

# **Predictive Safety from Near Miss and Hazard Reporting**

**Written by Bernard Borg, CSP**

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## Predictive Safety from Near Miss Reporting

Does your company report 30 to 60 Near Miss incidents for every injury? If not, you may be missing a major opportunity to reduce the cost and effect of accidental loss. Predictive Safety from Near Miss reporting is about moving from reaction to anticipation. Since Near Miss Incidents have common causes to loss producing events, acting upon the causes of the Near Miss will also eliminate the causes of the loss.

### Near Miss Reporting Programs

Many organisations believe in Near Miss reporting. The benefits from identifying and eliminating the common causes of accidents before the loss occurs makes sense and is easy to understand. The problem is that very few organisations are able to do it.

Organisations that have managed to achieve effective Near Miss reporting programs have achieved outstanding safety performance. In Western Canada a major Petroleum Producer reduced injury frequency by more than 90% within one year of achieving their goal in Near Miss Reporting. In South East Asia, another major Petroleum Company reduced their injury frequency to zero and reduced the direct cost of accidents by US\$3,000,000.00 in 1996 alone. In addition to the reduction in injury and reduction of direct cost, a total of 10,000 barrels of oil was identified as the production loss related to accidents and accidental process shutdown. In 1996, 10,000 barrels of oil a day at US\$25.00 was worth over US\$90,000,000.00 a year. If that amount of accidental production shutdown could be reduced by 10%, cash flow would still be increased by over US\$9,000,000.00 a year.

### The Accident Ratio Study

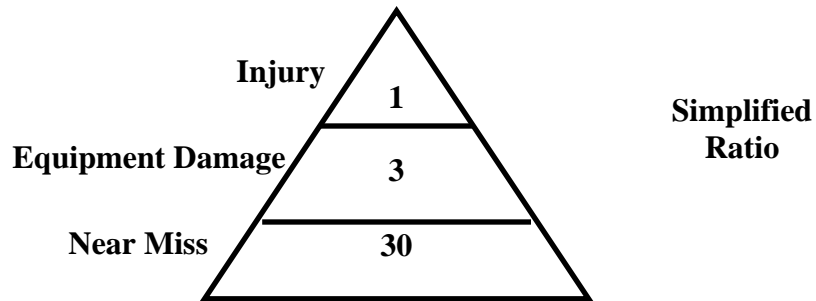
The accident ratio study conducted by Frank Bird shows that for every major injury, there are 10 minor injuries, 30 equipment damage and 600 Near Miss incidents.



One of the difficulties of using Bird's accident ratio triangle, that there is a grey line between major injury and minor injury. Also 600 is such a large number for Near Miss incidents that most people doubt it is possible in the first place.

## Simplified Accident Ratio Triangle

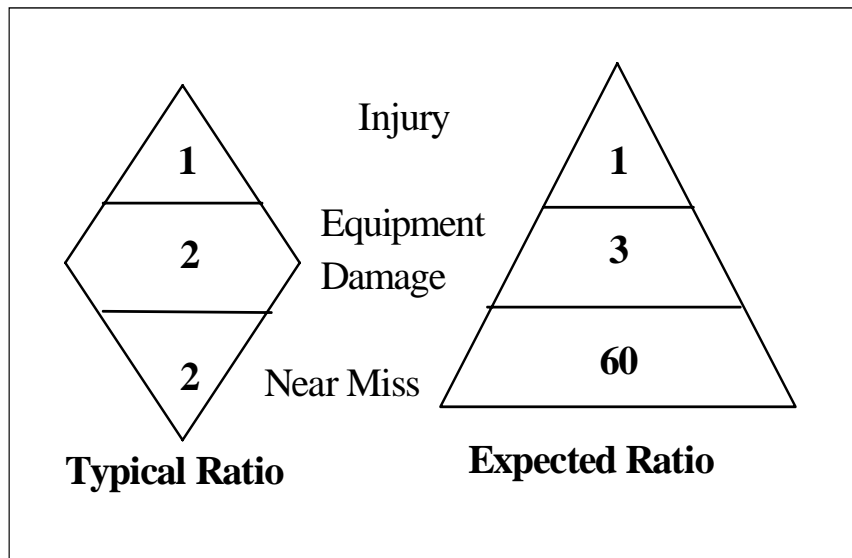
A more effective triangle to describe the ratio is one that groups the injuries together. This results in a simplified triangle.



Analysis of the accident experience of the typical organisation shows that for every injury there are two or three equipment related accidents and a couple of near miss incidents. Instead of an accident triangle, it is more like a diamond.

## The Accident Diamond

The ratio of injury to Near Miss for the majority of organizations is more like a diamond than a triangle.

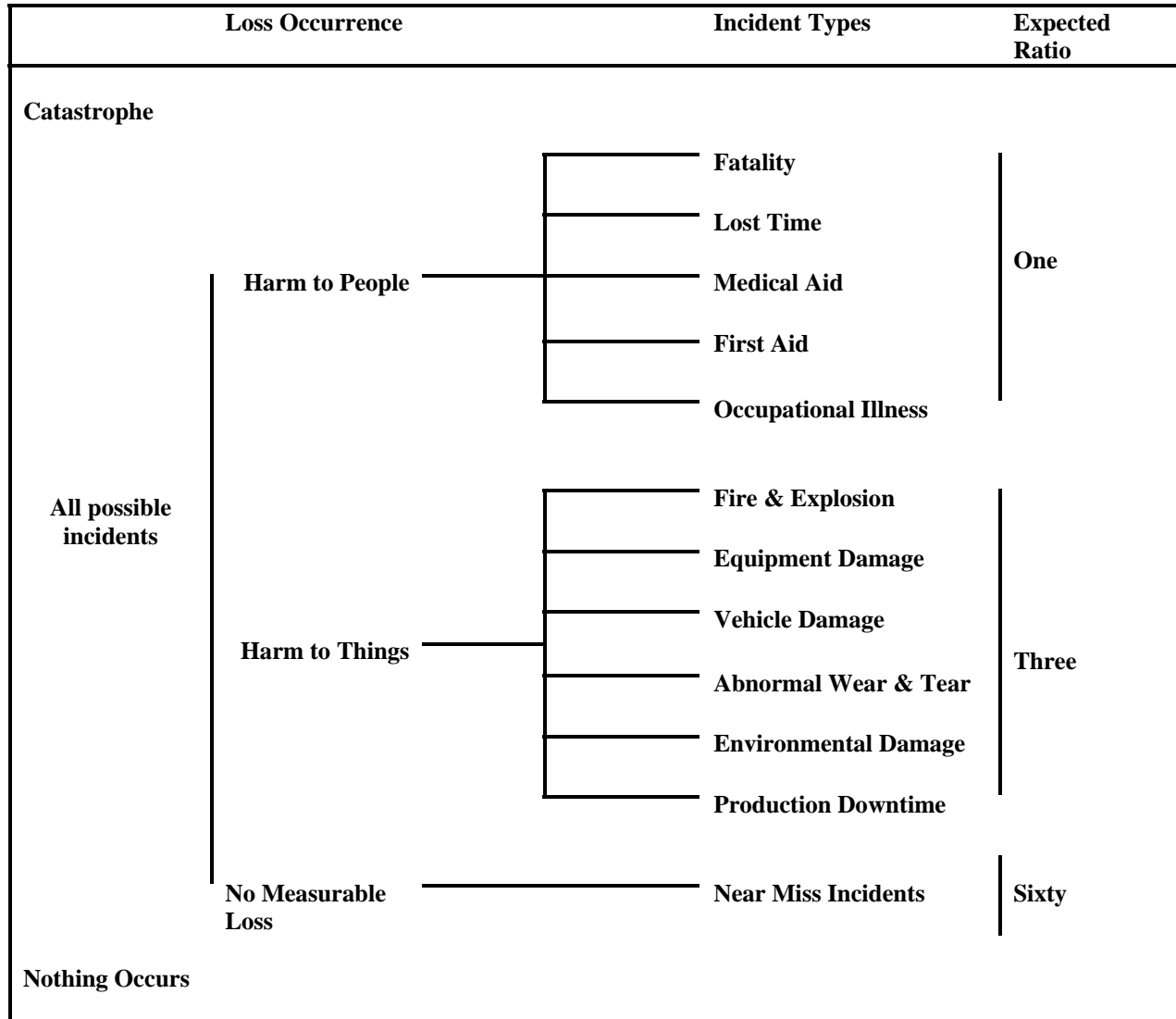


If every Near Miss, Injury and Equipment related incident report identifies 3 action items to eliminate causes, with the typical ratio of 2:1, only 5 causes of accidents are eliminated. With a 60:1 ratio, almost 200 causes of accidents are eliminated for each injury. The causes of Near Miss incidents are the same as for injury incidents.

Why wait for an injury before taking action to eliminate causes?

## About Accidents

An accident is defined as an unexpected, unplanned event, which could or does result in a loss. The following table further illustrates what kinds of events, which could be defined as accidents. The expected accident ratio is illustrated on the right of the chart.



In a basic sense, there are 3 primary outcomes of accidents or incidents.

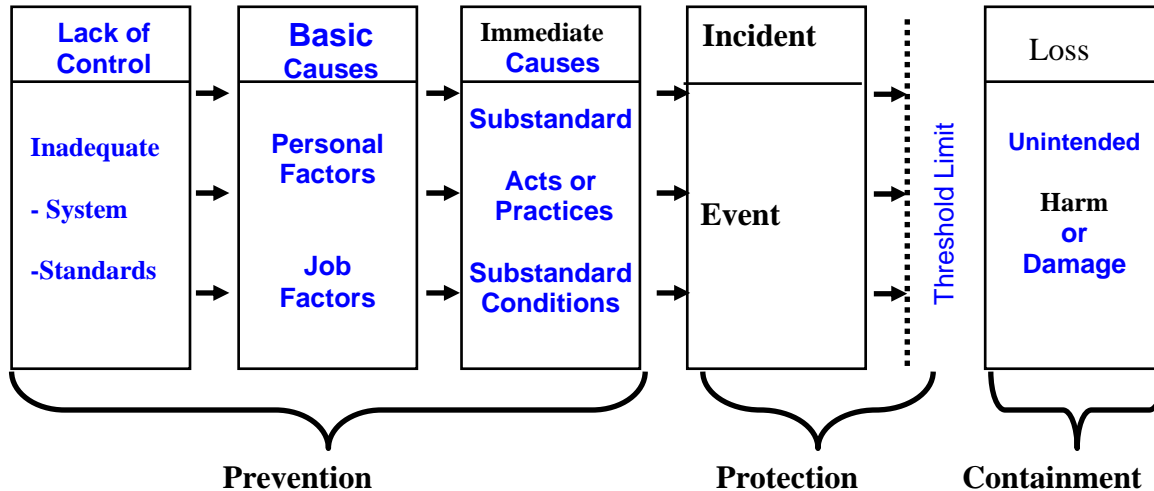
1. Harm to people,
2. Damage to things, equipment and environment.
3. Near Miss incidents.

The loss causation model in the following chart one of the better ones to use in Near Miss Reporting programs. It is simple, intuitive and easy to use. It isn't perfect but gives the 80% solution.

There are 3 stages of control:

1. Prevention
2. Protection
3. Containment

### Loss Causation Model



If each near miss incident reported is investigated and identifies 2 immediate causes, 2 basic causes and 1 system related cause, at least 5 action items result.

If 60 near miss incidents are reported for every injury, over 300 causes of incident are identified. These causes are common with the causes of injury. By eliminating causes before the injury, injury type accident will be prevented.

### Window of Opportunity

Successful business today requires a total commitment by managers, supervisors and workers. Safety can be dealt with individually where everything related to safety is mutually exclusive of the rest of the business or safety can be dealt with as interrelated, mutually supported and dependent entities. Only when managers and supervisors actively demonstrate that they actively care for people and are supportive can we expect commitment from the workforce.

Workers are out in the process, on the assembly line and on the roads. They are in direct control of the equipment and are at the point of control. What workers do and don't do have a very large impact on the efficiency of the business.

Most managers and supervisors are committed to the business. That is how they got to be supervisors in the first place.

The findings of the American non-managerial work force by the Public Agenda Foundation discovered that:

- 50% of workers said that they put into their jobs only what is required to keep it.
- A majority of 75% said that they could be significantly more effective than they are at the present time.
- Approximately 6 out of 10 said they are not working as hard as they once did.

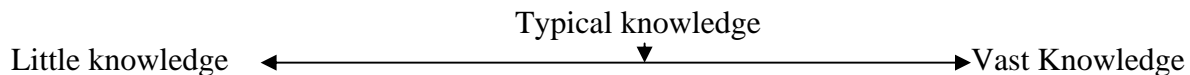
A more recent survey conducted by the Boston University's marketing department found that:

- 43% of respondents were "highly cynical"
- held "jaundiced life views"
- were suspicious of others
- Only 22% said they trusted management.
- 75% of workers feel that the main reason that they work less is that managers do not motivate them.

How then do we gain the commitment and involvement of workers? How do we gain the trust of the work force and create a positive atmosphere where people do more than just keep their jobs? What effect do supervisors and managers have on the performance of the work force?

One of the major ways on accomplishing the goal of employee involvement and commitment is to react positively to accidents and near miss incidents. We know that if workers don't trust the organization, they will only report the obvious. This includes equipment damage, trauma type injuries and incidents where outside factors play a role.

In all organizations, managers know somewhere between everything that happens to very little of what happens. On a continuum then, the average manager would be somewhere between these two extremes.

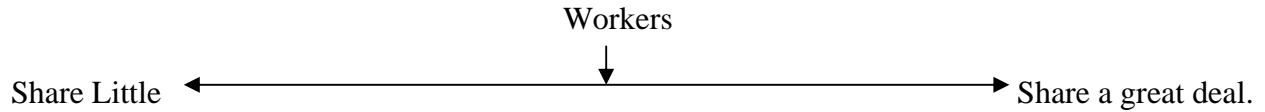


It is intuitively obvious that the more knowledge a manager or supervisor has, the more effectively the causes of accidents can be eliminated.

The question then becomes one of where the information and knowledge comes from. Many supervisors assume that they know more than the workers do. In many cases that is true. But what if workers know different things than the managers and supervisors know and are not sharing this information? Because workers have different information, the goal should be to add this information to the information the manager already has. The information the manager has added together with the information the workers have is greater than the information of the manager alone.

Once supervisors and managers have the full picture of their organization, they will be able to set priorities and allocate resources, which reduce the cost and consequence of loss.

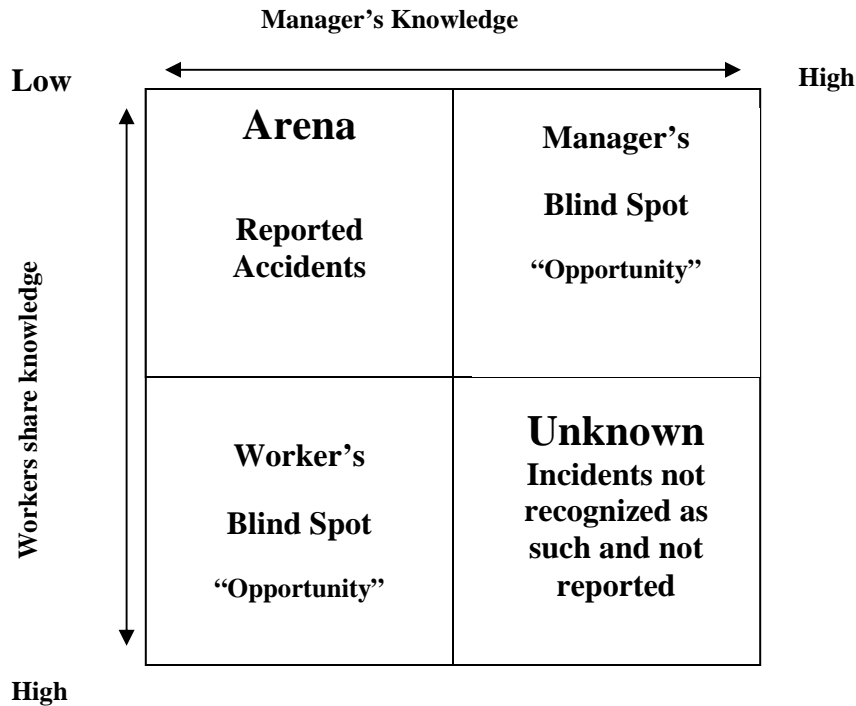
Workers then can be plotted on another continuum in terms of how readily they share information with managers.



If these two continuums are plotted on an “x” and “y” axis, then a “Window of Opportunity” model is created.

### Window of Opportunity Model

Maintaining the status quo.



The “Window of Opportunity” model has 4 quadrants. The arena is where all organisations operate within. It is the area where managers have knowledge of accidents because it is also the area of reported accidents.

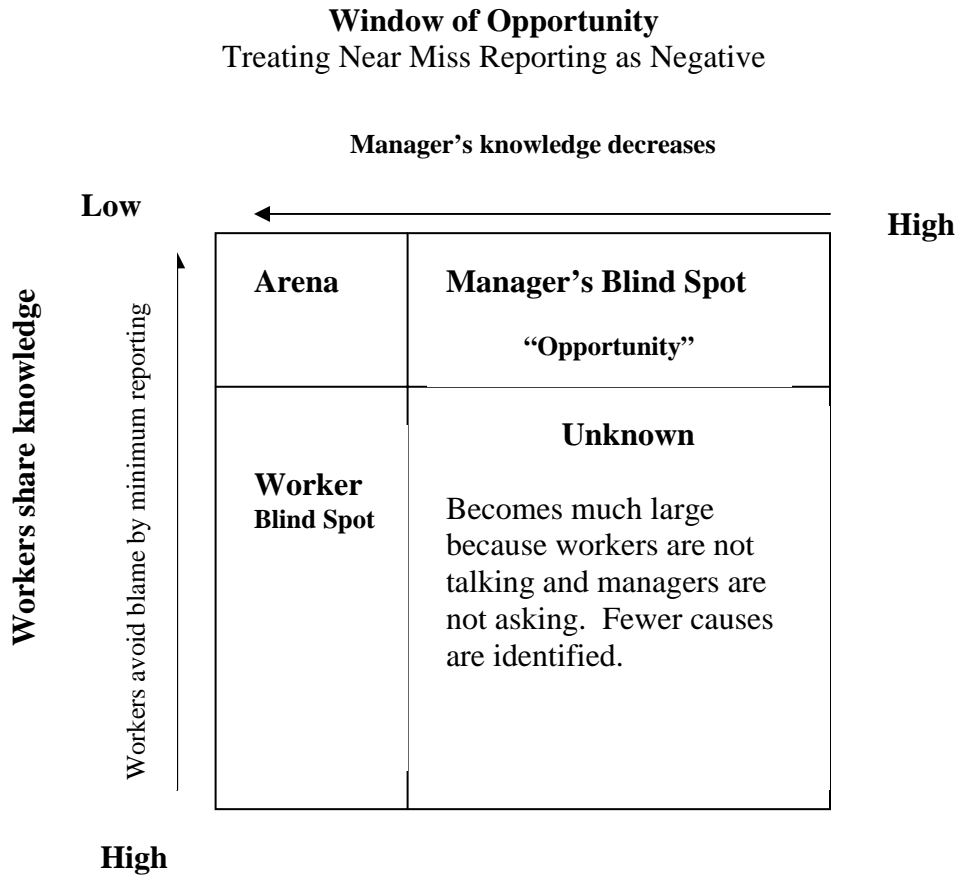
Both the manager’s blind spot and the workers blind spot are areas of opportunity. If we could make both of these areas smaller, we would be able to increase the size of the arena. This means that more causes of accidents would be understood and identified allowing preventative actions to take place.

Let us consider a couple of scenarios. First of all, what if managers treated Near Miss reporting as negative. Negative can mean a number of things.

- It may be direct in the form of a reprimand.
- It may be simply a negative first reaction.
- It may be asking the worker to investigate in detail and fill out complicated forms.

- It may be a general statement like “These types of incidents need to stop”
- Workers are blamed for the Near Miss.

If managers or the system blame workers for Near Miss incident, then workers will avoid blame by not reporting incidents except those where a loss has not occurred. The net effect will be that the arena shrinks in size. Managers will know less about what is going on in the workplace and workers will lose their trust in managers and the system. The result will be that few of the causes, which can lead to loss, will be identified. If the causes can not be identified, then incidents can not be prevented.



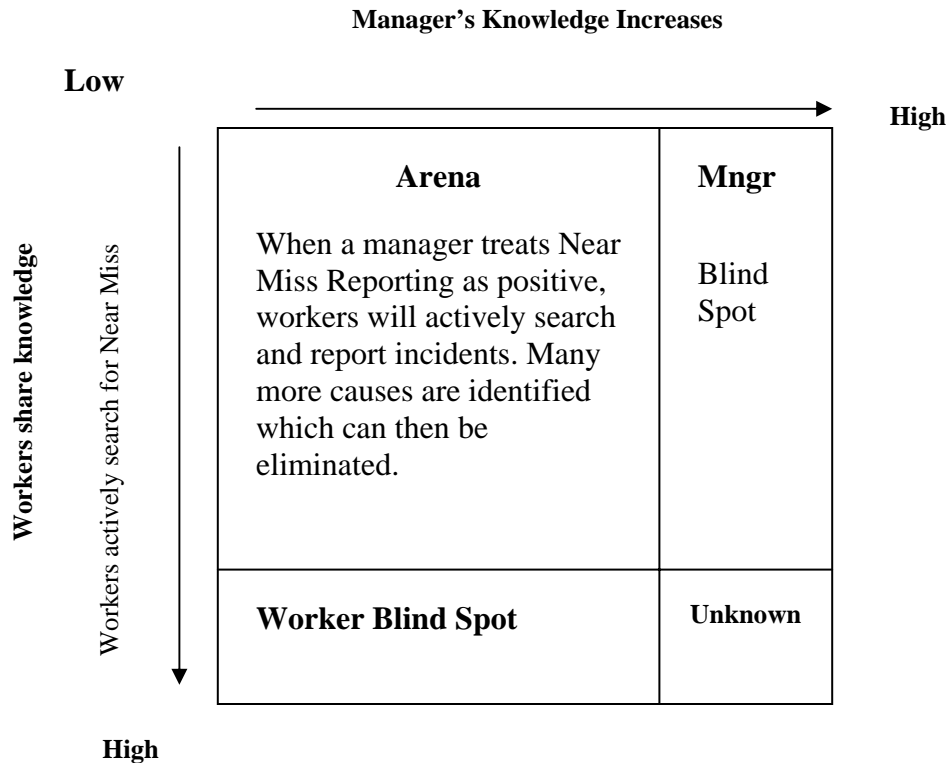
When managers are successful at creating a positive safety culture which does not blame workers for Near Miss incidents, then workers will begin to report more and more incidents. This will have the effect of increasing the size of the arena. Since many more incidents are now being openly discussed, many more of the causes can be eliminated. Once these causes are eliminated loss type incidents such as injury and equipment damage will also be prevented.

The effect of treating near miss reporting as positive is shown in the following model.



## Window of Opportunity

Treating Near Miss Reporting as Positive



### Recognition

Treating Near Miss reporting as positive requires recognising people for doing something right.

Ken Blanchard, the author of the one-minute manager, expressed very well the principle that works when giving recognition for Near Miss reporting.

*“Catch people doing something approximately right.”*

The Event or Near Miss may not be positive, but the willingness to report is positive.

Recognition often becomes confused with Safety Awards and incentive programs. Safety Awards and Incentive programs rapidly become a wages and benefits issue. There is usually a complex formula and awards are based on years of avoidance of injury. Since the probability of injury at the individual level is so low, most people work along, bad habits and all, make little contribution and are rewarded for it.

Recognition is something different altogether. Recognition is a soft issue and is not about things. It is letting a worker know that his efforts are appreciated and that he is doing the right things.

When I first started the Near Miss Reporting program, I knew that a lot of what I needed to do was marketing. Each time I received a near miss report, I would write a personal memo on company letterhead, sign it in blue ink (so that he knows it is an original) thanking the individual for his contribution. As the program developed and the volume of near miss reporting exceeded my expectations, the sending out of all these memos started to become a lot of work. One day, I was visiting one of the field offices and on the safety bulletin board was a copy of the letter I had sent out to one employee. I started looking around and found these memos posted in control rooms, offices and lunchrooms. I found one of the people who had posted the memo and I thanked him for thinking the memo was important enough to post. This employee had more than 20 years in with the company and he said that my memo was the first thank you note he had ever received from management. Wow! Did this employee feel good about recognition? You be he did!

Most companies have an appraisal system. Why not tie Near Miss reporting into the formal system. Most supervisors will jump at the chance to have something more measurable than attitude. With the numerical goal appraisals are easy. You may wish to try a system similar to the following or create one of your own.

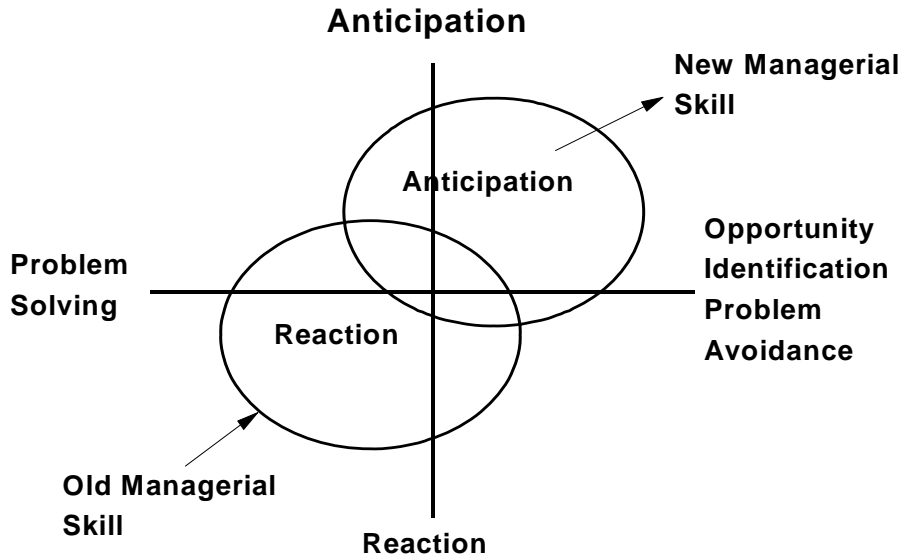
- More than 10 Near Miss Reports / year – Outstanding performance.
- More than 2 Near Miss Reports / Year – Exceeds expectations.
- 2 Near Miss Reports – Meets expectations, good solid performance.
- 1 Near Miss Report – Below expectation.
- Zero Near Miss Reports – Requires improvement.

Be careful on any negative connotations. If there is any hint of punishment related to near miss reporting, it will stop with blinding speed. It is critical to ensure that everyone knows that you are measuring effort and contribution. Recognise and reward the people who meet or exceed exceptions and do nothing for the ones below standard. In fact, don't even mention on the yearly appraisal that the individual did not meet the performance standard for near miss reporting.

### **Moving from Reaction to Anticipation.**

First, let us consider the meaning of the word "Anticipation". Anticipation is the ability to foresee, to realize beforehand. To anticipate is to see what needs doing, what is likely to happen and to do what is necessary. Peter Drucker, in *Managing in Turbulent Times*, makes an interesting observation. He writes about skills that a good manager needs and suggests that one of the most important skills is anticipation. Most successful managers as well as safety professionals, have strong problem-solving skills, predominantly in the reactive mode. That is, when an accident or real problem occurs, they solve it. While it is true that all of us periodically move from problem solving to anticipation, most of our efforts revolve around problem solving or reaction. This is for good reason. Safety professionals and managers are hired to solve problems, so it is only natural that we spend our time doing it. What Drucker is suggesting is that we must improve our skills in the area of anticipation and spend less time reacting.

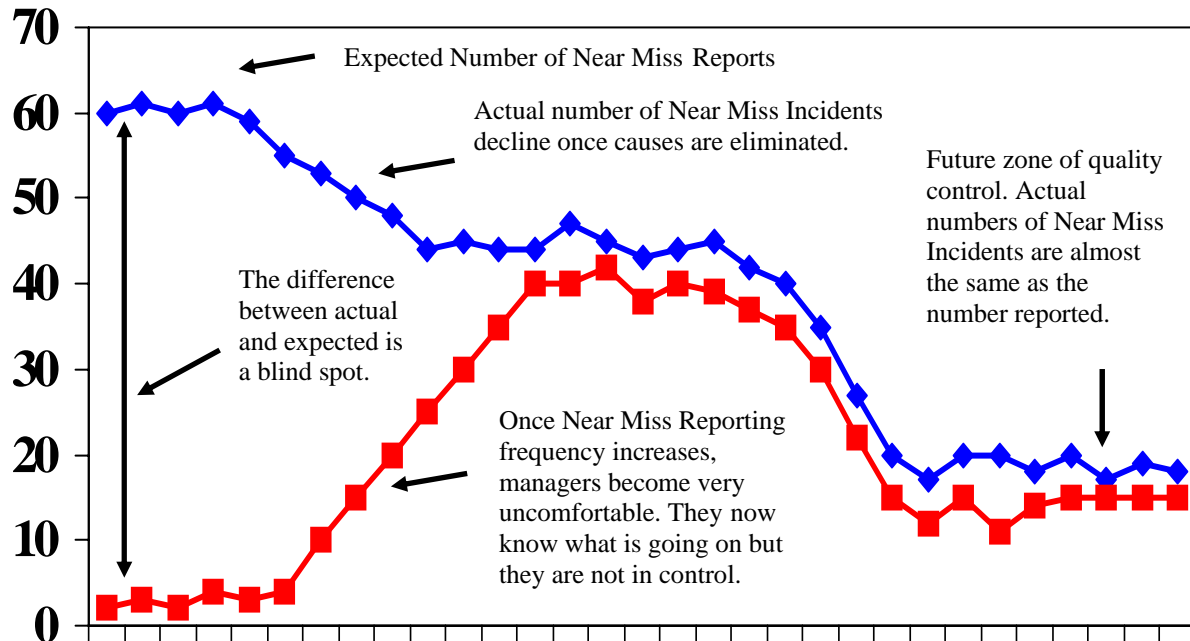
## New Measure of Managerial Skill



To solve problems as well as avoid problems we need information. The organization gathers information through accident reporting, accident investigation, hazard reporting, inspections etc.

### The Life Cycle of Near Miss Reporting.

## Expected Ratio and Actual Ratio



To close the gap between the expected number of Near Miss incidents and the number being reported. A formal program is required. To change the culture of an organization is a very difficult thing to do. A near miss program needs to address and eliminate the hidden barriers before the program will be successful. This may take a number of years to accomplish and depends upon the active support by managers.

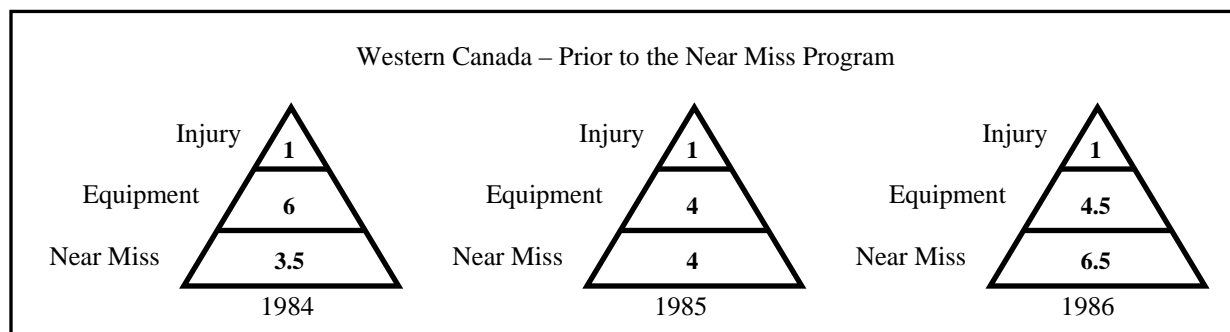
Once the program starts to be successful, at some point the managers become very uncomfortable. They thought they had been doing a good job, but apparently they were not. What we are now doing is uncovering the "Blind Spot". This is a very fragile time for the program. Managers will find it easier to go back to not knowing. To circumvent this, now is the time to look at the other indicators of safety such as cost, equipment damage, and injury. A correlation of positive trends with other indicators will sell the program.

Almost immediately from the commencement of the Near Miss program, it will start to have the desired effect. The elimination of the common causes of loss producing events the effect will be to reduce loss. As the Near Miss program matures, we should see a dramatic reduction in the gap between the reported Near Miss incidents and the actual. In theory, we should be able to achieve 100% reporting of all Near Miss incidents. The effect will be an increase in Reported Near Miss and a decrease in the actual frequency of the incidents. At some point, these two forces will balance out in the middle.

### Western Canada – Near Miss Reporting Case History

To illustrate the actual effect that a Near Miss Reporting program can have on an organization, consider the following case histories. The first case history is the safety performance of a major petroleum company in Canada. The near miss reporting & injury performance is the complete decade of the 80's.

The following chart shows the ratio of injury to reported Near Miss incidents for the 3 years immediately preceding the formal program.

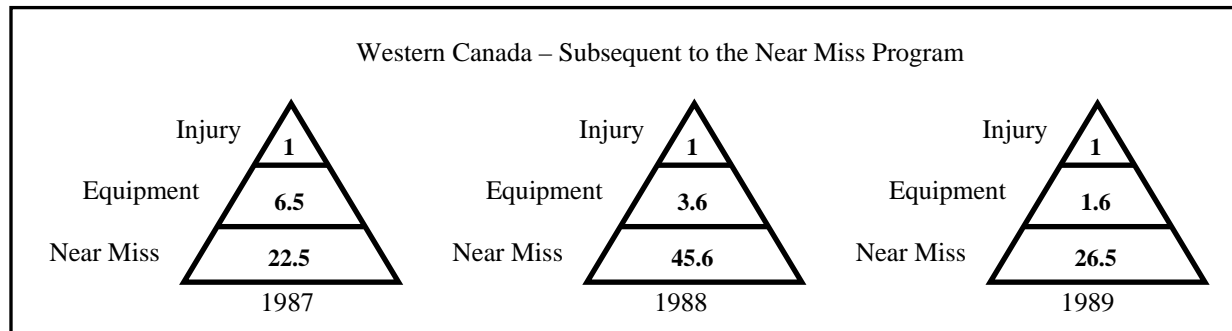


The ratios in each of these 3 years are typical for most organizations. What we see is a diamond rather than a triangle.

In 1986, a formal Near Miss reporting program began based upon the conceptual models we have already discussed. The effect of this program was a dramatic increase in the numbers of

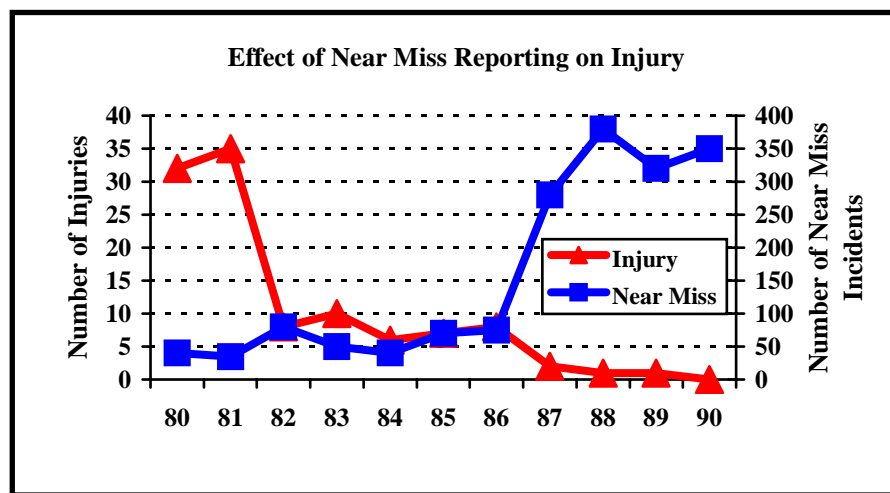
Near Miss reports being made and a corresponding 80% decrease in the actual number of injuries being experienced. A similar correlation was made with the cost of equipment related incidents. Since the data was readily available, we plotted the trend back to 1980. This trend showed that in 1981 there had been a separate shift in injury numbers corresponding to an 80% drop. The fundamental change in Safety Management in 1980 had been the implementation of the International Safety Rating System.

The following chart shows the ratios of injury to Near Miss in the 3 years following the implementation of the Near Miss reporting program.



While these ratios did not achieve the expected ratios of 60:1, they are a significant change from the 3 years prior to the program.

The following graph shows the numbers of Near Miss incidents reported each year for the 80's and compares the number of injuries to the number of Near Miss incidents reported.

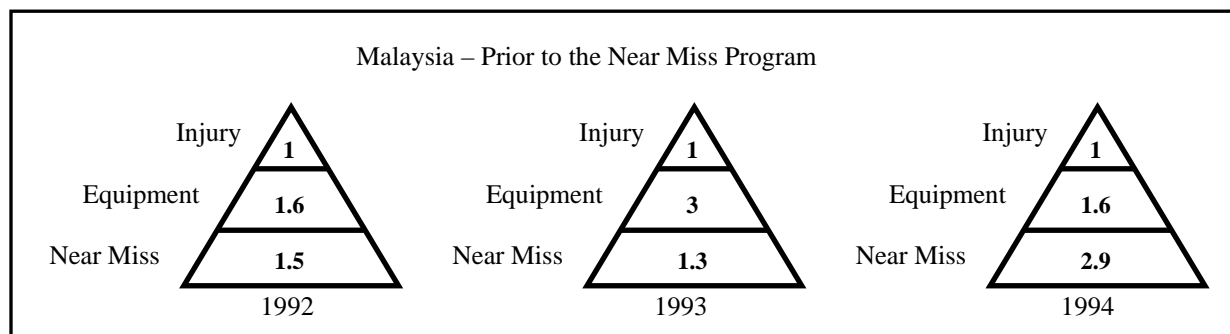


In 1981, this organization experienced a total of 35 injuries including one fatality. The implementation of a Total Loss Management program in 1980 accounts for a decrease in the injury rate to a total of 8 injuries in 1982. In 1986, the Near Miss Reporting program was implemented. The result was drop in injury rate to zero by 1990. In the same period of time the total number of Near Miss incidents reported was more than 350.

What this graph and the change in management style represent is the Juran Trilogy®. The Juran Trilogy®, simply shows that an organization has an original zone of quality control and when you implement a quality improvement program, that you can achieve a new zone of quality control. Injury was reduced (quality improved) in 1981 by implementing the International Safety Rating System. In 1986, injury was reduced by the implementation of a "Formal Near Miss Reporting Program" and a new zone of quality control was achieved.

### Malaysia Case History

The second case history occurred in a major oil company in Malaysia. The following chart shows the ratio of Injury to Near Miss for the 3 years immediately prior to the implementation of the formal program.



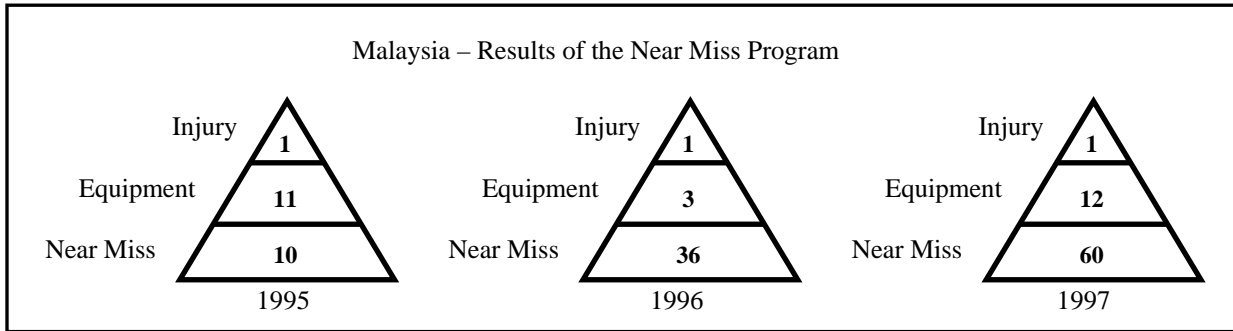
The ratio of injury experienced to Near Miss incident reported did not approach the expected ratio of 60:1. Again, the charts show a diamond rather than a triangle.

In 1993, there was a small increase in the number of incidents reported. Since the numbers were still well below the expected, a formal Near Miss Reporting program was introduced in April 1994. By September of 1994, this zone of quality improvement ended and we entered a new zone of quality control. In mid 1995, the ISRS program was adapted and leadership training started. In January of 1996, an e-mail form for Near Miss and all other accidents was introduced. During this time period, the thought process of management changed from the "Safety Department is Responsible" to "Management are Responsible. In January of 1996, the management team made a concerted effort to personally encourage "Near Miss Reporting. The results were instant and dramatic. The reporting frequency as a 1-year running average jumped from a frequency of about 15/1,000,000 hours to almost 50 by the end of May. The Safety Department has started to use Quality measurement terminology and have predicted a zone of quality control for 1996. The reaction of the managers was that we were too conservative and that they would even encourage more Near Miss Reporting prove it.

To help us prove that the ISRS program and Near Miss reporting are beneficial, we started to look at other indicators in a different way. In early 1994, we started to track the direct cost of equipment related incidents. Much to the dismay of the manager who truly believed they were doing a good job, a total accumulated cost of \$4,500,000.00 was accumulated over the 2 years. In the word of Thomas J. Peters and Robert W. Waterman, Jr. In Search of Excellence, "What gets measured gets done. Putting a measure on something is tantamount to getting it done. It

focuses management attention on that area. Information is simply made available and people respond to it."

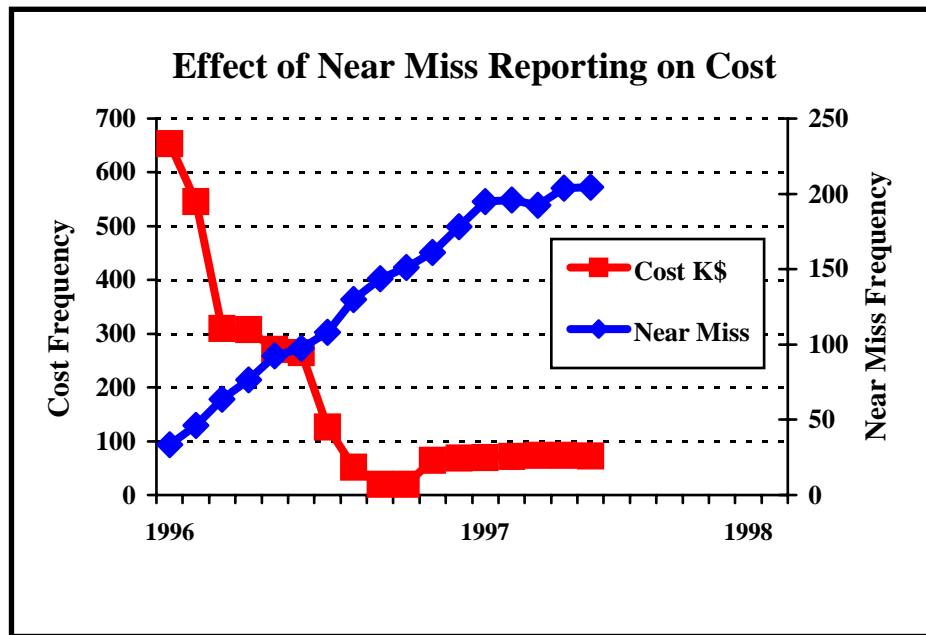
In 1995, a formal Near Miss Reporting program was started. The following chart shows the ratios that were achieved as a result.



By mid 1997, this organization achieved a 60 to 1 ratio of Near Miss reporting to injury.

One of the other benefits achieved was the reduction of the cost of equipment related incidents. After all, if the causes of incidents are common but with different results, then equipment related accidents reduce at the same time injury accidents reduce.

The following chart shows the effect of Near Miss reporting on cost.



Both series on this graph are 12 month running averages. That means that every point on the graph is the average of the previous 12 months.

The average cost / month in 1996 was \$675,000.00. By mid 1997, the average cost / month was \$80,000.00. In 1996 this added up to over \$3,500,000.00.

The positive effect on safety that both of these case histories illustrate is just how much opportunity there is to an organization when you are successful in the elimination of the causes of accidents. In both cases, management did not believe they had a large blind spot. As soon as the blind spot was uncovered, they became very uncomfortable. After all, in both organizations, using the standard safety indicators of the time, they appeared to be doing a good job. The other area that was improved was the work group's skill in looking for and recognizing the causes of accidental loss. With the e-mail system of accident reporting every location receives a copy of the incident report the day it is written. These reports are discussed at morning meetings with every work group. These work groups in turn then watch out for the same causes of accidents and in a small way every day does something to prevent them. It is all these small changes added together that could revolutionize an organization's safety performance.

Near Miss Reporting helps to identify the common causes of accidental loss. By understanding these common causes, management as well as workers can anticipate the next probable accident and take steps to prevent them. When we only measure major incidents and injuries, we limit our ability to understand all the causal factors in the workplace. Ken Blanchard in *The Power of Ethical Management* says "Managing only for profit is like playing tennis with your eye on the scoreboard and not on the ball". In Safety we can say "Managing safety only by LTA, is like playing tennis with your eye on the scoreboard and not on the ball.

The implementation of a program to increase the reporting of "Near Miss Incidents" is extremely difficult to do. Without the successful case history, the results in the second case history may not have been possible. Influencing and changing an organization is a very difficult thing to do. First, you must be able to believe that it can be done and then you have to work continuously for what may be years before you can measure a result. It is hoped that the models used in this paper and the case histories will assist in the justification of a "Near Miss Reporting" program. The trick seems to be finding a single manager or supervisor who will believe in and support your efforts. Work with him/her and get the program started. Give us much positive feedback as possible and protect them from the people who believe that Near Miss incidents are the fault of the work group. Start measuring results in different ways. Compare reporting results to other departments. Don't make a big deal out of the ones who don't report at first. However, do make a big deal out of the departments that start to report. Once the second department or supervisor decides to outdo the first one in order to get some of the positive attentions, and then your program will start to take off. In both case histories, the result far exceeded my initial expectation. I am totally convinced that we can move from accident reaction to accident anticipation.

### **Near Miss Reporting Performance standards**

Performance standards must be measurable and achievable. When starting out, it is important that the organization believes in the standard that is set. All individuals need to work to achieve the goal.

For example, the companies that are successful at near miss reporting have set goals for near miss reporting that relate to the individual and to supervisors.



## **Near Miss Reporting Performance Standard.**

*Each worker will report 2 near miss incidents a year.*

*Each office worker will report an average of 1 NM / person / year.*

*Each supervisor will ensure that the average near miss reporting level for the team will be an average of 2 NM / person / year.*

*Each manager will ensure that his supervisors report and average of 2 NM / person / year.*

These types of performance goals are extremely important. They have a numerical goal so that individuals, supervisors and managers can measure their own performance. To achieve these goals, people will have to invest some time and actually look for things to report.

Many traditional safety goals are related to the avoidance of loss. For example a company may have had 10 injuries during the past year and have set a new target of having only 8 in the coming year.

What can the individual do? People weren't trying to become injured when the organization experience the 10 injuries and they will continue to try in the coming year. Since the probability of injury at the individual level is very low. Typically less than one injury every 20 years, people will not feel inspired to do anything that is different.

What if you do better than the target and have only 6 injuries? Does that mean you have to break some arms to meet the target? (Just kidding).

The magic of having achievable and measurable goals that require effort in the part if everyone, is that luck is taken out of the equation. People actually have to do something and contribute. Each of these small contributions adds up to be very significant over the year. Once people go out looking they find things. It's a lot like the children's Easter egg hunt. The children, who are enthusiastic and look really hard, end up finding the most. The one child who is grumpy and refuses to participate finds none.

When a goal of 2 NM reports / person / year is first proposed, there may be a lot of resistance from workers, managers and supervisors. This is natural and to be expected. Some of the arguments can be diffused by discussing exactly how much effort it takes to report a near miss. I estimate that depending on the complexity of the reporting system and the amount of discussion that takes place that it takes about 15 minutes to report a Near Miss. Two a year means an investment of 30 minutes. Who among us are not willing to invest 30 minutes in safety in a year? That's only 15 minutes every 6 months.

One of the other common responses will be people asking if they can count vehicle near miss incident to and from work or off the job. The answer is yes, by all means. Many people will say that the program won't work and that they had 2 near misses on the to work this morning. Great! Write both of them up and you have made your contribution for the year.

I can remember one employee that I worked with that was a very intense person and liked to take things literally. Once Pat had bought into the goal, he started to report Near Miss incidents at the incredible rate of 8 a month. This was a bit overwhelming for both the safety department and the supervisor. However, when the Near Miss incidents that he was reporting were analyzed, there were only a couple that was questionable. The rest were valid events that under slightly different conditions could have led to equipment damage or injury.

### **Putting it all together**

Near Miss reporting programs need to be led by the management of the company. The following are some of the steps that need to be taken.

- Analyze your current incident statistics. Multiply the number of injuries that have been experienced to determine how many Near Miss incidents should have been
- Multiply the number of near miss reports that you should have had by 5. This is the number of causes of accidents that were not acted upon.
- Train all managers and supervisors in some basic accident investigation. Train a key group of workers also.
- Set targets for reporting and convince management to measure safety success by positive action rather than avoidance of loss.
- Develop a constancy of purpose.
- Provide people information on the process.
- Make reporting easy to do from the point of view of the people you are asking to do the reporting.
- Take action on issues that arise and be seen to be taking action.
- Group a number of Near Miss incidents together and start identifying trends.
- Keep treating reporting as positive and don't give up.

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