



OVERFILL PROTECTION: A REVIEW OF API 2350 4TH & 5TH EDITION

In the second of a two-part article series, Philip Myers and Brock Trotter of PEMY Consulting review the 4th and 5th editions of API 2350 and how it affects overfill standards



MANAGEMENT SYSTEM PRACTICES

LOCS

A key step in OPP is to establish LOCs (levels of concern) as shown in Figure 3. OD is the liquid level we never want to reach. It is defined as overflow, damage, or any other problem associated with a too high liquid level as specified by the operator/owner. In API 2350 there are 2 important LOCs:

1. LAH
2. LAHH

The LAH is mandatory. Regular practice tends for most owner/operators to use an LAH and LAHH. API 2350 now requires only one alarm level. It has been demonstrated that adding more alarms does not necessarily improve operator performance. Historically, two alarms were required because the alarms were so unreliable.

Today however, alarm systems can be incredibly reliable. For these reasons, API 2350 allows for a single alarm. The owner operator must ensure that their alarm system is engineered to be highly reliable. So, the use of

a second alarm (LAHH) is optional. However, when used, the LAHH or second alarm must then meet all the rules specified in API 2350.

Obviously, alarms must be initiated using sensors which are shown in Figure 3. The other levels such as OD and NFL must still be determined but they are just elevations; no physical sensor or equipment is needed at these levels.

Take note that API 2350 does not address the requirements for alarms at the normal maximum fill level (NFL). API 2350 enforces the principle that an alarm is actionable, must be procedure driven and is always to be considered an emergency. Therefore, if an operator wants to be notified when the level exceeds the NFL it can use an 'alert', which is not within the scope of API 2350. Differentiating between alerts and alarms will be an important cultural shift in some organisations.

The high alarm should never be used as an alert or notification that the level is too high. That opportunity has already passed when the NFL is exceeded. Companies which do not use this process must rethink their approach and understand the benefit of the API 2350 methodology, which is aimed to reduce issues related to faults in human factors.

RESPONSE TIME

Response time is the time between LOCs. It is, of course, based on the flow rate into the tank which is a maximum flow value. The inset in Figure 3 shows that response time (RT) is the reasonable and necessary time for an operator to detect the alarm, physically go to the field and turn the appropriate valves or shut off pumps, with the addition of a safety factor.

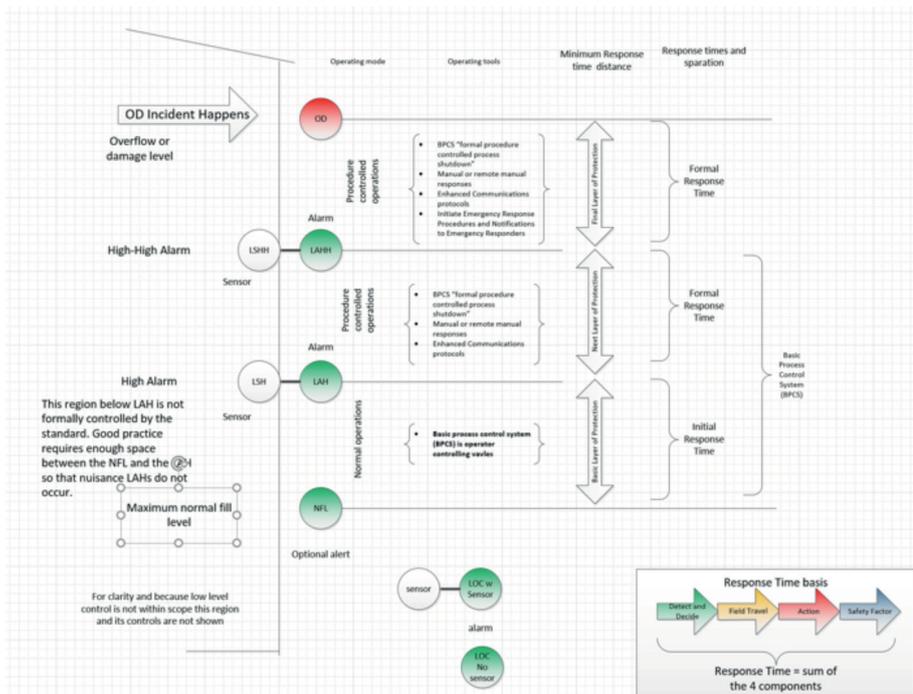


Figure 3: LOCs and response times

Measuring the response time is a critical step to preventing an overflow event. There is usually pressure to maximise tank storage capacity and response time works against this. Do not reduce the LOCs until the remaining tank space is not viable for overflow prevention.

OTHER MANAGEMENT SYSTEM COMPONENTS

Like any management system, written procedures are required. These procedures should address normal and abnormal conditions. For example, loss of power can affect the level indication and alarm systems. There must be procedures to address issues such as power failure. Facility personnel must be competent in performing their duties. This comes from experience and training.

Managing change for both equipment and personnel is important. The management of change process (MOC) is mature in the industry so will not be covered here. Proof testing is a critical element of reliability and thus must be incorporated into written procedures. API 2350 discusses the requirements and principles for proof testing. As a point to reiterate the importance of proof testing, a significant causation for the Buncefield event was due to improper proof testing of the alarm system.

RISK ASSESSMENT

One of the key elements of API 2350 is risk assessment of a tank facility. Since all tanks cannot be simultaneous, it is important to have a method for determining which tanks pose the most overflow risk to deal with those risks first. Many factors contribute to risk and the entire topic of risk can be complex. Because there are so many ways of dealing with risk and each owner has a unique perspective and perhaps tolerance for risk. API 2350 only requires that a risk assessment be done, it does not address how to do it.

Risk assessment, as a requirement for overflow protection, requires a robust approach and strategy. If a tank facility owner has only one or two tanks the problem is relatively uncomplicated. However, if the tank facility owner has 1,800 tanks then a more strategic approach is needed to deal with the resources and time required to appropriately address the risk assessment process. Moreover, if the facility owner wants to accomplish a specific management objective, such as complying with the 5th edition of API 2350 within a specific period, then a strategy that ranks and prioritises risks for accomplishing this goal is essential.

In a complex environment, such as those portrayed in API 2350 for overflow protection, everything can't be assessed or measured at the same time; data collection, assessments and risk assessment must prioritise resources. The most effective approach is to address the most critical risk assessments first – those addressing the most undesirable threats first.

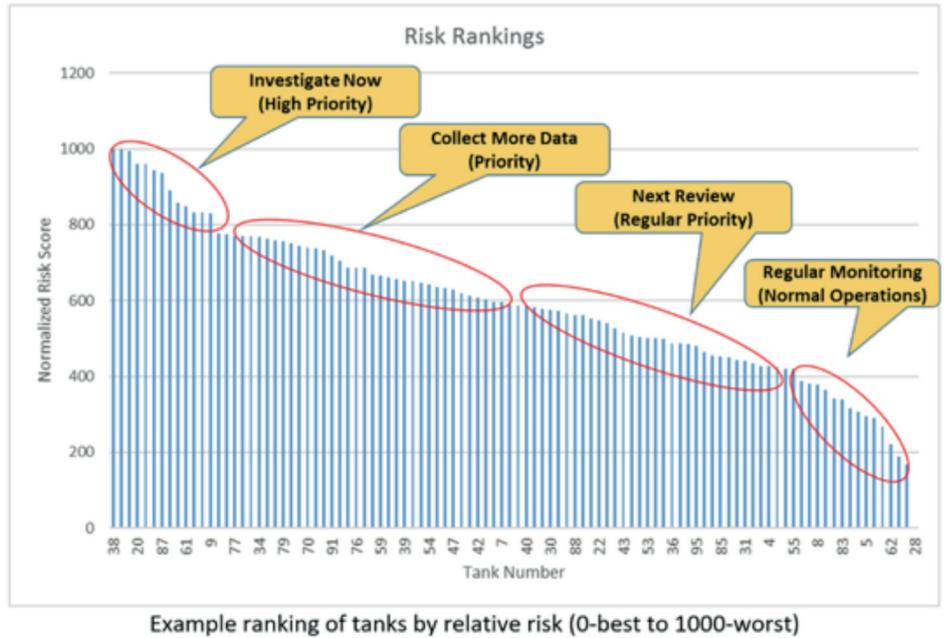


Figure 4: risk screening results

“ Quote please ”

Prioritising risk assessment or risk screening studies are the quickest way to prioritise actions that reduce larger, more imminent risk concerns.

The many tools for doing risk assessments range from simple what-if analyses, to check-list, hazard and operability studies (HAZOPS), even trees, fault trees, failure modes and effects, etc. Because of the labour involved, it is usually infeasible to apply complex methods to every single tank in the tank population. Rather, a risk screening process is usually appropriate in the early stages, and it gives a moving window that focuses on those high priority tanks that need to be addressed now. A simulated risk study on 1,000 tanks is shown in Figure 4.

A screening exercise can be done by using metrics for likelihood and consequence and then combining them in an appropriate manner. Because risks can arise from different types of threats, such as those of human health and safety or damage to the environment, a logical system that incorporates the owner/operator values must be applied to the risk assessment metrics.

CONCLUSION

A standard, law, regulation or policy is only that – paperwork and penalties for non-compliance. By themselves or with absentminded compliance, standards cannot create safe and effective practices to reduce risks.

Corporate leadership and messaging supersedes standards because the belief and value systems, as well as resources allocated for improvement, are all determined by senior level management. Senior level management sets the tone within the minds and hearts of employees who make the business run as it does, creating change or stagnation. Senior level management determines the corporate safety culture regardless of what it claims publicly.

No regulation, policy or law can create the kind of environment where safety or environmental protection are a top corporate priority without the continued messaging and accountability of leadership within the organisation. Unfortunately, this is not something that API 2350 can influence and bolster.

Blind compliance with API 2350 (or for that matter any important safety or environmental standard) will not be as effective in reducing risk without the right corporate values and leadership philosophy, accountability and messaging to back it up. This is the hard and difficult journey for getting API 2350 to work for the industry.

FOR MORE INFORMATION

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