CHAPTER 2.
OVERVIEW OF ACCIDENTS IN OIL & GAS
(UPSTREAM)

The chapter outlines the business importance of Oil & Gas, Major accidents that have caused human loss and environmental damages. It also illustrated the need of safety management systems that required to prevent disasters in Oil & Gas (Up-stream).

2.1 BUSINESS IMPORTANCE OF OIL & GAS INDUSTRY

Oil is wealth. For high quality of life, energy is the fundamental requirement. Oil is as important as agriculture to the developed world. It’s truly a condition for the continued existence of most of the humanity today. For over hundred years, Oil is the primary contributor for the development of world economy. 2,5% of worlds GDP is directly contributed by Oil business.

The Oil and Gas industry is one of the most powerful business of world economy. More than four billion metric tons of oil is produced worldwide annually. Oil and Gas companies are among the largest corporations in the world. In 2015, Royal Dutch Shell reported a revenue of more than 250 billion U.S dollars. Oil demand and oil consumption have been rising steadily over the last decades and it is expected to increase further more till the year 2035.

2.2 MAJOR ACCIDENTS

Piper Alpha disaster was one of the worst offshore disasters and had huge impact on the oil & gas industry in the UK and subsequently the world. The public enquiry into incident report contained 106 recommendations and led to
safety case requirement for each installation, requiring operators to demonstrate their ability to manage safety and emergencies as part of the Safety Management System etc.

The Deepwater Horizon drilling rig explosion occurred in the Gulf of Mexico, on the April 20, 2010 resulted in loss of 11 personnel and a significant environmental damage [15] [21]. This incident has been categorized as the largest environmental disaster in United States of America’s history as it spilled tons of Crude Oil.

According to the report developed by the NORA Oil and Gas Extraction Council, 648 workers were fatally injured in United States during year 2003-2008. It resulted in an occupational fatality rate of 29.1 deaths per 100,000 workers which is eight times higher than the rate for all United States workers. Nearly half of all fatal events in the Oil and Gas extraction industry resulted from highway crashes (29%) and workers struck by objects and equipment (20%). The illustrated incident data clearly emphasizes the need for an effective occupational safety and health management system that integrates safety and health concerns into a daily routine. People working in Oil and Gas industry are exposed to various risk factors.

2.3 PARADIGM SHIFT OF SAFETY MANAGEMENT SYSTEMS

Oil and Gas Industry works engage in many activities that exposes them to many serious hazards such as fire and explosion, falling from height, exposure to extreme weather conditions, unguarded machinery, being struck by heavy equipment, electrocutions and road transport hazards. Therefore to mitigate the risks and ensure safety of personnel an effective Safety management is essential.

The objective of occupational safety and health risk management is to identify and assess safety and health hazards existing at the workplace and to define appropriate control and retrieval steps.
Business processes in Oil and Gas industry are very complex. Hence it is essential that a systematized approach should be used for managing occupational safety and health hazards. Health, Safety & Environment Management is the key component for Oil and Gas’ Safe and sustainable business [66].

Learning from the past incidents and to comply with regulatory requirements, the Oil & Gas companies have imbibed safety management systems in their business management. However, the reflection of repeated incidents reminds that the Organizations shall demonstrate a paradigm shift in their existing safety management system. It shall not only address the regulatory compliance but more on identification of work place hazards, risks of all types and demonstrate risk mitigation measures. The focus shall be on involvement of workforce, bringing a uniform safety culture for prevention of accidents. Safety needs to become the way of life for people in the Oil and Gas industry. A change of heart and a change of mind set are imperative to achieve Health, Safety and Environmental excellence.

Mere compliance with the standards and regulations in HSE is not enough. It is important for every Oil & Gas company to strive to benchmark and match the global best practices and improve continuously.

Small initiatives such as daily toolbox talk before the commencement of work can go a long way in adoption of HSE at grass root levels in the organization.

In countries such as Japan, workforce is trained to be alert through regular yoga sessions. Both, mind and body have to be alert and work in coordination in order to prevent any hazard from occurring.
Organization to believe, Health, Safety and Environment management saves both the loss of lives and disruption/damage to infrastructure which is imperative to move the wheels of prosperity.

The Oil & Gas industry often focuses on the financial risks that is facing and neglects the other risks in pursuit of commercial profits. While achieving business targets is important, it must be remembered that safety cannot be compromised. Having a big expansion agenda is welcome but the growth should be sustainable and inclusive.

The leadership team across organizations would be the key to leading this paradigm shift in transforming HSE culture, making business processes state-of-the-art, safe, and sustainable.

It is also essential to have a good reporting culture among the organizations in the industry. Incident reporting and information dissemination is extremely important. Any such matter that is not reported represents a missed learning opportunity to analyze the root causes of the incident which in turn can help prevent such incidents in future.

Good Health, Safety and Environment (HSE) Leadership does not happen by chance. Everybody has to play a part in the same. This includes the contractors, service providers, employees and the organization leadership who have the ultimate responsibility.

HSE needs to be built in the design phase itself as at that phase it is possible to eliminate some hazards rather than just controlling them later.

Effective major hazards control requires constant engagement of the workforce and contractors. The leadership needs to regularly monitor and evaluate the performance of the organization. Openness about sharing performance data and key lessons from all major incidents as well as near-misses is critical.
Any leadership program must engage the workforce to ensure they receive, understand and react appropriately to leadership messages. Leadership programs must also engage the workforce since they have a unique understanding of how work is actually done in practice. Involving the workforce is an essential source of data about how work is actually done and how plant is operated. Leaders must tap into this vital source of intelligence about their business if they are to manage major hazard risk effectively.

An organization needs to cultivate a chronic sense of uneasiness about “Building Human into HSE Management System”.

Workforce engagement is a collective behavior and is required to deliver world class safety performance. At all levels within the organizations, people need to exhibit correct behaviours to reinforce and support workforce engagement. The quality of interactions between people is critical and decides the team’s effectiveness.

While the Process Safety Management (PSM) system is very powerful, it fails to prevent major losses due to the lacking human elements. Behavioral safety and cultures still remains the weakest link. The PSM system if implemented as per current standards is not sufficient in addressing prevention of major incidents. The lacking elements in PSM include employee participation, competency, behavior based safety (BBS) and human factors. With human factors, there is a need for a more “softer” human factors management sciences approach rather than just a human factors engineering approach. Human factors need to be considered when developing systems and procedures, something which is not being done effectively. There is a strong need for integration of BBS and PSM. Further debate and discussion is required to establish the new elements that must be weaved in to the PSM system.

HSE management is at a major transformation point. It is changing from compliance driven command & control model (regulations, standards,
corporate policies) to stakeholder market-based model (reduced operation risk, enhanced corporate brand, and increased shareholder value). There are many operational and enterprise challenges to this transformation. There are many business benefits such as reduction in insurance costs, increased productivity and reduction in maintenance costs when such challenges to this transformation are met.

The use of predictive analytics is emerging as an important technique to identify organizational, operational and safety risk factors and is becoming core to their performance management programs. Predictive analytics is about analyzing current transactional and historical facts to make predictions about future events. It is the ability to model good (or safe) operations learned from historical experience and then apply those patterns to avoid future events. It is a natural progression of increasingly sophisticated tools available in safety management and has become more common in the chemicals and petroleum industry in such areas as predictive maintenance. Predictive HSE analytics is driven by data. The goal of the predictive analytics is to draw reliable conclusions from data captured across the enterprise and act accordingly.

Oil and Gas Organizations to realize that safety is an investment that organization makes to sustain itself but not a cost.