workers working on two decks simultaneous, it was very important to keep housekeeping under control. Early on, a scoring process was developed to evaluate housekeeping and if the average score dropped below a value of seven, then the entire project was shut down and the sole task of the project became one of getting the house back in order. The project stewarded both the numbers of times that the project was shut down and the relative level of housekeeping. As shown in Figure # 11 and Figure #12, the relative level of housekeeping improved over time and the number of times the project was shut down decreased over time.

![Figure #11](image1.png)

**Figure #11**

*Average Housekeeping Score*

![Figure #12](image2.png)

**Figure #12**

*# of Closed Down Areas*

Barricade Performance

Fabrication of the structural steel decks and installation of the associated equipment required a significant amount of work to be performed in elevated areas. Precautions were taken to prevent items from falling, and redundancy was built into the safety process by requiring the use of barricades. Initial observation by both the management site safety team and the worker site safety team indicated that the barricade program was not performing as expected. The decision was made to improve barricade performance and a measurement process was implemented. As a
result of the observations and associated scoring process, weaknesses in barricade performance were identified which ultimately resulted in the changing of barricade processes and additional specific barricade training. The end result as noted in Figure #13 was an improvement in barricade performance over time.

Figure #13

Safety Walks

Early on, the Diana Project team recognized that management leadership and commitment would be a key element of the safety success. One way to demonstrate leadership and commitment is to actively “manage by walking around.” Senior management and foreman at the site were encouraged to participate in safety walks. The purpose of these walks were to 1) actively seek out significant hazards using the most experienced managers at the site, 2) motivate and visibly demonstrate to the workers that the management team cares about their safety, and 3) lead by example. Early on the walks by senior management were viewed as a policing effort, where management walked through the site, took notes on every hazard they spotted, and then as a team generated an action item list. Over time, management learned to focus in on only the most significant hazards and an equal amount of time was spent talking to the workers trying to understand from their perspective what hazards existed, and what they thought the best solutions may be. One just can’t say enough positive things about "actively caring." For more information on the subject of actively caring, one may want to read Dr. Scott Geller’s book titled The Psychology of Safety. As demonstrated by Figures # 14 and 15, significant progress on foreman and site management participation was made over time.

Figure #14
Case Study Results

The utilization of leading indicators was a success in this case study. ExxonMobil Development Company believes it was a success not so much because of the improvement in the total recordable rate, but because it was an excellent process for 1) getting management involved, 2) increasing worker involvement, and 3) focusing safety resources on accident prevention processes. As shown in Figure #16, the injury rate did significantly improve. The case study involved 4+ million manhours of labor and the safety performance improvement over a 24-month period resulted in approximately 75 fewer injuries.

How much of the improvement that can be linked to the use of leading indicators is debatable. The management team and the workers clearly had a desire to improve, and would likely have shown improvement with or without the use of leading indicators. The only thing that is known for a fact is that there was statistical improvement in those processes that were measured, and those processes were associated with preventing accidents. The management team reviewed the processes monthly in their management safety steering team meetings, and on several occasions made conscious decisions to drive improvement into specific processes. For example, the percent of management and foremen participating in the safety walks increased as a result of the monthly review process by the management safety steering team. Housekeeping improved because the
management team and the foreman were dissatisfied with housekeeping, and made a conscious
decision to measure it during their safety walks. The barricade process improved because it was
inspected weekly, measured, and results used to train the workers in the morning safety meetings.
While one may not be able to prove that the use of leading indicators clearly led to an
improvement in performance, one can say that it facilitated the improvement. The use of leading
indicators provided the management team additional opportunities to manage safety performance.
They took advantage of that opportunity and did well! What more could one ask for?

Conclusion

Many in the safety profession spend a significant amount of time gathering, analyzing, and
reporting numbers. If all this effort is not directly leading to improved performance, then maybe
a site's safety resources are not being utilized in an optimal fashion. The safety profession's goal
should be to ultimately improve both short term and long term performance. This equates to
fewer workers being injured. It can be summed up by saying that the safety profession is all
about preventing accidents. Fewer accidents lead to fewer injuries and illnesses, which lead to
fewer lives disrupted. As frustrating as they may be at times, trailing indicators do offer some
insight into safety performance. Used correctly, the data associated with trailing indicators can
help both the management team and the workers better understand overall performance trends
and the significance of relatively minor events.

Leading indicators are all about focusing resources on those things that a site does to prevent
accidents. If used correctly, leading indicators:

⇒ Allows management to actively demonstrate commitment and leadership,
⇒ Allows the workers to get involved with measurable processes, and
⇒ Focusses resources on accident prevention processes.

The case study in this paper supported the accepted belief that those things that get measured
and reported to management get attention. The case study also supports the ideal that the use of
leading indicators can facilitate improved performance. Are your respective sites measuring
those safe behaviors that drive safety performance towards a level of zero injuries and illnesses?

Selected Articles Related to Safety Metrics

All the following articles have been published in Professional Safety Journal of the American
Society of Safety Engineers. The following abstracts have been included to facilitate your
interest in reviewing the articles. Special thanks to Ms. Cathy Matula with the ASSE who
assisted with researching the abstracts.

<table>
<thead>
<tr>
<th>Title, Author, Date, etc.</th>
<th>Abstract</th>
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<tbody>
<tr>
<td>Caution: Beware of OSHA Statistics. D. F. Zahlis. Dec 1995: 41-43.</td>
<td>Author says that using OSHA statistics as the primary measure of program effectiveness causes the divorce of two disciplines that should be highly integrated--safety and claims management.</td>
</tr>
<tr>
<td>Title, Author, Date, etc.</td>
<td>Abstract</td>
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<td>Benchmarks of Safety Quality. S. J. Adams. Nov 1997: 33-34.</td>
<td>&quot;How can one quantify safety and health?&quot; To answer this question, the author describes three measures that safety pros can use to develop a quantified benchmark of their firms' safety performance.</td>
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<tr>
<td>Safety &amp; Statistical Process Control: One Perspective. L. W. Sorrell. Jan 1998: 37-38.</td>
<td>Although statistical process control techniques are effective tools, they are not safety's panacea, the author warns. The true key to safety improvement is thorough accident investigation and analysis.</td>
</tr>
<tr>
<td>Measuring Safety Performance to Achieve Long-Term Improvement. J. C. Manzella. Sept 1999: 33-36.</td>
<td>Author says implementing program changes based on OSHA statistics is an ineffective strategy; instead, firms should measure conformance to established systems, which allows risks to be identified before injury occurs.</td>
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References


