Legislation and Compliance Including Seveso III

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Serious accidents like Seveso, Bhopal, Piper Alpha, Fukushima and Buncefield, over the last decades caused by industrial activities urged for UK regulations to be improved, simplified and practiced. All accidents are preventable if the safety is adequately managed. We must protect employees, public, company assets and the environment. Compliance can be enhanced by:

- Training and educating individuals about the regulations/legislation and how to comply with them
  - Building a voluntary compliance culture within industries
  - Understanding the consequences of poor performance
- Monitoring compliance
- Personal safety and relation to process safety

Process Safety and Health & Safety continues to be a priority for many industries in the UK, it is used as a determining factor for its overall success. When managing safety the initiative must come from the top management, not only the company but every individual within the company must apply significant effort to manage risk and achieve good levels of health and safety performance. They must constantly question what could possibly go wrong and have measures in place that would prevent/mitigate that risk. There is a link between personal safety and process safety and neither of them should be compromised. Personal safety deals with low severity and high frequency but process safety deals with high severity and low frequency event.

This paper will describe the correlation of Health & Safety and Process Safety; this will include the identification and mitigation of potential hazards effectively controlling the management of change and ensuring effective inspection, testing and maintenance of equipment and alarms.

Provision of an effective Process Safety Management system is a key requirement of the Control of Major Accidents (COMAH) regulations therefore this paper will also discuss the key changes introduced by Seveso III which affect the Control of Major Accidents and Hazards including a simple introduction to COMAH. COMAH ensures that businesses take the necessary measures to prevent accidents involving dangerous substances such as chlorine, liquefied petroleum gas, and explosives which can cause serious damage/harm to people and/or the environment. This paper is intended at safety mangers and individuals responsible for compliance with SevesoIII/COMAH regulations.

KEYWORDS: Process Safety, Process Safety Management, Training, Monitoring, Compliance, Major Accident Prevention Policy.

Introduction

Recent major accidents in industries including Texas City Refinery Explosion, Buncefield Oil Storage Terminal Fire, Texas Fertilizer Plant Explosion and Japan Fukushima Nuclear Accident remind us of the risks associated with industrial processing. Although regulations have evolved in the past 25 years, it is clear that we must do more to prevent these accidents from occurring. The contributing factors which caused these events such as inadequate hazard identification, poorly designed equipment, incompetence and human error continue to be challenges faced by the industry. The hazards which caused these accidents were all foreseeable, and suggest further improvement is required from both regulators and industry.

Modern industries handle many hazardous materials – appropriate risk management ensures safer operation, and protects life, assets, organisations reputation and prevents economic disruptions. To prevent accidents we need to commit to a good process safety management, understand the hazards, risk and associated control measures and learn from past experiences. Understanding of what can go wrong, how to prevent this happening and to ensure that these systems are reliable over time are essential to process safety management.

In the UK the Control of Major Accident Hazards Regulation (COMAH) requires sites to prepare a Major Accident Prevention Policy (MAPP). MAPP is a site specific process safety management system which does not need to include detailed description of process safety management system but it must demonstrate that company has effective plan in place for the management of major hazards. MAPP helps companies to identify and recognize the potential for major accidents which can occur at their premises, by identifying these hazards companies can provide high level of protection for their employees, visitors, contractors and the environment as well as identify opportunities for further improvement.

The HSE report Statistics on Fatal Injuries in the Workplace in Great Britain 2014 shows that the number of workers fatally injured in 2013/14 is 133. This corresponds to a rate of fatal injury of 0.44 deaths per 100000 workers. The UK goal setting regulatory regime needs to do more to reduce the number of accidents. This suggest that industry is making repeat mistakes, and we continue to see near misses with the potential to lead to catastrophic losses which cause, fatalities, injuries, loss of assets, harm to the environment, significant economic loss and negative reputation. All stakeholders' organisations including their management team and employees, the public, and regulators all want the same outcome – a safer industry, yet we still have not achieved the goal of zero significant operational incidents.

As chemical engineers we end up in many different roles within the industry i.e. process engineers, operators, maintenance, management and consultants are all responsible for establishing robust safety systems which includes, plan definition, responsibilities, duties, reporting, document control, process reports, and tracking changes. It is our responsibility to help our colleagues to understand the risk involved, and to lead the champion the interactions between process and health and safety to ensure our performance improves.

Our sector continues to innovate and push technology and chemical engineering into new horizons. High pressure /temperature, corrosion, erosion, moving into deeper waters, extreme climates and the manufacture of new chemicals which often involve exothermic reactions and the use of unstable toxic materials are all factors contributing to higher risk. This means that as we engineer new frontiers we also need to evolve and improve our safety management systems. This article explores how compliance can be enhanced through training, monitoring, culture and understanding the consequences of inadequate performance and how individuals influence the design, implementation and assurance to process safety management systems.

This paper also demonstrates close relationship between Personal and Process Safety including examples when Health and Safety accidents lead to a Process Safety accidents followed by a short introduction to the latest Seveso III changes which affects the control of Major Accident and Hazards (COMAH).

Training and Educating Individuals about the Regulations/Legislation and how to Comply

Failure to comply with regulations and to implement good process safety systems might lead to conditions which could potentially pose a risk to the safety of employees, community or the environment and might also lead to regulatory non-compliance and enforcement actions. Damage to the company`s reputation may result should any of these risks occur. Knowledge, skills, attitude, experience are essential to process safety excellence; this will not only result in safer working conditions but improve profitability.

The importance of competency was emphasised after the Buncefield and Texas City accident. Companies need to ensure that their staff as well as contractors have the right skill set to perform safety critical tasks. Competency should be incorporated into company policies supported by robust training programme. Training of staff/contractors and understanding regulations and legislation minimizes the risk of accidents occurring, improves safety culture, protects employees, environment and supports regulatory compliance. Good training standards ensure that staff have essential training, experience and competence required for their role. Training should be relevant to their role and emphasis should be put on the specific safety, emergency operations and safe work practices. Suitable Key Performance Indicators should be developed to monitor staff competency and to ensure that their training and refresher courses are up to date. Refresher courses should be run as often as necessary but not less than once every 3 years. This practice ensures that individuals adhere and understand current regulation, policies and current operating procedures of the process. All minor or major accidents, incidents and near misses should be reported, properly documented and fully investigated detailing the findings and recommendations. Corrective action should be documented and most importantly the main intent of incident investigation is to implement preventative steps to prevent reoccurrence not to assign blame. Accident investigation reports can be used as training materials as their staff will be able to relate to the examples. The company will be able to identify their weaknesses and use it for improvement.

Building Voluntary Compliance Culture within Industries

The best approach to increased safety is to encourage voluntary compliance with obligations. Reward good performance but respond to breaches of noncompliance with appropriate enforcement action. This action will demonstrate to each individual that there are consequences for noncompliance. It is essential to develop positive, encouraging and entrusting safety culture within each organisation. Safety should not be put ahead of profits (safety is more profitable than unsafety). Staff should be encouraged to report accidents, incident, near misses, unsafe acts; they should be able to stop work immediately if they do not feel it is safe to continue. Equally no one should be taking shortcuts to compromise safety. Factors like education, training, culture within the company and attitude can encourage voluntary compliance within organisation. A company has established a good safety culture when their employees have taken proactive approach to their job tasks, the result and quality of their work is the same with or without management intervention.

Is there such thing as "voluntary" compliance?

Yes there is. An example of voluntary compliance is when an operating company which has assets in countries which do not have regulatory bodies such as the HSE. These companies choose to follow UK or European regulations to ensure safe operation. Another example of voluntary compliance is when a foreign country does not have regulations they opt to adhere to regulations adopted from UK or Europe. Factors which drive voluntary compliance are public opinion, competitiveness, awareness, self-motivation, auditing and requirements of suppliers and buyers.

It is crucial to encourage voluntary compliance within companies because it is impossible for the site managers to check if every single task was completed. Regulators, companies, managers and engineers we all rely to some extent on the ability of the individual to complete the work to their best ability.

Understanding the Consequences of Poor Performance

Quite often poor performance is linked to lack of understanding of the real consequences of poor performance. If individuals were aware of the risk they bring upon their colleagues, public and the environment then they would act differently. Latest technology offers various simulation equipment and software which allows engineers precisely emulating and screening runaway reactions, explosions and modelling toxic and flammable releases. Hazard and risk identification studies are well developed and should be used to prevent accidents and to demonstrate operators and the management the real consequences of poor performance. Knowledge, understanding, strong management commitment, good policies and procedures, effective communication, awareness and motivation are factors which can improve poor performance. None would want to hurt their colleagues knowingly and if individuals understand the real consequences of their actions then they would think twice before they neglect safety or take shortcuts. Good performance should be encouraged and rewarded but on the other side poor performance should be investigated and appropriate enforcement action should be taken.

Monitoring Compliance with Process Safety Management System

Organisation as a minimum must adhere to local regulations. Good risk management requires a robust system to be in place and a good compliance with the system. Measurement and monitoring is essential to maintain and improve compliance. Monitoring can be ensured by

- Carrying out on-site quality checks

- Reviews

- Audits

- Key Performance Indicators (KPIs)

These are the systems which can determine if the system is working effectively or as intended. Site visits and reviews by senior management or independent parties will provide feedback on the effectiveness of implementation of regulations, policies, and process safety in the field. It is important to check to what extent the regulations are implemented and how well the system works. During walkabouts site managers meet engineers face to face which encourages vital communication and open dialogue between the management and engineering and operations staff.

Businesses need to have clear understanding of the benefits of an effective audit programme. Good audit must have guidelines which describes how an audit should be conducted and what corrective actions should be taken. Process safety auditing is continuous improvement rather than just a compliance activity. Benefits of thorough monitoring include avoidance of major losses, protection of reputation and shareholder value, improvement of business performance, including higher productivity, higher quality, reduced waste, and lower costs.

It is critical for companies to develop Key Performance Indicators to ensure process safety performance is sufficiently monitored and assessed against these indicators. Auditing alone might be too infrequent to determine deficiencies in process safety management. Trained personnel covering different stages of process safety management should help to develop key KPIs which focus on critical part of their PSM. Monitor critical tasks which can go wrong quickly with excessive consequences and rely on human intervention. Ensure that identified KPIs are reviewed, it is clear what they monitor and what they tell and why are they vital.

Personal Safety and Relation to Process Safety

There are still a lot of organisations which do not differentiate between Personal Safety and Process Safety. Figure 1 below simply explains the difference between Personal Safety and Process Safety. Basically personal safety keeps employees and contractors safe by focusing on compliance and tackling issues that can lead to unsafe behaviour. Process safety ensures that facilities are well designed, safely operated and adequately maintained. Process Safety prevents harm to people and environment through identifying potential hazards and taking the necessary steps to reduce/eliminate them. Process safety incidents include chemical processes, exothermic reactions, overpressure, thermally unstable compounds, fire and explosion. If these incidents go out of control then they can cause serious injury or result in death, significant plant/asset damage, negative reputation and large financial losses.

Although there is a significant difference between Personal Safety and Process Safety there also is correlation between Personal Safety and Process Safety. For example welding work which was required as part of construction operations, could not be completed due to the welding engineer being injured. Although the work was not completed the work order was prematurely closed as being completed. During commissioning the tank was filled with flammable material and as a result a large amount of flammable material escaped from the system causing material loss and resulting in fire. Approximately 55 people were injured and 3 workers died.

It is in company's interest to develop robust process safety management which requires systematic approach to evaluating the entire process. This process considers process design, technology inspection & maintenance activities, routine and non-routine activities; emergency action plans and training programs. In the US the OSHA regulations suggests 14 elements of a Process Safety Management:

- Review Scope of projects

- Process Safety information

- Hot Work

- Process hazard analysis

- Operating procedures

- Training

- Contractors (training)

- Pre-startup safety review

- Mechanical integrity equipment

- Management of change

- Incident investigation

- Emergency awareness

- Compliance audits

- Trade Secrets

All 14 elements are mutually dependent and equally important. Every element contributes information to other elements which makes them dependent of each other. They all require managed system (ownership, standard of expectations and expertise and continuous improvement). Sound process safety management helps companies to avoid catastrophic accidents which injure people. Companies will benefit from fewer incidents, good employee morale, strengthen and maintain good relationship with community and regulators, compliance, credibility, improved reliability mechanical integrity of equipment, reduced cost and receive regulatory approvals more quickly.

Figure 1. Personal Safety vs Process Safety

Control of Major Accidents Hazards (COMAH)

Control of Major Incident Hazards involving dangerous Substances is the UK implementation of the Seveso III directive these regulations were amended on 4th July 2012 and changes must be implemented by 1st June 2015

The COMAH regulation affects industries where the inventories of hazardous substances specified in the regulation are above the required threshold. These include the chemical industry, and some storage activities, explosives and nuclear sites and other industries, where threshold quantities of dangerous substances identified in the Regulations are kept or used.

The COMAH regulation places a duty on the Health and Safety Executive which is referred to as the Competent Authority to prohibit companies where it is observed that measures to prevent and mitigate major accidents is deficient.

Main benefits of the COMAH report are:

- Prevent the risk of explosion, fire and toxic releases to the environment

- Identifies of safety critical equipment and procedure

- Reduces risk to as low as reasonably practicable.

Major Accident Prevention Policy

The main goal of Major accident prevention Policy (MAPP) is to achieve plant safety ensuring high level of prevention, and control of major accident hazard and the protection of employees, public and the environment. Basic principles of MAPP are made operational by the Safety Management System (SMS). The level of compliance of the objectives is in MAPP and SMS represents the adequacy of the measures. Main aim of safety reports is to ensure that both MAPP and SMS have been implemented, it ensures that companies identify all major accident hazards. If the hazards are identified then the company can try to remove these hazards or limit the consequences to As Low as Reasonably Practicable (ALARP). If hazards can not be completely removed then companies have time to prepare for these adverse situations by preparing detailed internal and external emergency plans. If you do not know the hazard then it is impossible to prepare for emergencies. When accidents happen it is difficult to quickly work out how to deal with the situation. By identifying hazards in advance companies buy valuable time which allows them to think about emergency situations it gives them time to prepare, review, demonstrate and analyse their plans and possibly put further measures in place should this be necessary. MAPP also ensure that appropriate safety is incorporated during the whole project cycle including design, construction operation, maintenance and installation.

Conclusion

Engineers have an ethical responsibility to embed safety to drive improvement in our spheres of influence. It does not matter how comprehensive and well-designed PSM program is, it is the day-to-day ability and voluntary compliance that changes safety systems from concept to reality. Many companies of various sectors are increasing their business activities; unless a good precaution is taken then this can increase the potential for accidents. Some companies are adopting bad practices mainly to increase growth and profitability although laziness and restricted budgets can also be contributing factors.

Companies need to commit themselves to voluntarily compliance through monitoring, education, training and understanding. Development of robust policies and procedures will support this process. Regulators need to encourage companies to comply with local regulations by making policies widely available, clear with no grey parts, easy to follow and implementable. Regulators need to work closely with industries and experts to ensure that policies are implementable in the field. Companies should share their good and bad experiences so that everyone in the field can learn from these practices.

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