

SIGNIFICANT ACCIDENTS IN SEPT-OCT 2021

Explosion and fire kill two, injure six in Boisar factory



Two workers died and six sustained injuries in an explosion followed by a fire in a cloth manufacturing factory in Boisar of Palghar district early on Saturday. The fire occurred in Jakharia Fabric Ltd in MIDC Tarapur around 6 am.

Three injured as boiler explodes



At least three workers of a Chemical factory in Attibele in Karnataka were injured following a chemical boiler blast on Friday evening. The incident is reported in Attibele Industrial Area in the southeastern part of Bengaluru.



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EDITORIAL

Dear Readers,

Process safety is attaining importance now a days with several Chemical Plant accidents happening in last few years. Eventhough all the MAH units are having Safety officers/ Managers, their role mostly get restricted to the General fire and safety aspects. Bhopal tragedy has highlighted the importance of process safety and Govt. of India have set up a sophisticated laboratory at CSIR- CLRI, Chennai named Centre for Industrial Safety and Risk Analysis (CISRA) for taking up studies related to Chemical plant operations and run away reactions.

Most of the industries are carrying out HAZOP studies during project stage. These studies brings out various safety issues and most of them are addressed during project implementation. There are certain points needing attention during operations of the plant. In many plants , the HAZOP points are not known to the operation team and are not being followed. This situation can be avoided by implementing Process Safety Management (PSM) where operating team is also involved in hazard recognition and developing process control.

It is a known fact that MSDS of several intermediates in manufacturing are not available. Also properties and Characteristics of several Waste streams are not available. Without such basic information , handling such items are very risky.

Hazardous plant operations are to be carried out by qualified and well trained operators. PSM trainings are important .Standard Operating Procedures (SOPs) should be well understood and are to be rigorously followed.

Responsible care is the initiative of ICC to improve all aspects related to Safety, Health, Environment & Security. By implementing RC, Chemical industries can perform better in all these areas. It is high time that all Major Hazardous Chemical manufacturing units are implementing RC and get certified.

Even though our Chemical industry have achieved significant progress in Employee Health, Safety and Environmental Protection, Process safety Management needs substantial improvement.

Regards,
Dr. P.N. Parameswaran
Advisor- BEIL Group



CoE ACTIVITIES

TRAINING ON ENERGY AUDIT AND SAFETY IN INDUSTRIAL BOILER

Three workers injured in explosion at chemical factory



Three workers were injured when a solvent vessel exploded accidentally within the premises of a chemical factory in Attibele Industrial Area on Friday.

Four of six injured in explosion at Westlake Chemical released from hospital



Six people were injured in an explosion at Westlake Chemical Monday night. Four of the six have since been released from the hospital, according to company spokesperson Joe Andrepont.

Three Killed and Two Wounded in Explosion Outside a Mosque in Kabul



An explosion outside a mosque in the center of Kabul killed at least three people on Sunday, a Taliban spokesman said, under scoring the challenge of maintaining security for the country's new rules after decades of waging war.



This training program was tailored for people who have interest in energy audit and safety & allied fields and are seeking a deeper understanding of energy saving opportunities and safety practices in Boiler. This course benefited those who are involved in some facet of the application or those who are interested in pursuing as a career in these areas. Probable attendees were Plant Engineers, Utility Managers, Maintenance Technicians, Plant Operators, Safety Engineers, Energy Engineers, College faculty and Engineering students.

EXPERT LECTURE ON IMPORTANCE, OBJECTIVES & PLANNING OF INDUSTRIAL SAFETY

The Dept. of Chemical Technology and CoE organized an expert lecture entitled "Importance, Objectives and Planning of Industrial Safety" on an online platform on 03/10/2021 at 11:00 am for the students of UPL University of Sustainable Technology. The expert lecture was delivered by **Mr. Gokul Mahajan**, Principal Engineer- Process safety at GEXCON India Pvt. Ltd. Mumbai & Norway.

He explained about industrial safety, necessity of Industrial safety, objectives, hazards, risk, types, causes, Industrial safety statics, cost & consequences, prevention, planning and hierarchy control etc. with the help of presentation and some video related to industrial accidents.

HAZOP- A DIFFERENT PERSPECTIVE ON DETECTING MANAGEMENT SYSTEM WEAKNESSES



Mr. Alok Kumar,
Consultant to Chemical Process Industries

Introduction

Hazard & Operability ie HAZOP studies have now long been used in the Chemical Process Industries to identify hazards associated with the process operations, and suggest remedial measures to bring down the risks to acceptable levels.

I have been involved in conducting Hazop studies / workshops since the late nineteen eighties, and have gained useful insights over time on the potential utility of this method of analysing hazardous situations in chemical process plant operations.

When I started facilitating Hazop studies I was a process engineering professional, involved in technical services & process design aspects for chemical process plants. However overtime my role kept on evolving in the organizations I worked for; and I had opportunity to work in various other roles like Plant Operations management, Project Conception, Execution & Management, Procurement of Chemicals including transportation, handling & storage, Corporate Safety & Environment management, Establishing a new business & managing it, culminating finally into the role of a Chief Executive; and now as a Consultant.

Over these thirty plus years, I kept myself involved in Facilitating Hazop studies whenever there was an opportunity. This gave me opportunities to look at this technique in newer perspectives as I also grew more experienced in my profession. I feel it would be interesting to share these perspectives now.

Deciphering Management System Aspects

In normal circumstances we expect any Hazop study to conclude with recommendations on providing certain engineering safeguards , and maybe a few administrative controls. After achieving this the Hazop study goes to the archives.

I will now describe my take on how I focus on getting deeper insights during the study and highlight aspects which reflect probable weaknesses in the management systems, and thereafter suggest recommendations to remove these weaknesses. To be able to do this, the selection of the Hazop facilitator (or Hazop chairman) is very crucial . I have been able to focus on these aspects mainly owing to my insights in all aspects of various functions in the management of an organization.

An advantage here is that Hazop is the most common Hazard Analysis & Reduction exercise we generally take up in the Chemical Process Industries (esp in India). Therefore it's a platform which is more easily available to address these aspects on weaknesses in the management systems. It's a platform which for good reason does not get stressed by the daily target achievement pressures. It is also a platform where a multi-functional team is participating.

When we read about major accidents we note a common theme , “total failure of management system” in the organization.

The most recent examples :-

Failure of management systems is, the “ONGC barge ship sinking near Mumbai in the Cyclone “Taukte” during May 2021, leading to loss of lives. Its very difficult to comprehend how this could happen when all information including warnings were available to even the general public.

Next is on the Vizag – LG Petrochemical accident. The extract from the investigation report is worth focussing on : - Knowledge / Talent Deficit

The technical investigating team determined root and contributing causes for the accident and revealed the deficiencies in the following management systems.

- Incident Investigation
- Human Resources
- Hazard Recognition
- Emergency Response and Communications
- Knowledge / Talent Deficit

If we go back into history a bit, the “Piper Alpha accident of 1988” is another prime example of failure of management systems in an organization.

Poor Industrial safety standards resulted in accident that killed two



Poor safety standards at the soda ash plant of saurashtra chemicals in porbandar resulted in an industrial accident on Wednesday that killed two & injured three others.

At Least 3 Killed, 33 Injured In Gas Explosion In China



A gas explosion at a restaurant ripped through a busy street in a major Chinese city on Thursday, killing at least three people and injuring dozens, state media reported.

Huge blast kills 16 at Russian chemicals plant



Sixteen people were killed in an explosion and fire at a gunpowder and chemicals plant in Russia's western Ryazan province on Friday, Russian state TV said, and one man was taken to hospital with serious burns

My experience in detecting weak management systems during a Hazop study

When we conduct Hazop studies we require certain essential information to ensure a proper study. These include the P&IDs, Process Description, Safety Information, the SOPs (Standard Operating Procedures) , and Accident History . We will discuss some of these now to demonstrate how the weaknesses in the management systems of the organization can be detected and recognised.

1) Standard Operating Procedures : These documents are very crucial to each plant operation, as following these ensure that the operation is controlled as intended. The quality of SOPs being used, and also utilised during the Hazop studies directly indicate the management focus & emphasis on this aspect.

I have noticed quite a few issues on the SOPs during my experience in conducting Hazops, as listed below :-

- a) The SOPs don't relate to the P&IDs and other documents of the plant in a clear and unambiguous manner.
- b) The participants at times do not agree on the SOPs indicating that the plant operation is not conducted exactly as per the SOPs.
- c) The SOPs are not made available to the shop floor operating personnel, indicating an alarming situation !
- d) The SOP document is actually a descriptive document from lab experiments !!

I am able to ask such questions, as I have been able to build my insight how safety is impacted by such aspects, during my professional working in different roles over the years. Normally in a Hazop, the agency conducting the Hazop will simply state that the study is limited to the accuracy of the documents supplied for the study.

In many Hazop studies I have called for the managers responsible for Human Resources, Training & Development, to highlight glaring shortcomings in ensuring basic and adequate training to the operating staff.

2) P&IDs - Meaning & Clarity in various Organizations : It is a fundamental assumption of good plant design & engineering practices that "All components of a Plant Facility have to be represented on a P&ID , and what is not represented in a P&ID, is not a component of the Project / Plant.

- a) I have frequently noticed in the Hazop studies that the P&IDs are not representing the total scope of the Plant facilities. This results into a Hazop study which is incomplete, and thus certain Hazards are not addressed. A good Hazop Facilitator should be able to detect this with some simple questions.

b) The response of the participants to this aspect will indicate how sturdy are the management systems in the organization. Many a times a vague and irresponsible responses indicate weak management systems in the organization. As a Facilitator I insist that the Hazop is continued only on availability of correct & complete documentation.

c) At times we come across instances of P&IDs and documents which are not current. This again indicates weakness in the management systems in the organization.

3) Process Description & Process Chemistry Information Availability : This crucial aspect has been observed to be ignored by quite a few organizations to their own peril.

During Hazop we are analysing deviations in parameters, and many times the required information and knowledge of Process behaviour and Chemistry is not adequate in the participating group. We know that majority of the accidents in the chemical process occur owing to certain parameters (like temperature, pressure, concentration, time, etc) deviating beyond the safe limits.

The typical responses I receive for absence of this crucial process information are very amusing to say the least : some examples are quoted here –

- a) The Process information is Confidential : My counter response to this is always a question on whether the particular manager would like to be driven in his car by a person who does not know driving ??
- b) Only R&D department has this Information, but they do not participate in Hazop studies this again reflects poor management system on knowledge & talent aspects in the organization.

4) Information on Past Accidents : This information is not compiled or tracked systematically in majority of the organizations. We know that the investigations of accidents serve as a good and effective learning platform for future improvements and risk reduction.

The past accident data is an invaluable tool for understanding what type of potential accident scenario could exist in the process under study. For example in one project I was managing for a Hazardous Chemical manufacture, analysis of past 20 years accident data indicated that over 85% of accidents were transportation accidents.

We come to know the strength or weaknesses in the Management systems of the organization for knowledge sharing & improvement by such practices.

The abovementioned experience is a small but important aspect of detecting management system weaknesses in an organization during a Hazop exercise.

ELEMENTS OF PROCESS SAFETY

In the 1st Issue of SAFEXCELLENCE, SRICT CoE has selected 17 process safety elements and based on these elements and published literature, an attempt is made to analyze the disasters taken place during the month for the probable cause/s. SAFEXCELLENCE team points out the missing process safety element/s in the events that happened.

MISSING PSM ELEMENTS WHICH CAUSED THE ACCIDENTS, Sept. – Oct. 2021

Accidents	Missing PSM elements																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Explosion in Jakharia Fabric Ltd in MIDC Tarapur	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Boiler Explosion Attibele in Karnataka	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Explosion at chemical factory in Attibele	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Explosion at Westlake Chemical	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Explosion Outside a Mosque in Kabul	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Soda Ash plant of Saurashtra Chemicals in Porbandar	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Gas Explosion in China	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Gunpowder and Chemicals Plant in Russia's western Ryazan province	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

3 dead in accident at Bokaro industrial unit in Jharkhand



Three labourers involved in maintenance work at Vedanta ESL industrial unit in Jharkhand's Bokaro district died in an alleged accident late Monday evening around 8pm.

3 dead as 'unstable chemical' causes explosion in godown



At least three people were killed and four others were injured on Thursday when a blast took place at a firecracker storage facility in Bengaluru. The explosion took place in New Tharagupet area of the Karnataka capital.

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OPERATIONAL RISK ASSESSMENT IN CHEMICAL INDUSTRY

Introduction:

In Chemical Industries, there are mainly two types of Safety Risks one is Process Risk and second is Operational Risk. In this article we will be covering Operational Risk Assessment.

Risk assessment is a primary management tool in ensuring the health and safety of workers (and others).

Many of the people may not be aware that, it is the Legal requirement, that employer shall conduct the Risk Assessment of activities conducting in the Factory.

The types of risk assessment required within any workplace should be proportionate and relevant to the operational activities being undertaken.

Risk assessment is a straightforward and structured method of ensuring the risks to the health, safety and wellbeing of employees (and others) are suitably eliminated, reduced or controlled.

Objective:

The main objectives of risk assessments are:

- To identify health and safety hazards and evaluate the risks presented within the workplace
- To evaluate the effectiveness and suitability of existing control measures
- To ensure additional control are implemented wherever the remaining risk is considered to be anything other than acceptable level.
- To priorities further resources if needed to ensure the above.

When to carry out Operational Risk Assessment

Risk assessment must be carried out prior to a particular activity or task being carried out in order to eliminate, reduce or suitably control any associated risk to the health, safety.

This risk assessment should be reviewed periodically. Whenever any Incident / Accident happens the risk assessment should be revisited.

How to carry out Operational Risk Assessment

- Identify the team members who will carry out the risk assessment.
- Training to team members on how to conduct the risk assessment.
- List out the Operational Activities carried out by Worker.
- Make the Job Design ie listing out each and every step of activity.
- Identify the Hazard in the form of Man Machine Interface (MMI) and Man Chemical Interface (MCI) involved in each step.
- The activity should be observed repetitively to ensure identification of every Hazard.
- Calculate the Risk Rating based on Likelihood and Severity of Hazard to convert into Consequence.
- Identified Risks related to MMI/ MCI on shopfloor should be eliminated by Engineering Controls (Mechanical / Instrumentation) or should have administrative control based on the appropriate measure to minimize the Risk to acceptable level.
- After implementation of all Control Measures, Job Design – JD should be revised by incorporating all Control Measures.
- Training should be done for every Doer.
- Effectiveness of all Control Measures and Training of Job Design should be checked on the shopfloor while actual



PROCESS SAFETY MANAGEMENT

Part-II



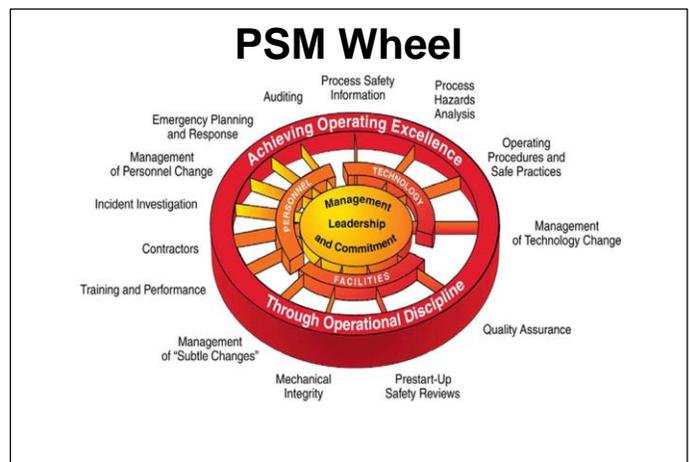
Mr. Ashok Dashputre
Consultant of Process Safety Management

How to Implement Process Safety Management

Process Safety Management is complex and requires a multidimensional approach that blends technology and management solutions. Every Process Safety Management program should include 14 basic elements generally known as PSM Wheel, according to OSHA. Let's have a brief overview:

- 1. Process safety information:** Staff should have access to basic information about the hazards of the chemicals and tools they are using on the job.
- 2. Process hazard analysis :** This helps organizations evaluate their processes and operations to identify potential hazards. Still, organizations can't manage safety and hazards until they know what hazards are actually in their facilities.
- 3. Operating procedures:** Work should follow consistent, well-established safety protocol.
- 4. Hot work permit:** Work with fire or other sources of ignition requires a systematic process for authorization and oversight.
- 5. Emergency preparedness and response:** Organizations should have a response plan if something goes wrong.
- 6. Mechanical integrity:** Businesses are required to track and evaluate the evolving safety risks of equipment.
- 7. Pre-startup safety review:** Businesses are required to thoroughly assess new or modified facilities before hazardous substances are introduced into the workplace.

- 8. Training management:** Employees should be properly trained on all safety procedures and have access to ongoing refresher training.
- 9. Management of change:** When processes change, businesses should conduct a systematic review of how the changes will affect risk throughout their facility.
- 10. Incident investigation:** When incidents and near-misses occur, businesses need a systematic process to record, track, investigate, report and analyze what happened.
- 11. Contractor safety management:** The safety of contractors and subcontractors should be covered by process safety management systems.
- 12. Compliance audits:** Organizations should conduct regular internal audits to ensure procedures and processes are compliant.
- 13. Employee involvement:** Employees should be able to access, acknowledge and sign-off on policy documents.
- 14. Trade secrets:** Employees must be provided thorough documentation of materials and processes, even those that are trade secrets, to ensure health and safety.



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