INTRODUCTION

Why investigate a near miss? Near misses share similar causal factors and underlying causes as accidents. By investigating near misses and addressing the underlying causes of accidents and near misses, the precipitating conditions can be influenced so as to be avoided in the future. Near miss reporting is important for continuous improvement efforts for an organization's safety performance. The purpose of accident investigation is to identify causative factors and develop corrective action to prevent accident recurrence, mishaps, or near misses.

TERMS/DEFINITIONS

Accident: Unplanned sequence of events accompanied by undesirable consequences

Causal Factor: Structural/Machinery/Equipment/Outfitting problems, human errors and external factors that caused an incident, allowed an incident to occur or allowed the consequences of the incident to be worse than they might have been.

Incident: Unplanned sequence of events with the potential for undesirable consequences (i.e., accidents and near misses)

Loss: Any condition or sequence of events and outcomes that leads to human injury, environmental damage, equipment damage, or business loss.

Near miss: An unplanned sequence of events and/or conditions that results, or could have reasonably resulted, in a loss event. A near miss is an event where no contact or exchange of energy occurred, and thus did not result in personal injury (and any observed unsafe working conditions are to be reported electronically as a near miss).

Potential Loss: Any condition or sequence of events and outcomes that may potentially lead to human injury, environmental damage, equipment damage, or business loss. These are events where good fortune may have intervened, and thus avoided a loss.

Root Cause: Commonly used to describe the depth in the causal chain/analysis where an intervention can reasonably be identified and implemented to change performance and prevent an undesirable outcome.

DISCUSSION

Level of Concern

The contribution of human error to accidents has been a much discussed topic for decades. Summarizing it all, about 80% of marine accidents involve human error. In about 50% of accidents human error is the precipitating cause, and in about 30% of accidents human error is a contributing cause (where a situation, such as weather, likely would not have resulted in an accident or loss if the human acted without error). This also suggests that only about 20% of marine accidents are not directly attributable to humans making errors.

Near misses are another matter, and it is only recently that the notion of analyzing "accidents that almost happened" has been receiving wider attention and scrutiny. After all, the difference between a loss and a non-loss is often due to

circumstance and luck. The same precipitating conditions can occur again – and lead to an actual loss, of unknown magnitude.

As a general rule of thumb, the ratio of near misses to accidents is about 300:1. That's a lot of near misses, and many (but certainly not all) can be used to identify opportunities for continuous improvements in an organization's safety management system by identifying the precipitating factors (including human errors) and addressing them, it is hoped, before any actual loss occurs.

For the seagoing maritime industry, the International Maritime Organization (IMO) has published the International Safety Management Code (the ISM Code), and states that a functional requirement for a Safety Management System is the presence of "procedures for reporting accidents and non-conformities." Further, the supporting IMO guidance in relation to accident investigation states a basic principle of a safety management system is the provision of means of "reporting and analyzing non-conformities, accidents, and hazardous occurrences (including near misses)."

What Constitutes a Near Miss?

A near miss can also be interpreted as a set of conditions or a sequence of events that could reasonably have, but did not, result in an accident, and since there is no loss to cue our observation, how are near misses identified? How does one observe something that *almost* happened? One approach is to develop and use operational definitions. Operational definitions provide a means to define, quantify, and identify a situation, condition, or object that is (or was) not tangible and therefore is not directly observable or measurable.

At a very high level, two operational definitions of a near miss are:

1. An event with no consequences, but that could have reasonably resulted in consequences under different conditions
2. A near miss that had some consequences that could have reasonably resulted in much more severe consequences under different conditions.

Additional examples of operational definitions of a near miss include:

1. Any event that leads to the implementing of an emergency response or procedure, and where those actions spared a loss.
2. Any event where an unexpected condition existed that led to no adverse consequence, but that might have (for example, had a person been standing where a load was dropped).
3. Any dangerous or hazardous situation or condition that was not discovered until after the danger passed.
4. Anytime an emergency action has taken place, such as summoning the fire department or an ambulance.
5. Violation of a safety rule, procedure, or policy.

A very simple and common rule is that anytime someone observes a situation or sequence of events, and considers it to be a near miss, it is an event that will undergo some level of scrutiny to verify whether a near miss has occurred or not.

Note that an operational definition of a root cause is:

1. The cause can reasonably be identified. In some cases it cannot, for example when a worker is unaccounted for and never discovered. About the only conclusion that can be drawn is that he probably went over the side. The "why" of it will likely never be identified.
2. That means to fix or correct the root cause can reasonably be identified (again, in some cases it cannot, for example a rogue wave)
3. That management has the authority to implement the recommended fix (due to costs, legal impediments, effectiveness of a proposed fix)

A Process for Analyzing a Near Miss

Depth of analysis for a near miss investigation should be guided by the extent and likelihood of the potential consequences of a recurrence of the conditions and actions associated with the near miss. If, for example, in the course of a near miss a significant consequence was avoided, and if those conditions are deemed to be likely to reoccur, then an in-depth analysis may be called for. For a near miss deemed to be of low likelihood or consequence, then an in-depth analysis would not be needed. Depending on the depth of analysis to be performed, and the specific activities of the process to be performed, the process could be done reasonably quickly.

Determine Whether a Near Miss Occurred and Determine Depth of Analysis.

The first decision to be made is whether a near miss merits investigation. After documenting the early information about a near miss (e.g., who and what was involved? What happened and where? What was the potential extent of loss? How near was a loss to actually being realized?), a decision must be reached as to whether a near miss should be investigated. When the actual or potential consequences of the near miss are minor, it may be sufficient to simply enter the near miss into a database. If the decision is to not investigate, relevant facts should be documented and filed – including the factors leading to the conclusion that an investigation is not necessary. When considering whether to investigate a near miss as a near miss, the following can be considered:

- What could the consequences of the near miss have been? Should the potential near miss consequences be considered an acceptable risk? The larger the potential consequences, the more resources should be committed to an investigation.
- Is the risk associated with this near miss well understood? Is the risk associated with the near miss acceptable? If a decision has been made that the risk from this near miss is acceptable, then an investigation would not result in any significant changes.
- Are adequate safeguards in place to protect the workers and the public against these near misses? If adequate safeguards are provided, then an investigation would not result in any significant changes.
- Are there apparent causes (immediately obvious causes) that require validation by means of further interviews or other causal analysis?

A Basic Accident Investigation and Reporting Technique

Effective investigations are imperative to the success of a safety program. The purpose of accident investigation is to identify causative factors and develop corrective action to prevent accident and near miss recurrence. Effective investigations will:

- Describe what happened. Thorough investigations can sift through sometimes conflicting evidence and arrive at an accurate description of the incident.
- Determine the causation. Any investigation should be detailed and thorough in order to reach a conclusion of the causes of the incident.
- Determine the risks. Good investigations provide the basis of deciding the likelihood of recurrence and the potential for major loss -- two critical factors in determining the amount of time and money to spend on corrective action.
- Develop controls. Adequate controls that minimize or eliminate a problem can only come from a sound investigation, which has truly identified the problem. Otherwise, the problem will appear again and again but with different symptoms.
- Define trends. Few accidents and incidents are truly isolated cases. When a significant number of good reports are analyzed, emerging trends can be identified and so controls can be set.
- Demonstrate concern. Accidents give people vivid pictures of threats to their well-being. It is assuring to see a prompt, objective investigation in process. Good investigations aid personnel relations.

Reporting

The ultimate objective of near miss identification, analysis and reporting is to identify safety threats of concern and to devise means for management to implement corrective actions. To do so requires that recommendations be generated, shared, and acted upon. It may take years for safety trends to be discerned, and so reporting must be archived and revisited for trending from time to time.

Since near miss reports should be trended with actual accident reports, there must be consistency in the identification and nomenclature of near miss and accident root causes.

Overcoming Barriers to Reporting Near Misses

Some of the chief barriers to reporting of near misses are fear of being thought blameworthy, being disciplined, embarrassed, fear of legal liability, and so on. Other factors that may be barriers to reporting are complacency on the part of those observing or identifying a near miss, disincentives to report, such as demanding that an investigation and report be performed on one's own time, or for fears of reprisal.

An effective means of addressing the bulk of these barriers is to, as part of the reporting process, "sanitize" reports so that individuals involved are protected from identification, thereby avoiding fear of retribution, disciplinary action, embarrassment, and so on. There also must be management commitment to a no-blame culture, and this must be perceived to be (and to be in reality) a sincere commitment by management.

The keys to overcoming barriers to reporting can be summarized as:

- Establishing a blame-free near miss reporting company culture
- Assuring anonymity for reporting near misses, as requested, by company policy and by "sanitizing" analyses and reports of information identifying persons associated with the near miss. Of course, there must be one individual (usually the near miss investigator) who must be identified as being the originator of a report.
- Establish and communicate management dispositions to the recommendations, if any, contained in a near miss report. This means that once recommendations are provided, their dispensation (implemented, planned to be implemented, or not to be implemented) must be communicated to the person who submitted a report and/or recommendation. Lack of feedback of this sort will curtail reporting as there will be a feeling that the effort was simply wasted time.

SUMMARY

Near miss analysis and reporting are important components of a Safety Management System intended to continuously improve, and trend, safety performance over time.

REFERENCES

American Bureau of Shipping. (2005). "ABS Guidance Notes on the Investigation of Marine Accidents." Houston: Author.

International Maritime Organization. (2011). "International Safety Management Code (ISM Code)." London: Author.