

Energy Insights:
Process Safety

Avoiding low probability, high impact events*

*connectedthinking

PRICEWATERHOUSECOOPERS 

Despite efforts to prevent environmental, safety and health events from impacting operations, bad things happen—even to good companies. But, it is possible to mitigate the risk inherent in even the most hazardous operations if a process safety governance mindset and operating plan is ingrained from the top down.

Authors: Bob Dennis and Ryan Hawk

A tank with an overflow alarm, to protect against loss of containment, would falsely alert during heavy rainfall. The operator overrode the alarm because it was a nuisance. Both supervisor and operator then forgot about the override condition. Would a simple human decision undo years of investment in technology, systems and planning?

Simple decisions with major consequences. Employees at energy utility facilities make dozens every day. Companies in the industry want to be sure that the right decisions are being made and that employees have the tools and technology to make these decisions.

Because of that risk, companies in the energy industry invest significant money and resources to ensure that comprehensive environmental, health and safety (EH&S) guidelines are in place and understood by all involved. Yet despite this, low probability, high-impact events do indeed occur, leading to tragic incidents and damaged reputations.

Some executives in the energy industry may view EH&S risk as a routine component of doing business. Or, in some cases, they may see the potential for danger as a problem that other companies have – “but not us.” With an in-house organization devoted to EH&S issues and a comprehensive safety program in place, it is easy for senior management to overlook the real level of risk inherent in the hazardous environment of an oil rig or refinery. Or – just as common – to assume that since accidents have not occurred in the past, they will not happen in the future. With the massive amount of data and technology in place in most organizations, the mind set has evolved to a degree of complacency because information, programs and metrics are confused with a robust governance mindset and program.

Yet as the true-life example at the beginning of this piece illustrates, even the most sophisticated program – backed by the latest technology – can be overridden by a single employee making a decision based on expediency or the misguided notion that nothing is wrong. All it takes is the right chain of events and a lax environment reflective of an “it can’t happen here” mentality.

Despite these challenges, a management team that is properly focused on EH&S issues – backed by the proper tools, information and governance processes – can mitigate the risk of low probability, high-impact events at its facilities. The key is improving the consistency of operations in four areas – people, process, technology and oversight/strategy – through integrated process safety governance techniques and tools. Embedding controls into processes as part of the governance aspect is often the critical element overlooked in EH&S programs.

Complacency creates failures

Robust process safety programs include information from:

Historical sources: What has happened in the past

Proactive sources: What inherent hazards exist at specific processes and operations

External sources: What has happened in other industries

It is rare for an EH&S incident to be caused by a single failure. Typically, a high-impact event has multiple causes, including poor judgment, human error, lack of routine or preventive maintenance, failure to recognize or report hazardous conditions and more.

The breeding ground for these types of breakdowns can often be attributed to organizational attitudes such as complacency, ignorance or arrogance. Employees can drop their guard when performing routine tasks. Others might not be properly trained. Ongoing maintenance programs can be underfunded or understaffed. Management might be tracking safety data that is not indicative of actual conditions. These types of organizational issues might not cause problems for years, or even decades, but this is no guarantee of future performance.

Another cause can be the corporate culture itself. For example, some companies pride themselves on being technically superior; thus, their approach to EH&S is engineering focused, to the exclusion of employee factors such as training or communication. Others take the opposite tact and invest heavily in improving employee competence, while overlooking the technology and engineering factors that could lead to a major event.

To overcome these common obstacles, an integrated process safety program provides a disciplined framework for managing the integrity of hazardous operating systems and processes by applying good management practices, design and engineering principles. It deals with the prevention and control of incidents that have the potential to release hazardous materials or uncontrolled energy, with an end result of serious injuries, property damage, lost production or environmental impact.

When implemented properly, a process safety program mitigates risk and improves EH&S performance by incorporating historical, proactive and external elements into the company's overall management system.

Safety's foundation starts at the top

The basic building blocks of process safety are three-fold. First, senior management commitment is a must, because the company's leadership sets the tone for the entire organization. Second is the delivery of appropriate data and information to the management team – in a way that enables leaders to drive ongoing, sustainable improvements while promoting the company's overall safety culture. Lastly, it is imperative to drive the learning from data and information into process change and controls. The last step is the governance step that is often overlooked.

The importance of senior management's buy-in cannot be overestimated. Safety starts at the top, in the CEO's office, and the measures and processes that make the difference in a company's performance must come from senior management. The tone from the top must go beyond the concept of safety; it must call for a culture that values and embraces governance processes.

For example, all employees should understand from management that it is acceptable to question how tasks are handled, or even to stop a particular project in progress if safety protocols are not being followed. Employees must also be encouraged by management to point out when certain activities are not actually predictive of particular dangerous situations. This simple – but critical – component of a safety governance oriented leadership tone is often overlooked.

At the same time, it is critical that senior management receives the proper information in order to understand current conditions and predict potential problems. Management information – in the form of a dashboard of leading and lagging indicators and other key data – must give the leadership team confidence that it is reviewing the right information for mitigating the appropriate risks.

Providing sustainable results

The development of an integrated process safety program – designed to provide sustainable results – begins with a comprehensive diagnostic review and analysis that includes four key steps:

Assess:

- **Qualitative assessment:** Reviewing the company’s culture and management systems, along with its performance evaluation system and corrective action and oversight policies, makes it possible to understand the current environment and the role it may play in allowing risk to flourish.
- **Quantitative assessment:** Analyzing EH&S performance through a review of employee-identified hazards, past incidents and related maintenance/inspection data provides a clear picture of major risk factors.

Design:

- **Risk and controls:** Industry-leading practices and standards are applied to the risks identified during the assessment phase.
- **Indicators:** Finally, key controls that mitigate the EH&S risks uncovered in the qualitative and quantitative assessments are prioritized, and leading and lagging indicators are identified to develop dashboard content for monitoring.

The assessment phase identifies risks and controls; evaluates oversight and strategy and the company's culture, leadership and direction; assesses employee accountability and competency; reviews the consistency, completeness and effectiveness of the company's EH&S policies; and accesses the technical architecture, functionality and integration of EH&S technology.

The design phase, which follows assessment, involves prioritizing controls and developing action plans to implement them; sourcing the management information that will comprise the dashboard and establishing data integrity standards; developing performance management guidelines and other tools for employees; and conducting readiness assessments.

At this point, the company is ready to begin implementation of its unique process safety system – including building the agreed-upon technical infrastructure and designing the actual management information dashboard – followed by a full roll-out to the entire employee population.

Technology and people: Maximizing their contributions

In today's high-tech world, companies often operate with the belief that technology will make the difference in their EH&S performance.

While process monitoring systems work well and provide an important warning system, the bottom line is that they are dependent upon people to make them effective.

Too often companies invest heavily in functionality with great promise, only to find later that employees do not use or are not aware of the system's full capabilities. Or, just as frequently, employees learn over time to overlook alarms or other caution signs, convinced that they are false readings. Thus, a company's technology is only as good as the people monitoring it. Training is critical, as is developing a culture that encourages employees to speak up when conditions indicate it is warranted.

In fact, the employee factor is one that is often overlooked by companies striving to mitigate risk. Creating a culture of safety awareness and empowerment is important, but it is just the first step. Linking employee evaluations and compensation to ES&H compliance and performance is the final step in process safety, ensuring that employees understand the importance of proper safety behavior.

The old saying that "what gets measured, gets improved" certainly holds true for ES&H issues. The key is emphasized in the appropriate metrics which will achieve better levels of success. The focus must be on measuring and tracking leading indicators of process safety, for instance, tracking leading indicators of process safety performance rather than lagging indicators of personal safety.

Once the appropriate set of metrics is defined and communicated, these must be integrated into every employee's objectives. When employees understand that meeting or exceeding certain parameters is part of their overall performance contracts – and those expectations are tied to their compensation – they will focus on safety issues properly. Creating that culture – through benefits and staff rewards, demonstration of core values, employee empowerment, training on leadership behaviors, communication of job roles and accountability and providing proper oversight and supervision – will go a long way toward supporting the company's overall ES&H efforts. It is very common for the focus to be on lagging indicators of personal safety, such as number of injuries. Although important, lagging indicators alone will not achieve the desired goals.

Process safety is change management

At its core, implementing process safety throughout an organization is really a matter of change management. After all, it depends heavily on senior management commitment, cultural adjustments, the identification of risk, implementation of new protocols, the deployment of new technology and an enterprise-wide governance process. These are the hallmarks of change management.

The common factors in any successful safety process design and rollout are, in fact, similar to any other major change effort – leadership and accountability, communication and change management and access to resources and information.

Change management programs are complex by nature, as is process safety. Ensuring that the team driving improved process safety has all of the skill sets is critical. Often, companies realize outside consultation is required. To increase the likelihood of success, ensure that expertise in change management, risk management and controls is applied in addition to the traditional ETT&S resources.

About the authors



Robert Dennis

Principal, Houston
Advisory Services
E-mail: robert.w.dennis@us.pwc.com

Mr. Robert Dennis has over twenty years of experience in a wide variety of technical, financial and business issues. Mr. Dennis is the National Leader of the Energy and Utilities Practice in Financial Advisory Services. He is also a member of the firm's Global Advisory Energy and Utilities Industry Board. Mr. Dennis specializes in the quantification of damages for dispute resolution and is an accomplished testifying expert. His experience includes claims related to environmental, toxic tort, asbestos, construction, lost profits and others. He has specific experience in insurance allocation issues, and is a recognized expert in virtually all aspect of environmental matters.

Mr. Dennis is a member of the Board of Advisors to the Environment Management Program at the Stuart Graduate School of Business, Illinois Institute of Technology. He is a featured lecturer at the Stuart School on accounting for contingent environmental liabilities. Mr. Dennis is a member of the American Society of Civil Engineers, the National Society of Professional Engineers, and Sigma Xi, the national honorary research society, and is a registered professional engineer.



Ryan Hawk

Principal, Chicago
Advisory Services
E-mail: ryan.l.hawk@us.pwc.com

Ryan Hawk is a Principal in the Operations, People and Change Practice where his focus is operational performance improvement, primarily in the Energy industry sector. Mr. Hawk is experienced in and has led major efforts in the areas of environmental, health, safety (EH&S), lean manufacturing, and corporate performance management. With respect to EH&S, Mr. Hawk has focused on measurement systems, as well as process and operational safety. He has more than 14 years of combined industry and consulting experience, holding positions such as engineering and maintenance manager and production supervisor prior to joining PwC in 1999.

He has degrees in mechanical engineering and industrial engineering.

U.S. Energy Leadership Team



Rich Paterson
Global and U.S. Energy Leader
richard.paterson@us.pwc.com



James Koch
Global Energy Tax Leader
james.koch@us.pwc.com



Martha Carnes
U.S. Energy Assurance Leader
martha.z.carnes@us.pwc.com



Michael Collier
Energy Transaction Services Leader
michael.collier@us.pwc.com



Niloufar Molavi
U.S. Energy Tax Leader
niloufar.molavi@us.pwc.com



Ray Slocumb
U.S. Energy Advisory Leader
raymond.e.slocumb@us.pwc.com

About PricewaterhouseCoopers

PricewaterhouseCoopers (www.pwc.com) provides industry-focused assurance, tax and advisory services to build public trust and enhance value for its clients and their stakeholders. More than 154,000 people in 153 countries across our network share their thinking, experience and solutions to develop fresh perspectives and practical advice.

About the PricewaterhouseCoopers Energy Practice

Recognized globally for deep energy industry experience, PricewaterhouseCoopers has an extensive history of providing expert resources and proven solutions that enable energy companies to meet their business imperatives. By providing audit, tax, and business advisory services to the Supermajors and key National Oil Companies and the vast majority of the Fortune 500, PricewaterhouseCoopers' professionals possess the experience necessary to provide optimal insight and impact. The global energy practice of more than 3,100 professionals, including 300 partners, is headquartered in Houston, Texas, and is committed to building meaningful relationships with energy clients. Commitment to the energy industry goes beyond service delivery and is demonstrated by an additional focus on knowledge sharing accomplished through thought leadership publications, educational opportunities, and industry event participation and sponsorship.