A dozen steps on the road to establishing a safety culture

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Bapco is a unique company, which has never stood still. The first to discover oil in the Arabian Peninsula in 1932, it started exporting in 1934 and refining in 1936. Since then, it has expanded into refining, distribution of petroleum products and natural gas, sales and exports of crude oil and refined products. In the course of this expansion, it has become a leading environment, health and safety champion regionally.

Bapco is committed to the protection of the environment, which it integrates under one umbrella with occupational health and process safety, endeavouring to create a zero-harm and incident-free workplace. Key to this was Bapco's adoption in the early 1990s of Process Safety Management (PSM), which has become the cornerstone of its safety culture.

Following a series of catastrophic accidents in the petroleum and petrochemical industries in the 1970s and 1980s (Flixborough, Seveso, Bhopal, Piper Alpha and others), it became clear to safety regulatory bodies in the US, Europe and elsewhere that a fresh approach to safety was vital to avoid recurrences of these major, high-consequence incidents. Investigation of these incidents indicated that the safety concepts then existing, in the form of prescriptive legislation and a reactive approach to the management of Health and Safety in industry were ineffective, and failed to ensure the active participation of all employees in the creation of a positive safety culture.

In order to create this culture, Bapco carefully reviewed many new safety management systems that existed then, and one of the approaches that we adopted was the PSM system. The reason for this was that we as an oil and gas organisation had exerted most of our efforts around personnel safety and the prevention of injuries, and that we had not really addressed process safety with the same aggressiveness and focus as personal safety. We realised the need to involve all of our employees and those of our contractors in our safety programmes.

We realised only by drawing on the vast and diverse knowledge and experience of all of our employees and by channeling this into a company-wide atmosphere of safety awareness would success be achieved. This systematic approach identified the strengths of the organisation and those areas or systems requiring improvement. Once these were identified, a comprehensive safety management system aimed at the proactive identification, evaluation and control of hazards was created, together with the means to measure and quantify its effectiveness and contribution to the profitability and continuity of the business.

We soon realised that PSM could only be effectively implemented if we were able to diligently assess and identify risks and hazards associated with our operations; to put in place effective control measures that were regularly monitored; to have in place comprehensive and robust health and safety programmes; to engage senior and middle management in showing support and involvement in safety programmes; to ensure a high level of participation by all employees and contractors; to establish robust and meaningful audit and review mechanisms; and to measure our performance through a set of leading and lagging indicators.

The 12 elements of process safety management

After a comprehensive assessment of the gaps in our systems, we chose the following elements to help us to augment and strengthen our management of health and safety.

Process Safety Information (PSI)

Plants should have accurately documented information on hazardous materials, process technology and design of process equipment. This information is essential for process hazard analysis and should be readily accessible to appropriate personnel in the operations, maintenance, inspection and engineering departments.

Process Hazard Analysis (PHA)

A process hazard analysis should be performed for any facility subject to the PSM programme. A PHA involves a systematic review of a process to identify possible hazards, evaluate possible consequences and determine whether the existing systems and procedures provide adequate control and protection.

Operating Procedures

Plants should have written operation procedures specifying conditions and steps for each phase of an operation, the consequences of deviation from these instructions and steps to make corrections. It should also document hazards arising from materials used during the process and specify precautions to take as well as control measures in the event of a hazardous release or exposure.

Health and Safety Training

Training and refresher training must be provided to all workers who are currently involved in a process and also to those who are newly assigned. The training should cover the basic knowledge required for the process and emphasise specific safety and health requirements, as well as procedures to be followed during emergency operations.

Contractors Safety

It is essential that contractors know and understand the hazards of working in a process. The contractor management team has a responsibility to identify potential hazards associated with the company's work and should make the contractors aware of hazards. Training of contractor personnel and facility safety procedures help protect the facility and employees

Pre-Startup Safety Reviews

The purpose of Pre-Startup Safety Reviews (PSSR) is to verify that all elements required for safe operation of the process have been properly addressed prior to startup. This ensures that the construction is in accordance with the design specifications, all necessary procedures for safe operation are completed, the applicable PSI is up-to-date, personnel responsible for operating and maintaining the process are properly trained, and all the recommendations made during the PHA have been clearly addressed.

Mechanical Integrity

The purpose of the Mechanical Integrity assessment is to ensure that equipment is in a condition suitable for its intended service for the specified duration of service. Mechanical integrity is accomplished through written maintenance and inspection procedures, employee training and qualification, and quality assurance procedures.

Safe Work Practice

The objective of the Safe Work Practice element is to provide for the safe conduct of operations, maintenance and modification activities, especially the opening of process equipment or piping, lock-out of electrical and mechanical energy sources as well as work that involves ignition sources, entry into confined spaces, and use of heavy equipment.

Management of Change (MOC)

The purpose of this element is to ensure that change is reviewed with the same degree of care and skill as the original design of the plant, and to prevent introduction of new, uncontrollable hazards into the workplace.

Incident Investigation

The objective of the Incident Investigation is to systematically identify the fundamental cause of process-related incidents and develop and implement corrective measures to prevent recurrences.

Emergency Planning and Response

An emergency action plan and an emergency control centre should be established to ensure that the facility is prepared to react, control, and mitigate events arising from a process or equipment failure. Each facility should strive to be self-sufficient in terms of emergency response, using the services of outside agencies only as backup or in the event of a catastrophe.

Audit

The purpose of the audit element is to provide periodic feedback to the management on the adequacy and effectiveness of the PSM system. Based on the audit findings, the management can relocate resources and redirect emphasis as necessary to improve the overall effectiveness of PSM.

Checking on effectiveness

To continuously improve upon process safety performance, it was essential for us to implement effective leading and lagging process safety matrices. To enable us to benchmark our performance against other industries and to be in line with industry best practices, we decided to utilise the guide issued by Center for Chemical Process Safety (CCPS) to measure and classify our process safety incidents. We also wanted to make sure that our performance was transparent and accessible to the whole organisation. So we created one of the most elaborate and comprehensive HSE Dashboards, which enables us to drill down and make comparisons with previous years. This data is now reviewed and analysed on a daily basis by line managers and on a monthly basis by senior management, the review enables them to look at areas of concern where improvements are required.

One of the major recent initiatives that we have decided to implement was to integrate all of our interrelated HSE procedures, programmes and processes under a unified system called Operational Excellence Management System (OEMS) which is based on a Chevron model. OEMS is the Systematic Management of process safety, personal safety and health, environment, reliability and efficiency to achieve world class performance. OEMS is another system that we voluntarily chose to adopt and implement because it is designed to integrate and align all current HSE systems under one unified structure and matrices. OEMS truly enabled us to involve the whole organisation by making company departments and individuals accountable for its implementation. It also created a strong sense of pride and ownership. No longer do we talk about HSE management being owned and managed by one department – now there is collective and collaborative responsibility, and all of us are stakeholders and must see to its success. ●