

## SIGNIFICANT ACCIDENTS IN JANUARY- FEBRUARY 2021

### Massive fire engulfs pharma factory in Gujarat



A massive fire broke out at a pharma factory in Gujarat's Valsad on 3<sup>rd</sup> Jan 2021. Around 10 fire tenders rushed to the spot to douse the flames. No injuries have been reported in the incident.

### Fire mishap averted at Nagarjuna Sagar power plant



A major fire accident was averted at the Nagarjunasagar power plant on 4<sup>th</sup> Jan 2021 morning. According to sources, the fire broke out from a transformer in the eighth turbine at the hydroelectric power plant.

### Four Dead in Gas Leakage At Rourkela Steel Plant



Four contract workers died and six others fell sick following leakage of toxic gas at the Rourkela Steel Plant (RSP) in Odisha on the morning of 6<sup>th</sup> Jan 2021.



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## EDITORIAL

### RELIABILITY IS BRAND EQUITY

Dear Readers,

Reliability is like the brand equity for any chemical organization. As for the consumer product manufacturing company with brand equity, it does not incur a higher expense than its competitors to produce the product and bring it to market and the difference in price goes to their margin enabling them with a bigger profit on each scale, the same is true with the high reliable chemical organization.

The goal of high-reliability safety is to focus on early warning signals that are often overlooked. In safety, learning organizations don't need to experience a catastrophe to understand how to prevent one from happening. In this process, safety leaders can improve how they identify and shape a response to those signals. A learning organization is the one that continuously challenges, develops and – yes – learns how to achieve long-lasting and high safety performance.

Learning becomes part of the fabric of an organization through vulnerability. Leading with vulnerability is like rolling over a speed bump in a car – it forces us to slow down and become more aware of our environment and actions. Just as speed bumps help prevent speeding cars from causing chaos on busy streets, creating an organizational sense of unease helps organizations reduce and avoid catastrophic events.

Leaders who want to lead with vulnerability are those who ensure each person in the organization is self-aware of their actions and environment. They understand that the organization is vulnerable and can fail, hence they actively promote to the workforce that everyone is needed to prevent a

catastrophe. This is an all-hands-on-deck approach because it affects every hand on deck.

The leaders of highly reliable organization are committed to creating a learning culture. They do this through their actions. They engage workers, they adapt to change, and they support the attributes of a learning organization. These leaders involve everyone from the frontline workers to those in the C-suit.

Leaders who lead through vulnerability usually have six attributes, all of which strengthen learning. These attributes are:

1. **They make enquiries:** They get relentless pursuit of information in a proactive position to discover system deficiencies.
2. **They Innovate:** They always think 'out of the box'; within a change management process. They are open minded and ready to do the things in different ways.
3. **They engage** They create change in ways that increase productivity and commitment across all levels.
4. **They act:** They are responsive to the discovered deficiencies and invest in driving change enforcing a safer organization.
5. **They adapt:** They are agile, resilient, and quick to respond to unexpected events. They act and switch gears if necessary, to save lives.
6. **They reinforce:** They align behaviors, culture, and systems so to support a common purpose.

All of these ways will help make high reliability a reality for the things a good leader should care about: our workers, our first responders and our community.

## Fire at Vizag pharma unit, none hurt



A minor fire was reported on 6<sup>th</sup> Jan 2021 at JPR Labs Private Limited, a pharmaceutical company, at J.N Pharma City in Parawada area in Visakhapatnam city .

## 5 die in Pune Serum Institute fire



Five labourers were charred to death in a fire that broke out in the fifth floor of a building under construction of vaccine manufacturing major Serum Institute of India (SII) in Pune's Manjari area on 21<sup>st</sup> Jan 2020.

## 17 workers rescued following major fire at textile unit



About 17 textile workers including three women had a miraculous escape after they were trapped in the textile weaving unit following a major fire at Kadodara on 25<sup>th</sup> Jan 2021.

## Major fire breaks out at pharmaceutical company in Dombivli



A major fire broke out in Calyx Chemicals and Pharmaceutical Limited situated in Dombivli MIDC on 27<sup>th</sup> Jan 2021. Six fire vehicles were rushed to the spot to control the blaze

# CoE ACTIVITIES

## PROCESS SAFETY MANAGEMENT TRAINING PROGRAM FOR GPCB OFFICIALS BY UK TRAINER



Dates: 11<sup>th</sup> – 16<sup>th</sup> Jan 2021



**Mr. Gary Pilkington**  
Principal Process  
Safety Engineer  
GEXCON UK LTD

## Managing Safety in Hazardous Chemical Handling

## PLANT VISIT TO UPL VAPI BY COE MEMBERS



First UPL factory at VAPI, built in 1969

The UPL Vapi plant visit was planned on 21<sup>st</sup> Jan 2021 to understand the actual facility plant layout and congestion. This enhanced actual visualization and helped in geometry preparation using the 3D CFD FLACS Software.

## Major fire breaks out at a powerloom unit, no casualty



A major fire broke out at Vasundhara industries in afternoon of 8th Feb 2021. The fire broke out on ground floor due to short circuit in the electric meter box. Fire officials said that more than 16,000 meters of polyester fabric and about 8,000 pieces of sari were reduced to ashes in the fire.

## Four injured in cylinder blast in Versova



At least four people suffered injuries in a cylinder blast in Versova at around 9.40am on 10th Feb 2021. The incident was reported from Yari Road based gas cylinder godown

## Blast in Boisar pharma unit near Mumbai, one injured



An explosion triggered a fire at the Bajaj Healthcare Limited facility in Tarapur MIDC in the Mumbai Metropolitan Region on 13th Feb 2021 injuring a worker who had to be hospitalised, fire department officials said.

## Fire in gas pipeline in vadodara



The piped natural gas (PNG) supply line of Vadodara Gas Ltd (VGL) was damaged and a fire broke out on the GotriSevasi Road on 13th Feb 2021. Gas supply was affected in the area due to the incident. According to a senior VGL official, the pipeline was damaged due to work on a water supply pipeline in the area.

### Shroff S.R. Rotary Institute of Chemical Technology

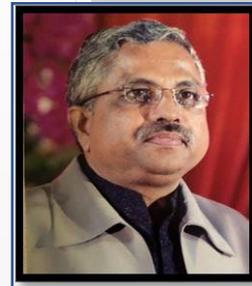
## UPL Center of Excellence in Process Safety

WAS ORGANISED

### Training on Fundamentals of Process Safety Management

From, 22<sup>nd</sup> To 26<sup>th</sup> February 2021

Training Was conducted on virtual platform



**Mr. ASHOK RAMAKANT DASHPUTRE**

Five-day (22<sup>nd</sup> Feb to 26<sup>th</sup> Feb 2021) PSM training was organized by the UPL-CoE for the industrialist and professionals working in this field. This PSM training covered the total 14 key elements of the Process Safety Management as per US OSHA 1910.119. The training was conducted by Mr. Ashok Ramakant Dashputre having '38+ years' of extensive hands-on and Leadership as well as Managerial experience in multinational industrial projects within power plants, fertilizer, petrochemical & refinery projects, onshore & offshore wellhead and process platforms. There were total 32 participants from all over the country had taken the training from the versatile fields of Industrial safety. Following elements that covered as part of the program.

## INTRODUCTION OF COE -TSS MODEL TO AUTHORITIES



**Mr. Pratik Shinde** delivered a session to Bhansali Engineering Polymers Limited (BEPL), M.P, on Introduction, services and certifying Process safety courses offered by SRICT-CoE.



**Tarun Bharat News** paper published an article on 16<sup>th</sup> Jan 2021, entitled with “ **Industrial process safety is a need of the hour (औद्योगिक प्रक्रिया सुरक्षा ही एक काळाची गरज)**” written by **Mr. Govind K.Patil**. The article explained about process safety need in India and CoE on Process safety.

## Two workers suffer burns in Tarapur drug factory fire



Two workers have been injured in a fire that broke out at a drug manufacturing unit at Tarapur in Maharashtra's Palghar district, a fire official said on 14<sup>th</sup> Feb 2021.

## 15 killed in accident at cracker unit in Tamil Nadu's Virudhunagar



In one of the worst fireworks accidents in recent times, 15 workers were killed and 33 injured in an explosion that ripped through Sree Mariyammal Fireworks near Vembakottai in Virudhunagar district of Tamil Nadu on 13<sup>th</sup> Feb 2021.

## Fire in Prasol company in Khalapur



On 17<sup>th</sup> February, a fire broke out at the Prasol Chemical Company at Honad on Takai-Adoshi Road in Khalapur taluka and huge amount of smoke was created in the area. Meanwhile, the fire brigade managed to contain the entire fire. However, there has been a financial loss.

## Two dead, 5 missing in fire at UPL plant



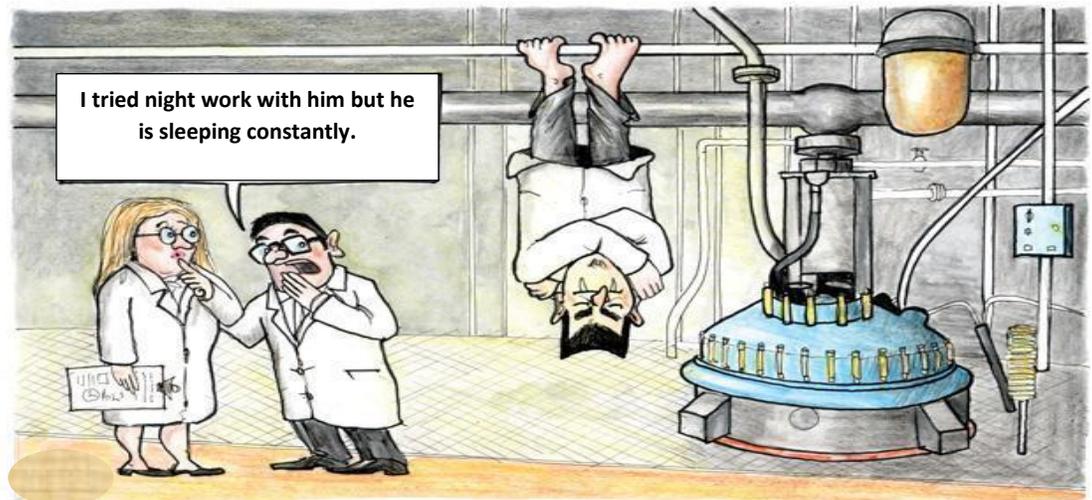
The Labour and Employment Department of Gujarat Government on Tuesday issued a closure notice to UPL Ltd (United Phosphorus Ltd) after a blast and major fire at the company's Jhagadia plant claimed two lives and injured 26. Five labourers are still missing, authorities said. A company statement said a fire broke out at 1.35 am on 23<sup>rd</sup> Feb 2021, followed by an explosion at one of its plants.

# PROCESS SAFETY MANAGEMENT – HUMAN FACTOR



**Conduct of Operation and operational discipline (COO-OD) is one of key elements of Process Safety Management (PSM) that explains human factor.**

## **A CASE OF SLEEPING WORKERS: COO-OD CAN HELP RESOLVING THIS ISSUE BY IMPLEMENTING THE KEY ISSUE OF OPERATION DISCIPLINE (OD) – CONCLUDING PART II.**



We discussed key attributes of Conduct of Operations (COO) in the 3<sup>rd</sup> issue of [SAFEXCELLENCE](#). This concluding part describes the importance of implementing key attributes of OD. For any organisation, implementing attributes of both, COO & OD are important to create a safety culture in organisation, that is conducive to motivate the employees in achieving a big success.

**What is OD:** Executing COO system within the organization by an individual as day-to-day activities is Operational Discipline. Performing the task, the right way every time by the individual shows his commitment towards process safety. Recognising unanticipated situation and maintaining the process in safe configuration, seeking involvement of wider expertise to ensure personal and process safety is what anticipated from the individual under OD.

## 6. ORGANISATIONAL

### 6.1. Leadership

The organisation selects people on the basis of requisite knowledge and skills, and subsequently position them in the organisation based on their abilities. These people are the real engine or the driving force for implementing COO/OD. People's collective attributes are the organisational attributes which strongly influence the OD system.

It is interesting here to note the observations of Carol Bartz, the former President and CEO of Yahoo! when she points out the difference in managing and leading the organisation, explaining further that allocation of resources against the tasks is managing while focusing on helping the resources is leadership. Senior management needs to understand and possess this special attribute.

The organisational culture is equally affected by operational discipline (OD) the same way, as do the safety operating, maintenance, emergency (SOME) and management of change (MoC) procedures. The effectiveness of engineering and administrative barriers (to prevent incidents) in any organisation is much relied upon operational discipline. Thus, OD drives reliability while COO drives OD. History has many examples that prove COO is the common characteristics for the organisations who transformed themselves from "Good to Great".

Transformation is a process of build-up followed by breakthrough. It can be achieved with three distinct stages; 1. Disciplined people 2. Disciplined thought 3. Disciplined action.

Unfortunately, most people don't want to change, for them, things are good enough just as they are and there is no need for a long and arduous journey.

However, there are good people in the organisation who need a slight motivation to push them out of their comfort zone. What needed is a formal explanation about the organisation's objectives, the way to achieve them, demonstrating the commitment and rewarding to the successful individuals. Organisation, who wants to succeed in the long run, shall ensure to replace the individuals who are unwilling to embrace the concept of COO/OD despite their talent or past contribution, for achieving the objective.

The organisation's leadership programme to start with abiding the establishes standards, like following the operating limits (OL) and limiting conditions of operations (LCO).

### 6.2. Team Building And Employee Involvement

Involvement goes beyond participation. Participation means limiting people to decision making or making advisory teams like PHA or Safety committee teams while involvement engage all members frequently.

Involvement goes beyond participation. Participation means limiting people to decision making or making advisory teams like PHA or Safety committee teams while involvement engage all members frequently. Some examples of involvement include day to

day job safety analysis (JSA), Peer- to- peer Safety Training Observation Program (STOP) and Behaviour based safety program (BBSP), The Kaizen program and the 5S program.

Kaizen is a system of continuous improvement that can be used to address quality, technology, process, productivity, and safety issues; Kaizen strives for incremental improvements on a regular basis. While some facilities believe that "If it isn't broken, don't mess with it," the Kaizen philosophy is to "Improve it even if it isn't broken, because if we don't, we won't be able to compete with those who do." The Kaizen cycle includes the following steps: 1. Standardize an operation 2. Measure the standardized operation 3. Gauge measurements against requirements 4. Innovate to meet requirements and increase productivity 5. Standardize the new, improved operations 6. Repeat the cycle

### 6.3. Compliance With Procedures & Standards

This refers to complying the laid down standards and procedure by an individual or a small group of people. Supervisors often acknowledge and greet the crew after the job is accomplished without going in details if they followed procedure/s, the way they are. He may reward for possibly an unsafe action. In fact, the activities should be rule- knowledge-skill based.

There are many deviations which an individual may opt, like shortcuts which are always dangerous even if they are easier or increase the productivity or bring desired results. Another deviation is the error of omission means skipping a step or doing nothing since the outcome is normally just fine. For examples skipping taking a reading with prescribed interval, or not greasing the lube points as nothing normally happens. This is like majority of people reach destination unhurt without wearing seatbelts.

A third class of deviation stem out from inadequate COO system by not providing sufficient time, adequate tools or other resources.

A more subtle class of deviations is failure to hold worker accountable for not following established policies or procedures. This can be a biggest error that can initiate chain of events that may lead to multiple serious injuries or fatalities.

Yet, another class of deviations may be a belief 'it's always been that way'. In a refinery the operator opened the drain valve from LPG sphere and went to perform other tasks, as it normally took several minutes to drain the water from the sphere. The resulting release of LPG set off a chain of fires and explosions that resulted in sixty fatalities. Tolerance of repetitive deviations undermines the OD system.

### 6.4. Housekeeping

Housekeeping is an indicator of the effectiveness of the OD system. A cluttered work environment not only reduces the productivity, it can lead to industrial safety accidents as well. OD goes well beyond housekeeping. If the facility's standard is to cap the end of drain and bleed lines, caps are in place. Likewise, machine guards are installed, pipe hangers are in place, there are no open electrical cabinets or uncovered electrical boxes, fire doors are kept closed, and so forth. Anything not properly closed or sealed is obvious to anyone who surveys the area. A very good indicator of housekeeping is a clean and dry floor and no clutter lying here and there.

## 7. INDIVIDUAL

### 7.1. Knowledge

Having only the excellent programs, policies, procedures, etc., don't ensure excellent operation. The excellence depends on how best people do their jobs. Thus, training and development of competence are the vital parts of a COO system.

The process or equipment fail to recognise when things are no longer "within the lines" that defines the boundary of safe operation. An individual has to know when he has sufficient knowledge to operate a process and/or the equipment and when technical assistance is needed. Upholding competence and effective training require 1) someone who possesses the knowledge and 2) someone who decides that the knowledge is required.

One of many ways to transfer knowledge is instructor led courses. Reviewing procedures, unit technology manuals etc in spare time are relatively ineffective. Study shows that we can retain only 10% If we read, A better learning way would be to participate on hazard analysis teams which is interactive session in an environment which is conducive. Rotating participation will train to think in "failure space (i.e. what would happen if....) rather than "success space" (where they act and then the intended consequence occurs). Another way of knowledge transfer is hands on training.

Transfer of knowledge is not a sudden "wake up one morning and decide" kind nor it is a thing to start after a consequence happens. Rather it is a planned activity which should go on continuous basis. Examples of Ad hoc training is 1) own experience 2) witnessed incidents 3) stories of past events or 4) conversation with senior colleagues or personnel from other facilities. However, Ad hoc training is not always necessary to be reliable.

Successful organisations integrate rule based and skill-based training with knowledge-based training. Rule and skill answers "what are we supposed to do and how" while knowledge-based answers "why we so it in this way and why will it work better than alternatives I might come up with.

### 7.2. Commitment

Placing in the harm's place for the greater good of the company or a willingness to covering the worker for a wrong cause are not certainly the expectations from commitment. Nor an unquestioning obedience is commitment. Performing duties in accordance with the prescribed policies, procedures or protocols and subsequently improving the OD system is a commitment. Holding workers accountable for their actions rather than the consequence of actions is a wrong way.

The most valued indicator of commitment is to pay a careful attention for the recognition and rewards by evaluating what might result in adverse consequences for those involved.

Commitment is not easy to measure. However past performance of a person is a good predictor of future performance. The adage – "strong commitment leads to desired outcomes" is very much true.

### 7.3. Awareness

Awareness is a key attribute for everyone, i.e. from CEO to frontline supervisors and further down up to the workers & contractors. It involves 1) perceiving the cues in areas they work 2) Interpret those cues and 3) what (wrong) can happen in the future. Unnoticed process problems can lead to process upsets and eventually incidents. The frontlines staff who actually occupies the ground field should be clearly aware in determining the consequences for any disturbed parameter, i.e. whether is it going to be small upset (brief outage) or a major incident. The aware worker understands the hazard and risk and examine the anomalies more closely that appear to be more risk significant.

Look, listen, touch, feel and smell are the best five senses which make us aware for any wrong happening in surrounding in the field. While in control room critical process alarms are crucial alarms where immediate action/s required.

This is truly a personal attribute which is very difficult. Making the personnel aware of the hazards surrounding them, making them more vigilant and aware of the shopfloor conditions and celebrating the loss event that never happened due to the actions of an alert employee help promote awareness.

### 7.4. Attention to detail

Awareness and Attention to detail, both the attributes are complementary to each other. While awareness prompts workers to look around what else must be happening that might affect their work, the later focuses on the task at hand.

While COO to identify the critical tasks and measures to prevent single human error might lead to unacceptable consequences, OD demands precise and repeatable work.

Usually providing safeguards help prevent or mitigate the consequences of human error but reducing the frequency itself with which these safeguards are challenged reduces the risk. The optimal solution is to have combination of reducing human error rate and improving safeguards. Evaluation of causes of the human errors (including inattention to detail) and taking corrective measures to reduce the error rates is the key feature of an effective OD system.

Attention to detail is very very precise and repeatable activity. It mops up the spilled coffee in the hallway, it ensures that every word is spelled correctly, it is about arriving at work on time and the list is exhaustive. Organisations have mixed individuals who are with different backgrounds and/or with different temperaments; some are attentive while some are not. COO highlights areas where attention to detail is critical to safety so that OD can ensure that everyone is attentive to those detail.

***Falling asleep (or feeling fatigue) on duty is a HUMAN ERROR because it is a human action which crosses the tolerance limit of human performance as defined by the system. It is an intentional violation that may contribute to or result in accidents. It is personal performance GAP.***

**ACCIDENTS STATISTICS IN INDIA (JAN-FEB 2021) & PROBABLE ROOT CAUSES, ATTRIBUTED TO PSM ELEMENTS**

**SAFEXCELLENCE** team collects information on industrial accidents that are taking place in India, using published news information sources and collate to create data, analyses the available data & assesses the probable root causes. The data of the months Jan – Feb 2021 shows 20 plus reportable accidents. Though the monstrous and incredible numbers are frightening, the causes are attributed to PSM elements as shown in the table below. Our readers are advised to implement PSM/ TSS model, being offered by SRICT-CoE in their organisation to ensure the process safety.



**STAGE-1: CONCEPT**

- Inherently Safety Review
- Design Basis
- Chemical Compatibility
- Layout & Plot Plan
- Process Flow Diagram
- Process & Instrument Diagram
- Process Description
- Material Safety Data Sheet

**STAGE – 2: ENGINEERING**

- Equipment Engineering Details
- What If Analysis
- Hazard Identification (HAZID)
- Hazard and Operability (HAZOP)
- Hazardous Area Classification (HAC)
- Process & Instrument Diagram (P&ID)
- Quantitative Risk Assessment & Facility Siting (QRA)

**STAGE – 3: SAFEGUARDS**

- LOPA – SIL
- 3D Consequence Analysis

**STAGE – 4: OPERATIONS**

- Operating Procedures (SOPs -Check Sheets)
- Safe Working Practices
- Management of Change
- Asset Integrity Management
- Pre-Start up Safety Review Training
- Conduct of Operations (Human Behavior)

**STAGE – 5: SAFETY EVALUATIONS**

- What if – Checklist
- Failure Modes & Effect Analysis (FMEA)
- Fault Tree Analysis
- Event Tree Analysis
- Cause & Consequence with Bow Tie

**STAGE – 6: EMERGENCIES**

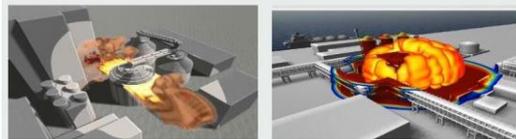
- Pre-Incident Plan (PIP)
- Scenario Video
- Rescue Team
- 3D – Animations – Virtual Reality Based Training

ACCIDENTS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Fire at Pharma Company, Valsad.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Fire at Nagarjuna Sagar Power Plant.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Toxic Gas leakage at Rourkela Steel Plant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Fire at Vizag Pharma Unit.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Fire at Serum Institute, Pune.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Fire at Textile Unit, Kadodara.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Fire at Pharma Company, Dombivli.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Blast at Boisar Pharma unit.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Fire at gas pipeline, Vadodara.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Fire at Tarapur Drug factory.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Explosion at Firecracker unit, Tamil Nadu.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Fire at Parasol, Khalapur.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Fire at UPL Unit-5, Jhagadia.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

**CoE ADVANCED SERVICES**

**3D CONSEQUENCE ANALYSIS**

The major objective of implementing the Process Safety during design stage is to identify locations that could expose employees, environment and property to serious hazards. 3D Consequence modelling refers to the calculation or estimation of numerical values (or graphical representations of these) that describe the credible physical outcomes of loss of containment scenarios involving flammable, explosive and toxic materials with respect to their potential impact on people, assets, or safety functions.



**Gas and Dust Explosion Modelling**



**Dispersion Modelling**



**Fire and Smoke Modelling**

**VIRTUAL REALITY (VR) SAFETY TRAINING**

3D based VR Safety Training is an advanced technology used by many countries worldwide to experience hazards related to gas dispersion, liquid release (pools), fire and gas explosions in industrial environments. The VR based Safety Training is realistic CFD based dispersion, fire and explosion simulations in a virtual reality environment using head mounted display (HMD). The main application area for a 3D based VR Safety Training is to enhance risk awareness and improve emergency response through education / training in a virtual reality environment as a replacement to traditional book-based education and real practical training.



## ACCIDENT STORY – ONGC , HAZIRA

### THE INCIDENT HISTORY

On **24 September 2020** at around 02:15 Hours a CISF constable on duty, at watch-tower number 4 on the north west periphery of ONGC-Hazira plant, observed a **vapour cloud from gas terminal area**. He immediately informed to Gas Terminal Control Room. Operating staff noticed that the cloud was coming from 36” pipeline which carries the sour gas and condensate from offshore to ONGC Hazira plant. They **immediately initiated the emergency actions by closing the pressure control valve on the line**. At 03:08 Hours, **the Ignition of the vapor cloud resulted in a blast**. The fire was brought under control by fire crew who were able to completely extinguish the fire by 07:30 Hours.

Consequence impact of the accident was, while no causality or injury to any person was reported, the 36” sour gas-condensate pipeline found badly damaged. The event caused environment damage to nearby trees.

The discrepancies were extracted from the “**Enquiry Committee Report**” which was constituted by **PNGRB (Petroleum and Natural Gas Regulatory Board)** to investigate the incident.

### THE INVESTIGATION REVEALED FOLLOWING DISCREPANCIES

MGMT COMMITMENT	PSI -HIRS	OPERATIONAL	LEARNING
<i>(PSM Elements Reference : <a href="#">Safexcellence</a>)</i>			
Sr.no.	Discrepancies as per “Enquiry Committee Report”		PSM Elements
1	Control room staff was found insufficiently trained to handle emergency situation.		Competence
2	Drawings (P&IDs) information and field actual installations mismatched. Drawing showed three pressure transmitters but no data available. Density transmitter shown in P&ID but the same was not configured in the DCS.		PSI-HIRA
3	MOVs (Motor Operated Valves) at gas terminal station having only local operations but not facilitated for remote operations (from control room) for emergency close.		
4	Hydrocarbon and H2S detectors were configured to annunciator panel for display but not connected to DCS (to know history).		
5	F&G detection system did not have provision for auto shut down of plant or activation of fire suppression system.		
6	Discrepancies in metering instrument calibration & No SOP for calibration of these meters.		
7	1060 mechanical notifications were pending out of total 7935. 252 were three months old and no actions were initiated		AIM/ MI
8	No recorded reasons for overrun of scheduled electrical preventive maintenance. Many PM remained open for a long time.		
9	Six months scheduled PM for electrical lighting was not followed.		
10	The schedule of checking thickness survey of pipelines of four years interval was not followed. No base line data of pipe thickness is available. The procedure does not ensure the selection of spots for measurement of thickness		
11	2017 report of pipelines thickness survey identified significant thickness reduction. No action was taken for those even after three years.		
12	Light fittings had no unique identification numbers to report specific problem.		Management of Change
13	Management of change (MOC) procedure was published in 2016 but not found implemented in actual.		
14	Operation manuals/SOPs with no approvals.		Operation Procedure
15	Discrepancies in PTW procedures and Mock Fire Drills were found.		SWP
16	Operations & maintenance of pumps, tanks, pipelines, hydrants/monitors carried out by various departments such as Utilities, mechanical maintenance & other agencies and therefore the functioning of the equipment and thus effectiveness of firefighting could not be ensured.		Emergency Mangment
17	Various discrepancies existed in ERDMP (Emergency Response and Disaster Management Planning) procedures were found.		
18	Internal Safety audit was just a task for completion. External audit’s some recommendations remained unattended even after almost three years.		PSM Audit
19	Discrepancies in history incident investigations were found.		Incident Investigation

**ROOT CAUSE OF FIRE AND BLAST**

**ASSET INTERGITY MANGMENT/ MECHANICAL INTERGITY**

18<sup>th</sup> September 2020 because of some abnormality in indication and its gasket was replaced. No hydrotest of the flanges was carried out after gasket replacement (No standard procedure in place for calibration and replacement of gasket). The gasket was nonstandard (locally purchased) Metering flange connected to 36" pipeline was found damaged. The meter was calibrated on

Inspection indicates that leak occurred from the retaining plate of the orifice in condensate metering skid. This leakage was either due to using substandard gasket or not adopting proper hydrotesting process for leak check (after gasket replacement) on high pressure system.

The source of ignition was confirmed from inside the plant and the most probable source was from nearby flameproof lamp where three bolts were missing and an opening of 5 to 6 centimeter found between the main body and glass cage.

**EMERGENCY MANAGEMENT - TRAINING**

Almost forty minutes (0220 – 0304 Hours) delay in closing the metering isolation valve and pressure control valve on 36" pipeline resulted in causing a very big vapour cloud. Also, there was complete absence of the wind flow, which otherwise would have carried away the vapour formed.

**ACCIDENT INVESTIGATION REFERNCE PICTURES**



Time – 02:12:50 (Dated 24.09.2020), Commencement of Vapour leakage



Time – 02:15:45 (Dated 24.09.2020), vapour cloud in piping area



Time – 03:00:44 (Dated 24.09.2020), vapour all around even at heightcontrol room



Time – 03:08:17 (Dated 24.09.2020), dense vapour clouds all around



Time – 03:08:22 (Dated 24.09.2020), major fire continued



Damaged pipelines

**CONCLUSION**

As seen from the above details, the nineteen discrepancies in first table and four discrepancies in 'Root Cause' are signaling to deficiency in nine specific PSM elements. This is a serious condition which shows that there is a substantial scope of improvement in Management leadership and implementation of 'Conduct of Operation and Operational Discipline' (COO-OD). It calls for immediate requirement of implementing process safety management in true sense in such a big organization.

Reference : Major Fire at ONGC Hazira Plant Enquiry Committee Report ([https://www.pnqrb.gov.in/pdf/ERDMP/Hazira\\_enquiry15012021.pdf](https://www.pnqrb.gov.in/pdf/ERDMP/Hazira_enquiry15012021.pdf))

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