

The role of “Active Monitoring” in Preventing Major Accidents

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Introduction

Almost every serious disaster in the major hazard industries prompts a detailed investigation and results in a comprehensive report. The Piper Alpha disaster in the North Sea¹, the Longford gas plant explosion in Victoria², Australia and the report by the Chemical Safety and Hazard Investigation Board into the BP Texas City Refinery explosion³ are but three examples of the genre. The details of these incidents vary and the nature of the personal tragedies is of course unique to those involved. However the similarities are striking. This is well known and understood by experienced safety professionals.

Amongst other things, these Reports inevitably show, that key barriers (or risk controls) to prevent the accidents happening were missing and/or had significant “holes” in them, (using James Reason’s famous “Swiss Cheese” model⁴) and did not work when called upon to do so⁵. Experience suggests that defences against an incident, be they hardware, procedural or system type barriers, need to be maintained. Furthermore, it is usually believed that at least some of these deficiencies were (or should have been) readily observable and hence able to be corrected *before* the accident. Hence, even if it is not possible to predict accidents, it is possible to identify failed or failing barriers. These could be regarded as “accidents in the making,” in the sense that if we can identify failed and failing barriers it is much more likely that incidents can be prevented.

This paper describes an essential part of any management system for safety (both process safety and personal safety) namely that part which proactively checks the status of risk controls or barriers, to identify failures in risk control systems before they manifest themselves in an incident. In this paper, the proactive checking is called “Active Monitoring⁶.” Active monitoring is distinct from the process of auditing because it is done by line management and supervisors whereas auditing is usually defined as an activity with a degree of independence⁷. Unfortunately, in common parlance the term “auditing” is almost invariably used to describe *any* type of checking activity whether or not it is done by a line manager or by someone with independence.

¹ Cullen, L. W. D. (1993). "The public inquiry into the Piper Alpha disaster." London: H.M. Stationary Office. ISBN 0101113102. 488pgs, 2 volumes

² Hopkins, A 2000, *Lessons From Longford: The Esso Gas Plant Explosion*, CCH Australia Ltd, Sydney, Australia.

³ U.S Chemical Safety and Hazard Investigation Board (2007). BP Texas City Refinery Explosion and Fire Investigation Report, March 23, 2005.

⁴ Reason, J. T. (1997). *Managing the risks of organizational accidents*, Ashgate Aldershot., p.9.

⁵ Health and Safety Executive (1997), HS(G)65, Successful health and safety management;55-66. Section 5, ISBN 0717612767

⁶ Health and Safety Executive (1997) , HS(G)65. p.57

⁷ Health and Safety Executive (1997), HS(G)65.p.77

This is not just a semantic point. Active monitoring is a *line* activity and auditing is done by persons with *independence*. Both are needed. By calling all checking activities “auditing” we are subtly removing the responsibility from the line to both implement safety systems and ensure that they work properly by measuring their efficacy. It should not be left to auditors. Unfortunately, this argument appears to be on the verge of being lost at least in the US offshore industry where the SEMS⁸ program puts great emphasis on independent audit but little or no responsibility on line management.

Describing line management activities as “auditing” runs the risk of inadvertently weakening line management’s responsibility to manage safety. It would be like saying the responsibility for managing people is the Human Relations (HR) department’s job. HR can provide tools, processes and advice on managing people but it is line management that has to do it. So it is with safety.

Preventing incidents by active monitoring

Andrew Hopkins points out in his analysis of the Texas City disaster that, “...mindful leaders do not rely on assurances from subordinates that all is as it should be.” “They...fear that there are problems lying in wait to pounce...and they ...probe for these problems and expose them before they can impact detrimentally...”⁹. In other words we must assume our barriers and defences are not as good as we think they are and that they have holes and gaps and that we should actively look for them. This is the essence of “active monitoring.” This paper will explain how one can identify when things are “going off the rails” by applying “active monitoring” techniques at each key layer of management, senior managers, middle managers, and front line supervisors.

What is “Active Monitoring?”

By “active monitoring” we are referring to all those checking activities, formal and informal, carried out by *line* managers which lie at the heart of effective management. There are a myriad of management texts which discuss the theory and practice of management and supervision in general. The UK’s HSE publication HS(G)65 *Successful Health and Safety Management*¹⁰ describes and illustrates how this concept fits into a health and safety management system. Note, we are not talking about *auditing* here. By contrast “auditing” is defined as an activity carried out with a degree of independence of the line management. This is consistent with most definitions of “audit.” Indeed what is advocated below should itself be subject to periodic audit!

Terminology

Most of the active monitoring that is done is usually called “auditing” in industry. This is technically incorrect. Is the terminology important? Noetic believe it is. If we allow this important activity to be called “auditing” we inadvertently send a message to line management that this is not something they need to be concerned about. As a result active monitoring may be left to others, “auditors” or perhaps the safety

⁸ Bureau of Safety and Environmental Enforcement, 2013, *Safety and Environmental Management Systems (SEMS)*, United States Department of the Interior

⁹ Hopkins, A. (2008). Failure to learn: the BP Texas City refinery disaster. Sydney, N.S.W, CCH Australia.p.120

¹⁰ Health and Safety Executive (1997). Successful health and safety management.

department. If we accept the principle that safety is a line management activity then line managers and supervisors also have to be active in monitoring that risk controls are implemented as intended. Furthermore by calling it “auditing” it is less clear that this is an integral part of the safety management system that should itself be subject to (real) auditing.

Active Monitoring in the Safety Management System (SMS)

Lord Cullen in his report into the Piper Alpha disaster, *The Public Inquiry into the Piper Alpha Disaster*, said, “I consider...[oil] operators should draw on principles of quality assurance similar to those contained in ...ISO 9000.” He also said the SMS should set out:

- The safety objectives
- The system by which those objectives were to be achieved
- The performance standards to be met, and
- The means by which adherence to those standards was to be monitored¹¹.

These are the essential elements of a control system and are directly analogous to control systems used for example in controlling an air conditioning system, although in this case applied to the management of safety. Lord Cullen did not make explicit the importance of the feedback loop but from the context of this part of the Inquiry Report this is implicit in the last dot point. Thus, it is reasonable to say that the use of the word *system* by the advocates and administrators is an intentional reference to systems thinking and not accidental or loose use of the term. To test this further we examined a major company’s SMS, the guidance provided by an industry association working globally and a respected government health and safety regulator, to see what they regard as being the essential elements of a safety management system. The results appear below in Table 1.

Table 1: Comparison of International Association of Drilling Contractors, (IADC), Chevron and UK Health and Safety Executive Safety Management System Elements

| Management System Elements (IADC) | Management System Process (Chevron) | UK Health and Safety Executive Guidance on Safety Management Systems |
|--|--|--|
| + Policies and Objectives | + Purpose, Scope and Objectives | + Policy |
| + Organisation, Responsibilities and Resources | + Procedures | + Organising |
| + Standards and Procedures | + Resources, Roles and Responsibilities | + Planning and Implementing |
| + Performance Monitoring | + Measurement and Verification | + Measuring Performance |
| + Management Review and Improvement | + Continual Improvement | + Audit |
| | | + Review |
| IADC HSE Case Guidelines Part 2.0.1 | Chevron Operational Excellence Management System (OEMS) 2010 | HS(G)65 Successful Health and Safety Management, HSE Books, UK. |

¹¹ Cullen, L. W. D. (1993) "The public inquiry into the Piper Alpha disaster."

It is notable that in each case the importance of checking by line managers is recognised as an essential part of the management system. The language may vary, “Performance Monitoring,” “Measurement and Verification” or “Measuring Performance.” However, when the detail of these systems is penetrated it becomes clear that they are referring to the checking of how the safety systems and processes are being applied.

Why carry out active monitoring?

We cannot assume our people will always do what we want them to do, our systems and procedures will always work as intended and that our equipment and hardware will always perform as desired. Even good, motivated, trained and experienced people who are not tired make mistakes. We know that our people are not perfect and nor are our systems and procedures, and consequently, they are not always applied as intended. Furthermore our equipment wears out over time and can fail. In other words people and systems need regular supervision.

What do we monitor?

Active monitoring involves checking all these components, people, equipment and systems, continue to work as intended. This is not new. What distinguishes the approach described here is the recognition that the topics which are actively monitored must include those barriers or controls needed to prevent a major accident. This needs to include preventive barriers as well as those barriers which are intended to mitigate the consequences of the event if it materialises. Furthermore there are subtly different types of active monitoring that should take place in different points in the organisation.

A Hierarchy of Active Monitoring

There is a hierarchy of active monitoring:

First line supervisors should regularly go into the “field” and observe what their staff are doing and discuss their jobs with them and how the systems and equipment they use are working in practice.

The managers of first line supervisors should do the same with their supervisors and ask how *they* know what their teams are doing; how the equipment is operating and how the systems they use are operating. In other words how do they monitor *their* staff. In addition these managers themselves should go into the “field” to see what is happening (albeit on a less frequent basis).

More senior managers should check that their reports have *systems* for monitoring their people, the equipment and the systems they use. In addition, they too should also go into the “field” themselves on occasions to see what is happening and thereby provide leadership. This is likely to be on a less frequent basis than managers and first line supervisors.

A common thread throughout these different layers of management is that all layers should go into the “field” and focus on those controls that have a direct impact on major accident events. It is inevitable that the most senior managers will go less often

but the positive impact they can have because of their positional power makes this activity very important and a key leadership opportunity.

However, as Andrew Hopkins has pointed out in relation to the Deepwater Horizon disaster¹², (where senior managers were offshore on a safety tour that apparently focussed on personal safety issues as opposed to major accident event issues), it is imperative that the senior managers look at relevant major accident event controls.

Formal and Informal Monitoring

Some active monitoring will be informal but still important such as a discussion over a coffee and is unlikely to need to be documented. Some will warrant inclusion in standard processes or systems such the company's staff performance and appraisal system, tool box talks and meetings prior to shift starts. Others will be documented in business unit procedures, safety management plans, inspection procedures and so on.

Whether it is formal or informal, all monitoring requires care in execution. Too much monitoring can be demotivating – too little and we run the risk of not knowing what is going on. The frequency and style of checking *may* reduce as we see the requisite tasks being carried out to the required standard more reliably. Conversely if an important activity is not being done – then increasing the frequency and seniority of the person doing the checking can send a powerful signal about its importance.

What should we monitor?

We know some people are more diligent than others. By checking, we are showing interest and leadership. Examples include regular checking of the operation of the permit to work system, process isolations, progress with HAZOPs/PHAs, management of change and so on. Selection of the appropriate subjects to check should be based on an analysis of the event being guarded against using conventional hazard and risk assessment methodologies. So called “bow-tie” diagrams provide a useful way of presenting the links between major accident events and the preventative and mitigating controls *and* a way of ensuring that the appropriate risk control systems have been selected for “active monitoring”.

Leading and Lagging indicators

There has been a great deal of discussion in recent years about leading and lagging indicators. Overall the debate has been useful although the jargon can be confusing with talk of KPIs, performance standards and more specifically “process safety indicators.” For the purposes of this paper we have stuck with “performance standards” as applied to specific roles.

Performance standards should specify for the most critical active monitoring tasks:

- who should do what;
- at what frequency;
- to what standard, and;
- the nature and frequency of the report on this active monitoring.

¹² Hopkins, Andrew, 2011, WP 79 - Management walk-arounds: Lessons from the Gulf of Mexico oil well blowout, National Research Centre for OHS Regulation, Canberra ."

Feedback and Governance

This feedback on what the monitoring shows about the “health” of our systems needs to be reported to and discussed by senior leaders. What is reported upon, the frequency of reporting and what action is subsequently taken on the results is fundamental to the success of the active monitoring. Crucially, if the results of the monitoring show that action is needed then they must take it. Failure to do so will demonstrate to everybody else that the leaders are not serious and the monitoring is not really important. Equally, providing feedback on the things that are working well is essential if people are to believe their efforts are rewarded.

Conclusion

As a matter of routine we generally do careful and thorough hazard and risk assessment exercises when designing and building new facilities. These usually identify the risk controls or barriers that need to be in place to prevent incidents. However, this is the easy part! More difficult is to ensure that these controls continue to be applied over the lifecycle of the facility, which can be many years. We know that risk control systems (like anything else) can deteriorate over time and a robust “active monitoring” program is needed to maintain them. In particular an effective active monitoring program will ensure that our people are:

- doing what they should be doing and checking what they should be checking;
- reporting what should be reported and to the right people;
- taking appropriate action on the information provided particularly to remedy identified deficiencies in risk control systems.

There are no quick fixes or silver bullets and, as with most other aspects of good management, it is easier to describe what is required than to do it effectively and consistently. Also it is axiomatic that the key controls are identified in the first place and effectively communicated (perhaps by bowtie diagrams) to all those who have a role in implementing and actively monitoring the controls.