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Preventing Serious Injuries and How BBS Can Contribute

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Quality Safety Edge

ABSTRACT

OSHA and others report than recordable injury rates are poor predictors of fatalities and other serious injuries. Most of these sources recommend the use of the hierarchy of controls in response to detailed analyses of incidents that have the potential for serious injury. The behavioral causes of a large number of fatalities remain in the areas long identified by safety professionals as the "safety absolutes" which include procedures such as lockout/tag-out, vessel entry, permit to work, etc. Dr. McSween will discuss a behavioral approach that helps management focus on the hazards that are most likely to cause fatalities or serious, life altering injuries. He will also discuss some of the differences in the application in construction projects versus manufacturing versus process plants. Leadership must take responsibility to ensure that hazardous work with the potential for serious injury or fatalities is identified and that adequate controls are put into place. Leadership must understand the importance of reinforcement in creating a positive workplace in which employees are not afraid to have honest discussions about safety.

Keywords: Behavior-Based Safety, Serious Injury Prevention, Fatality Prevention, behavioral safety, reinforcement

INTRODUCTION

In the past couple of years, serious incident prevention has been a hot topic in the safety community. Tom Krause, Ph.D., and his colleagues formed a consortium of companies that began to look at the relationship between incident reporting and fatalities[1]. About the same time, in 2013, Professional Safety and other safety periodicals published numerous articles on preventing serious injuries and fatalities. These factors prompted me to begin to think more critically and in more depth about that subject. The data in Figure 1 led Dr. Krause and the companies that were participating in this consortium to take a closer look at what they were doing to address injuries in the workplace. The point they make is that we have been more successful in eliminating the medical-treatment cases—that is the recordable injuries—than we have been at preventing fatalities and serious incidents. Following are some of the data that inspired their further inquiry.

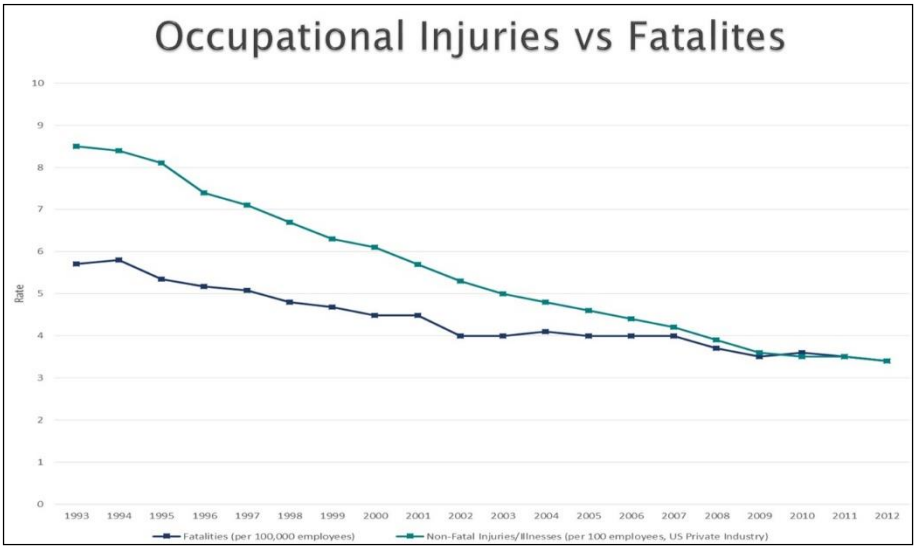

Figure 1 – Fatalities (per 100,000 employees) compared to occupational injuries (per 100 employees).

Looking at the Figure 1, the two sets of data appear to have a positive correlation, but, at least in a sense, the consortium's findings are right. The lower bar, which is the fatalities for 100,000 employees, doesn't have the same steep, downward slope as that of non-fatal injuries. At first glance, I thought that maybe the better you are at safety, the harder it is to improve. Maybe we're hitting an asymptote, but I think there is more to it. I also considered the fact that one of the things that's begun to happen in the last few years is an increase in the number of workplace homicides. Last year out of the 4,000 fatalities in the United States, 700 were deaths caused by workplace violence, which is now another factor impacting the number of on-the-job fatalities. I decided to look at other available data to see if specific sectors experienced similar

patterns. OSHA and the Bureau of Labor Statistics (BLS) have made upgrades to their websites that make it easier to tease out better data for analysis. The changes they've made in the last year will also make it easier to examine fatalities in the future. So from 2011 going forward, we'll be able to look more effectively at fatalities, the causes, and where they're occurring. I looked at just two industries, pulling the data out of the BLS interactive database, which is a wonderful tool. Below is the data on manufacturing. Here, we're talking about lost-work cases, not fatalities, because again they just made this shift to begin tracking fatalities in the same way that we've used historically around lost-workday cases. It's still a good metric and one I believe is indicative of how successful we are at eliminating serious injuries. The graphic indicates that certainly in the last couple of years the number of lost-work cases in manufacturing have been rather flat. I looked at construction as well and there's a little more of a steady downward trend, but not quite so much of a flattening out at the bottom as in manufacturing (See Figure 3).

This data raised the question for me, "If we're being more effective at addressing incidents requiring medical treatment, what role does BBS have in that and how effective are we at eliminating serious injuries and fatalities?" In the past, I can remember hearing people saying that BBS actually has a bigger impact on medical-treatment cases than it does in reducing lost-workday cases. That's contrary, in fact the exact opposite, of my early experience. For example, in Fugure 4 is data from an ore-processing plant that one of our consultants, Dr. Judy Stowe, worked with some years ago. The implementation of BBS had an immediate, significant effect on the severity of injuries. The longer they worked at improving their safety, the better they got. The graph shows severity rate, so the data points reflect the number of lost workdays per 100 employees.

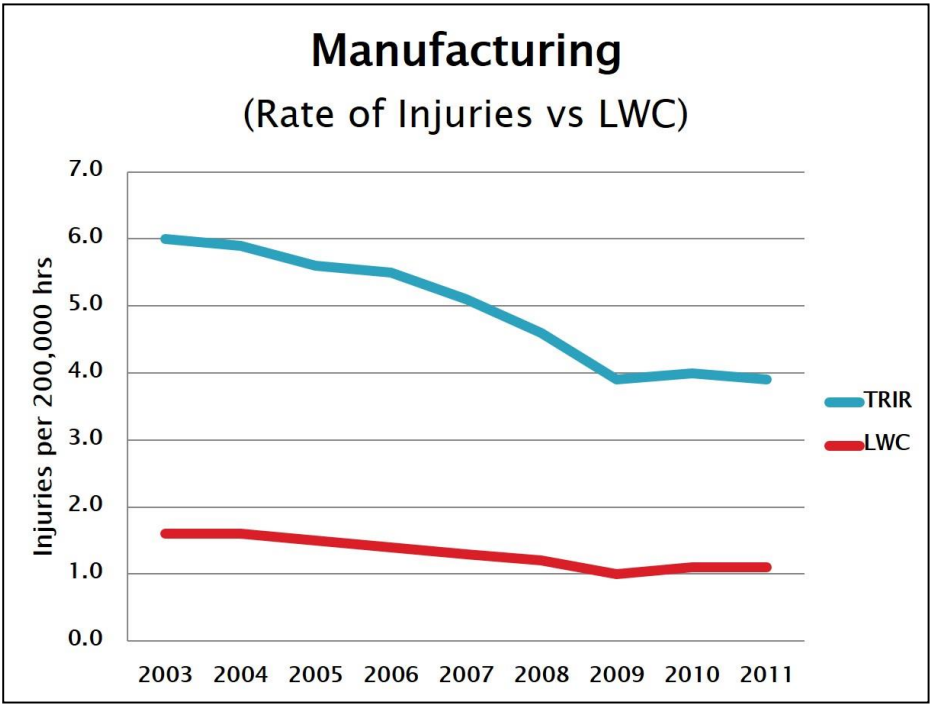

Figure 2 – Lost workday case rate compared to total recordable injuries (both per 100 employees) for US manufacturing.

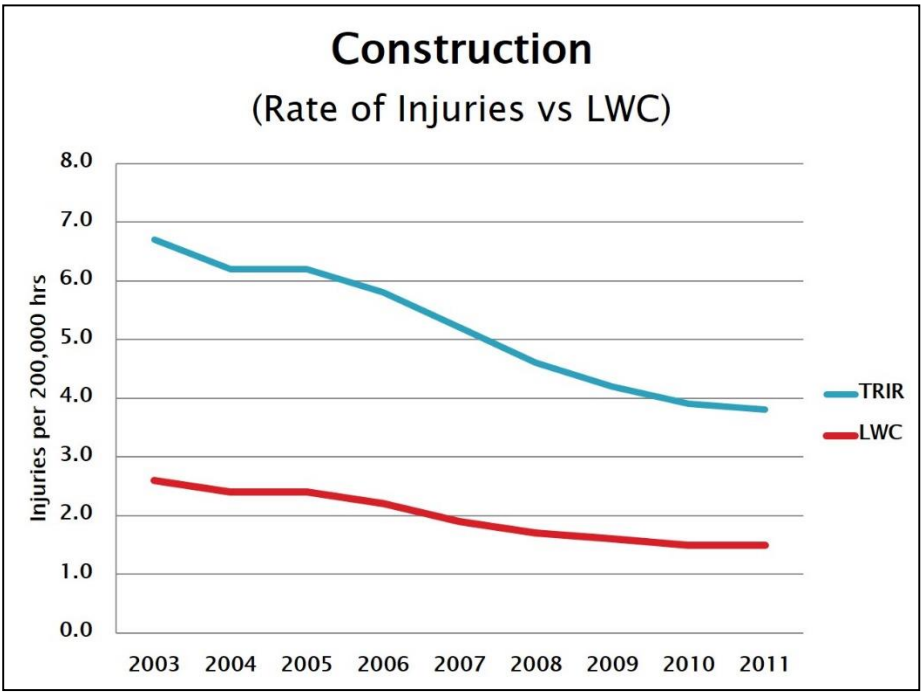

Figure 3 – Lost workday case rate compared to total recordable injuries (both per 100 employees) for US construction companies.

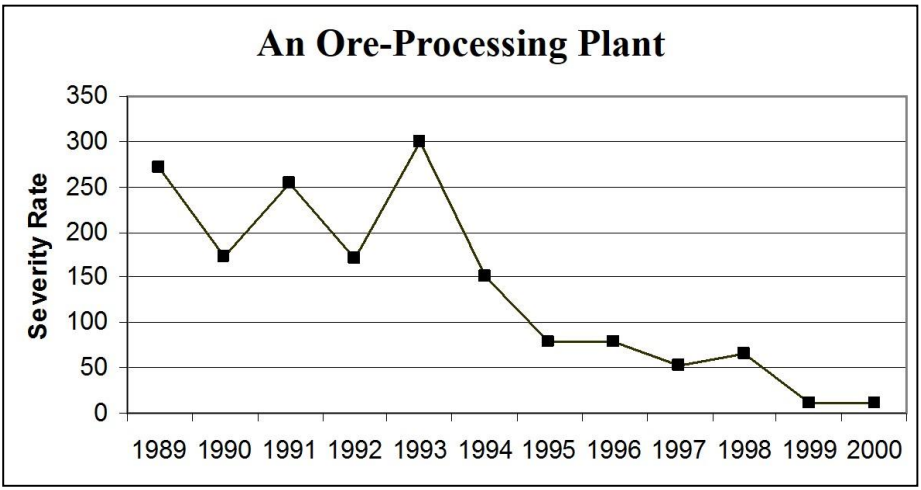

Figure 4 – Severity rate before and after a BBS implementation in 1994 at an ore processing facility.

A BBS FAILURE

I must acknowledge that not every BBS process works. In fact, I was very bothered a few years ago when I came across a research study published by the American Society of Safety Engineers on one of Chevron's efforts in the Toluca Oil Field off of Angola. I was very irritated by what the report labeled as behavior-based safety because it was not behavior-based safety as I understand it. The first line of the article demonstrated that the Chevron process was one based on a poor understanding of behavioral psychology: "The premise is that at-risk behaviors are the main cause of accidents." Then I looked at the methodology. With an average of 200 employees in this gas-production and gathering-center operation, they averaged 189 observations a day. Note that most of the research suggests roughly one observation per employee per week for most organizations. More specifically, work by Chuck Pettinger and his colleagues (2013) suggests that one observation per day is well past the point of diminishing returns. A number of other things concerned me about the process as it was described in the article. For example, they reviewed observation data in safety meetings. The safety team then picked a target for the next week; that is, they picked a target behavior that observers were going to give feedback on based on the previous week's observations. Not bad, except that they focused strictly on the behavior. The data were apparently not used as the basis of action plans to identify and address conditions that contributed to at-risk behavior. Also, the article did not describe leadership's role in the process, suggesting that leadership did not participate to ensure that BBS was an effective vehicle for engaging employees in safety improvement.

At the Behavioral Safety Now (BSN) conference in 2013, I had the opportunity to attend and listen to what Chevron was doing at that time in those same facilities. Instead of one observation per employee every day, they now encourage employees to do one observation per week with a heavy focus on quality of the observations. They also began to track the action items and assure the issues identified through the observations were addressed. In other words, they began to use the observation data to help address the conditions that cause at-risk behavior. Also, two levels of leadership above the onsite leadership go out into the field and do two observations a month, thus providing the visible leadership participation that, as we know, is critical to success. In yet another improvement, they reduced the length of the checklist behaviors from 37 down to 20, making it more relevant to the hazards and incidents they experienced on the production platforms. In my opinion, the most important change was growing an understanding that behavior is not a root cause of injuries, that behavior is a function of the environment, and that the way to change behavior is by changing the environment!

Sometimes, in spite of our best efforts, even our clients miss this message. I've been surprised at how difficult it is to get leaders to understand behavior and to view it as a function of the system. A couple of years ago, I was on a phone call with one of our clients: I'm almost too embarrassed to tell you about it. We were talking to the corporate director of HSE worldwide and I was asking questions about what the safety committees were doing with the observation data. I had been concerned, but they had

made some changes in the past couple of months and were doing better at it. Still, I was pushing them to be more aggressive at addressing hazardous conditions. Previously, when I was at this facility doing a tour of one of their plants, I saw a Plexiglass guard with a hole cut in it that allowed the employee to reach in and clear jams. What's wrong with that picture? I was really getting a little pushy about this and the client said, "Terry, this process is about fixing behavior, not conditions!" Remembering that conversation, I was thankful that my associate, Grainne Matthews, was on the call. She'd been working with one of this client's plants in Europe. I asked, "Grainne, what are the steering committees at the plant you've been working with doing to address conditions?" She reported that every employee and every department could point to at least one condition that had been addressed as a result of the committee's analysis of the observation data. I was pleased with her response as her plant demonstrated the proper use of observation data. That said, I remain disappointed that, as a field, we are not where we need to be in terms of encouraging a more robust understanding that the causes of behavior are in the environment.

PRECURSORS TO SERIOUS INCIDENTS

The study of serious incidents conducted by Dr. Krause and his consortium had another important conclusion. They examined the ratios in their data and compared their experience to the safety triangle developed by Heinrich. After reviewing their own data, the consortium decided that Heinrich's triangle was a good descriptive tool but not an effective, predictive tool. Thus, while it suggests that the ratios may exist, we cannot predict that we will reduce serious injuries just because we have reduced minor injuries. The important implication is that we cannot drop our guard against serious injuries just because we have been effective in reducing our overall incident rates.

Further, the consortium reported that serious incidents had observable precursors. In the chain of events leading up to an injury, almost every one of them was preceded by an at-risk behavior. Also, the behaviors are well known and are often in the category of behaviors in areas we consider as safety absolutes: fall protection, breathing apparatus, permits, proper excavations, and working around vehicles. Krause and his consortium report that, 87 percent of the time, problems with those factors could have been uncovered through safety observations and, therefore, a safety conversation could have prevented the incident.

Their findings suggest that we need to pay more attention in our analysis of observation data in the blue part of the triangle—those at-risk behaviors, first-aids/near misses, recordable and lost-time incidents—that could have potentially resulted in serious injury or fatality. The other data that fall outside of the blue area are important if we want to eliminate injuries and medical treatments, but if we want to prevent fatalities we've got to give a different level of attention to that "blue-area" data in Figure 5. When the consortium group began talking about precursors to serious injuries and fatalities, initially I was bothered by the new terminology. I was afraid talking about precursors would distract us from talking more specifically about the behaviors. As I studied their work more, I became more comfortable with the term precursor because it expands our

understanding to include (1) specific high-risk behaviors, (2) high-hazard tasks and conditions, and (3) complex situations or changing environments—startups, upsets, changes that occur sort of midstream after our GA, SA has been completed and we're in the middle of a task. Precursors of any one of these three types should prompt additional study and an additional layer of protection.

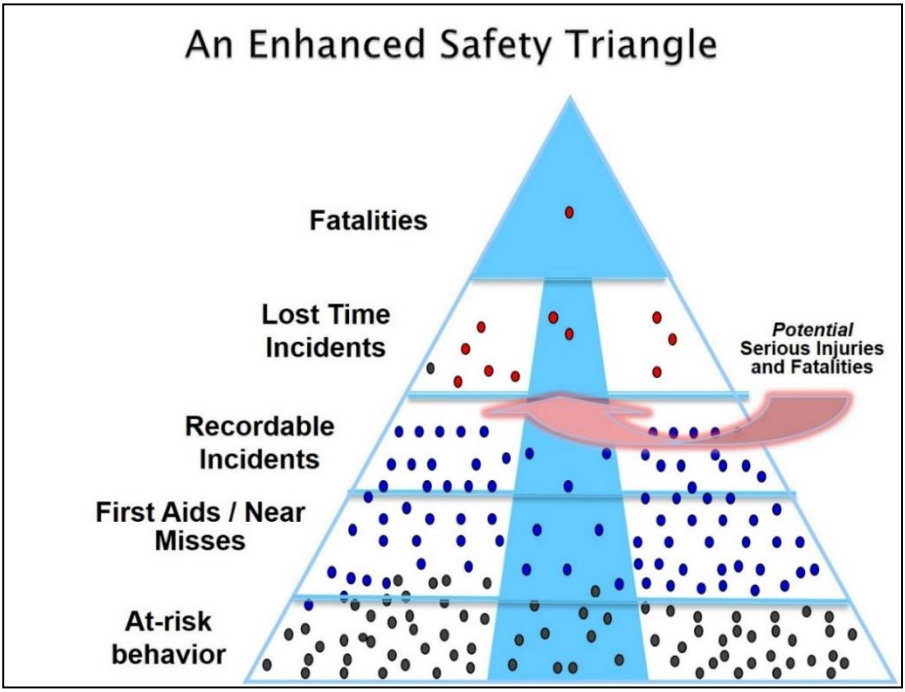

Figure 5 – Revised safety triangle showing precursors of serious injury that need special review and planning.

IMPLICATIONS FOR BBS

So, does BBS address serious injuries and fatalities? The answer is it can, but it depends on the basis for the design of the BBS process. I went back and looked at our methodology at that ore-processing plant. Our methodology in creating checklists has always been to first analyze the lost-workday cases, identify the behaviors that would prevent those injuries, and put them at the top of our checklist; then we did a similar analysis of other incidents. Next, behaviors that contributed to the most frequent minor injuries were placed on the checklist. The goal was to identify the 20 percent of the critical behaviors that would prevent all of the more significant incidents and 80 percent of the recordable injuries, and to keep it all on one page. In short, my conclusion is that BBS can help prevent serious incidents, but only if the behaviors critical to preventing

those incidents are identified and included on the BBS checklist, and then only if the BBS process is effective in addressing critical behaviors.

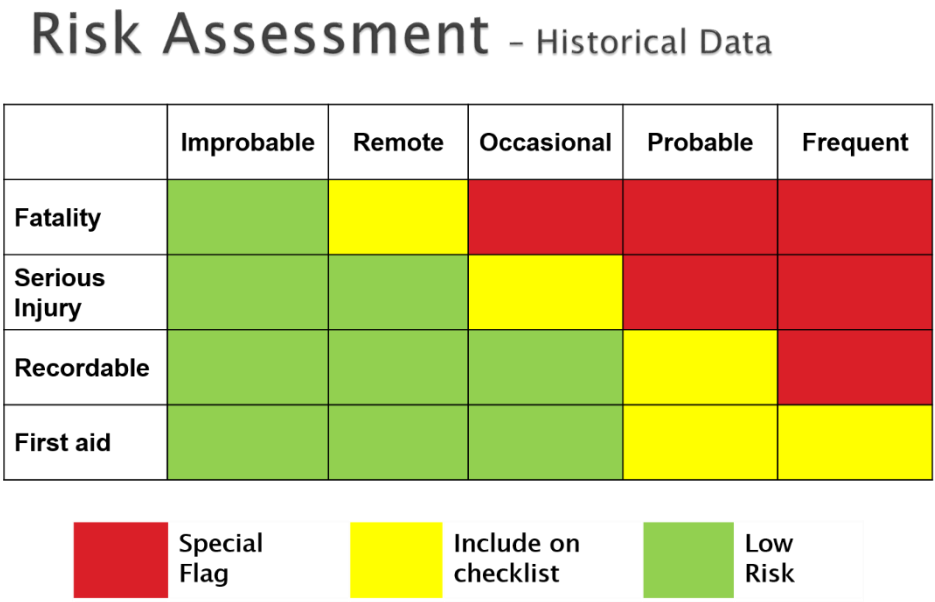

Figure 6 – Risk assessment matrix for use in analysing incidents, close calls, and observation data.

As part of our incident analysis, we need to treat potential incidents that occur in the red boxes differently (see Risk-Assessment diagram). Many different risk-assessment matrices are available, but the idea is to mine (1) your observation data, (2) your near misses, and (3) your incidents, for incidents that are precursors to significant events. In other words, those deemed as serious-incident precursors need a different level of attention than those same data related to less-serious recordable incidents. A broken arm that results from a fall in a parking lot should not receive the same level of attention as a broken arm that results from a fall from a tank car. The latter could have been a fatality, so the work done on tank cars needs to be redesigned to reduce the hazard or add an additional layer of protection. These concepts should be integrated into your BBS process. The implications of that analysis in creating your process are twofold.You should think about how you create your checklist and how your checklist can prompt observers to pay special attention to serious-incident precursors. You may want to encourage them to do a little more digging. Have a more detailed conversation if they observe issues related to serious injuries and fatalities. The second implication is in design of the process. You need to think about what the hazardous tasks are, so that you cluster your observations around those hazardous tasks.

Following are some examples, pulled from my experience. I could have gone to the

Bureau of Labor Statistics website and pulled out industry data, but I compiled this information from some of our client companies. I will use the acronym "FSI" for fatalities/significant injuries.

We started a big project down in Panama with a construction company that had killed 24 workers in the last 24 months. I was talking to the consultants that were going to work at the facility and I said, "My bet is that the fatalities they're experiencing are from a very discreet set of behaviors that we can create a lot of focus around. I expect the critical behaviors to be from practices such as working at heights, proper excavations, and working around heavy equipment. The consultants shared three stories, each one an example of one of those behavior sets.

Causes of Fatalities and Significant Injuries in Construction
• Working at heights • Excavations • Use of vehicles and mobile equipment

It turns out there's another factor related to fatalities. We have not yet started to deal with it effectively in behavioral safety and we need to think more about it—those 700 homicides in the workplace, that I mentioned previously. In Panama, gang violence is a big issue. Therefore, we also needed to think about how we could help them address the potential for workplace violence. There had been some discussion about how you couldn't put gang members in supervisory positions over members of opposing gangs. I voiced a concern about the potential for violence. Again, that lead to another recent story. While our consultants were there, a supervisor had asked an employee to do something that the employee didn't want to do and the next day two workers pulled the supervisor behind a trash can and beat him so badly that he had to be hospitalized. As behavioral practitioners, we must start thinking more proactively, and from a behavioral standpoint, about the things we can do to address violence in the workplace.

In my experience with manufacturing clients, these are the practices that tend to kill people:

Causes of Fatalities and Significant Injuries in Manufacturing
• Release of energy (LOTO) • Working at heights • Machine guarding • Confined space

I remember talking with somebody who had left all of these items off of their checklist. Do you know why? Because these were "disciplinary issues." They didn't want employees documenting any behaviors identified in the company's disciplinary

policies. We've got to move away from that mindset. The behaviors most often identified in disciplinary policies are the exact behaviors critical to preventing serious incidents. We want our employees to be talking about those practices, such as the behaviors involved in lockout/tagout, vessel entry, excavations, and large mobile equipment. The idea is to shift the discussions from blame and discipline, to open inquiry and looking at the overall system. BBS should promote the understanding that behavior is determined by the environment, and that changing the environment (i.e., the system) is the only way to change behavior. In other words, the behavior of employees is a function of a system that includes leadership, peers, physical layout and equipment, training, procedures, and potentially many other elements. And yes, supervisors have a legal obligation to enforce compliance with company policies and procedures and occasionally disciplinary action is necessary.

Another example, and this has bothered me for years, is the fact that some companies buy BBS as a Band-Aid to fix behaviors and they're unwilling to address conditions. I was touring a facility that used molten metal in one part of their process. Over the top of the molten metal was a water-sprinkler system that was part of their fire-suppression system. Now, a behavioral event might be the cause that sets off that fire-suppression system or breaks that line causing water to drop into the molten metal with the resultant explosion and potentially catastrophic event. Clearly, however, it would have been a mistake to treat such an event as a behavioral issue. It was a design issue that needed to be fixed and the client was addressing the issue. (It was, in fact, an upcoming capital project.) The point is, we need to use observation data to identify hazards that we can address through engineering and design when appropriate. When we have observations that identify practices that fall into the red blocks of this risk matrix we should focus on engineering the hazard out of the workplace. We need management involvement. An employee steering committee probably can't deal with these kinds of issues without management involvement. Often, the solution will require engineering support in order to redesign the process or facility so as to eliminate the hazard. We should use behavior-based safety to identify and address these types of hazards, not to be the permanent solution. If we cannot engineer a hazard out, then we need to add additional layers of protection in other ways—working at heights in construction, for example, and the use of fall protection. If you cannot engineer out the reliance on harnesses, you should consider adding an additional layer of protection. You might add some other passive, fall-restraint system. Or, you might consider what some of the refineries do to add an extra layer of protection in complex situations like a startup. For example, they ensure that there is a supervisor, process engineer, or both in the control room during any unit startup. In a similar fashion, perhaps some construction sites should have a supervisor present anytime employees must work at heights.

Many companies need to do better analysis, not just of their observation data, but of all the data coming in from their safety management system. Data in the blue section of the safety triangle are predictive data and they predict the possibility of work-related fatality. If we want BBS to help us prevent fatalities and serious injuries—and, of course, we do—then we need to pay special attention to those data.

One of the problems I have with short checklists is that they tend to be changed on a month-to- month basis. If that's the case with your process, maybe you can create consistency of purpose around those high-risk hazards while changing two or three checklist items depending on what your observation data suggest to you. I encourage you to think about identifying those safety absolutes around high risks and creating a consistent focus on those areas by having them remain a constant element of the appropriate checklist.

THE IMPORTANCE OF LEADERSHIP

In closing, I must re-emphasize this: leadership has got to do their work. Another thing that we struggle with in behavior-based safety is ensuring that it is being implemented in an environment of trust and respect: that is leadership's obligation and responsibility. If you're in a heavy-handed environment of threat, your BBS process is going to struggle and/or fail. I strongly agree with the importance of reinforcement, but my fear is that the term reinforcement is often misunderstood. You may interpret reinforcement in the context of a safety award program or trinkets that have been given or received in the past, or maybe you're a little more sophisticated than that and you think about reinforcement as positive feedback and pats on the back. Leadership is about relationships, trust, and respect—that's true reinforcement. It doesn't matter how well you say it; if you try to give somebody positive feedback, and it's not in the context of a positive relationship, you're only blowing smoke. Reinforcement requires sincerity supported by a foundation of trust and respect for peers and employees. Sometimes, the most powerful reinforcer you have is a conversation with someone in which you truly listen to what they have to say. That seems to be particularly important in safety.

Leadership isn't just about position and authority. I was reminded of this a few years ago. I was attending a presentation by employees at a plant, an FMC facility at the time, which brought tears to my eyes. An hourly employee at this facility, Cliff Norton, had a passion for safety that led him to champion the BBS process for more than 16 years. I'm convinced that the success of their process is due to his leadership as an hourly, union employee. Unfortunately, prior to their BBS process, he saw two of his friends die in an incident, an event that gave him greater concern for safety—he never wanted to experience that again. His plant had been through five plant managers across those 16 years. I'm not sure any of them understood what BBS was, but Cliff did. He single-handedly built support of the process with employees and with each succession of leadership. Cliff understood reinforcement and the importance of relationships.

Leaders must learn the importance of reinforcement to create a positive culture and encourage the meaningful engagement of employees. Without reinforcement, fear becomes the primary source of motivation. BBS does not thrive in an environment of fear because employees work to avoid blame rather than to promote honest discovery and problem solving.

IN CONCLUSION

As part of addressing serious incidents, I believe it's worth thinking about the

construction of your checklist items, the amount of attention focused on items related to potential fatal incidents, and how you highlight those items. Whether you create a separate group of those behaviors that can prevent fatalities, whether you put a red background behind them, or whether you simply put them at the top of the checklist, it's worth considering doing something to help ensure that these items get special attention. I believe doing so could add value to your efforts to prevent fatalities.

Many companies have a variety of problem-solving tools that are useful for developing action plans. In my view, those tools should be applied anytime you identify behaviors that could have led to fatalities or life-changing injuries. And, perhaps more importantly, the focus of your action plans for serious injury precursors should be on engineering the hazards out of the workplace. To control behavior, we control the environment.

Lastly, I believe BBS gives us an opportunity to make sure that all employees understand where hazards exist in the workplace. A successful BBS implementation ensures that leadership and employees are extra vigilant in their safety observations but equally diligent in identifying when they are exposed to hazards and addressing those hazards immediately, because their lives and the lives of their coworkers depend on it.

REFERENCES

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AUTHOR

Dr. McSween is a nationally recognized expert in the field of behavioral safety. He is CEO and cofounder of Quality Safety Edge (877-588-1140), a company that helps organizations improve safety and leadership through behavioral psychology. During the last thirty five years, he has worked with a large number of companies such as Chevron Canada, Corning Asahi Video, CITGO Petroleum, Manitoba Hydro, and Linbeck Construction Company. Dr. McSween is author of the book, The Values-Based Safety Process, (John Wiley & Sons, 1995; 2nd edition, 2003) and numerous publications and research articles on behavior based safety.

He has received numerous awards, including the ASSE's Scrivener Award in 1993, the OBM Network's Outstanding Contribution Award in 2001 and its Lifetime Achievement Award in 2010, Special Recognition for Service award from the Cambridge Center for Behavioral Studies in 2014, all for his work in the field of behavioral safety.He is also the founder of Behavioral Safety NOW, an annual professional conference for behavioral safety users and practitioners.