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Institution of Safety Engineers (India)

“Aim to prevent Accident, Protect Environment & Minimises Losses during disaster”

www.iseindia.in



About us: Institution of Safety Engineers (India) is established in year 2012 under ZJEW Trust, Registered under Public Trust Act in India, **Govt. Registration No. 5240** with objective to prevent accident, Protect Environment & minimise Losses during Disaster. Institution of Safety Engineers (India) is An ISO 9001:20015 certified institution and working to save Natural resources & control pollution. ISE (India) imparting EHS related Training to society and needy people for creating employment opportunities.

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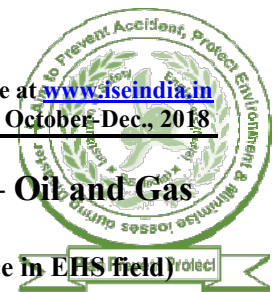
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Importance and need of Fire and Safety in Upstream and Downstream – Oil and Gas Industry

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Abstract

Oil and Gas industry plays vital role in development of country in world. Oil and Gas industry has various challenges in terms of Health, Safety and Environment. It has impact on society as manpower in world are involved in extraction of oil and gas. Hydro carbons in gas is highly flammable which is real time challenge to handle and control to unlikely event. Emergency preparedness is necessary and awareness among the employers and employee's community is spread through training and drills. Many accidents happened in decades which changed the safety measures and requirements emerged. Safety and control systems are modernized in upstream, midstream and downstream sectors of oil and gas. Incidents results in loss of life, loss of asset and affect to society. Emission of fumes and smokes adversely have effect on eco system. Objective to publish this paper is control risk of oil & gas sector industries.

Keywords:

Oil & Gas Industry Fire Safety, Risk Control, Influence of oil & gas industries, Fire prevention and emergency response.

Objective:

- To prevent Fire & Explosion.
- Risk Control in Oil & Gas Sector Industries.
- Increasing profitability.
- Protect Environment.
- Importance of Training.

Introduction

The oil and gas industry have lots of influences to world today. Oil and gas have direct influence on every other commodity in the market. Therefore, it is critical to identify risk and their solutions through technological innovation to maintain global economic balance and need. Oil and gas industry has positive and negative impacts. Positive Impacts is good for environment as well as society and negative impact is bad for environment as well as society. Impact depends upon taken control measure of employer and their employees during different phases of oil & gas production and enforcement of rules and regulation by respective state or country government authority or government.

The oil and gas industry are essentially subdivided into three phases and these include:

- Upstream sector
- Midstream sector
- Downstream sector

Note that the midstream sector is also included in the downstream sector.

Upstream sector: The upstream sector of the oil and gas industry involves processes including the searching for and the recovery of crude oil as well as its production. In the upstream sector, discovery or exploration of crude oil takes place. This involves intensive and extensive efforts towards ascertaining the actual places where crude oil is located.





Exploration is a very difficult process and therefore requires the service of experts in the field. More so, information technology plays active roles in the exploration or searching of crude oil in order to easily discover new grounds where oil is located and therefore take advantage of them.

The upstream sector includes different operations such as the searching for prospective underwater oil and gas fields, drilling of exploratory wells and also making requisite operations on the well so as to bring the crude oil or natural gas to the ground surface.

Downstream sector: The downstream sector of the oil and gas industry involves the refining of the crude oil and/or raw natural gases obtained in the upstream sector as well as selling or distributing the products obtained. Many products are derived from the refining of crude oil and these may include diesel oil, liquefied petroleum gas (LPG), asphalt, petroleum coke, gasoline, fertilizers, antifreeze, plastics, rubbers, pesticides, synthetic rubber, jet fuel and many more.

The downstream sector of the industry is the sector that relates with the consumers. Facilities involved in this sector include petrochemical plants, oil refineries, natural gas distribution companies, retail outlets etc.

The main processes involved in the upstream and downstream oil and gas operation include the following:

1. Exploration
2. Extraction
3. Refining
4. Transporting
5. Marketing

Management of safety in oil and gas production aims at a more proactive approach that combines both health and environment. Safe operations generally result in environmentally prudent practices.

The industry is striving to develop clear corporate policies and objectives that ensure that process standards, guidelines, and procedures are followed. Training of employees is at the core of most safety programs. Production operation safety is focused toward offshore operations where loss of life and environmental damage can be much more devastating.

The downstream sector of the industry has broad scope and tentacles. These include crude supply, trading, refining, product distribution, marketing and retailing. Lots of products are involved here including conventional fuels such as gasoline and diesel and low carbon fuels such as bio diesel.

Offshore Training: Training is an important part of a safe operation. All personnel need adequate training on their respective discipline to enhance skill and competency. Records are required to be maintained.

Human Factor: One safety area receiving more attention is the human factor that determines if jobs are structured to be within human capacities. An ergonomic checklist is as follows:

- Equipment controls should be easily identified, reached and operated.
- Equipment displays should be easy to read and understand.
- All controls and displays on a platform should be consistent.
- All control and displays should behave in a way personnel expect.

Environmental Pollution: Environmental pollution is a major issue in the upstream oil and gas sector. There is lots of oil and corroded pipelines still used today resulting to oil spill which degrades the environment. This need control measures like policy, procedures and legislations for oil and gas sector and effective implementation to control the spillage, Smoke from flares and chimneys, Vapours and Gas release etc.





Health, Safety and Environmental Security: The safety of the human environment as well as health protection should be the number one priority or concerns in the oil and gas industry. Legislation like implementation of ISO15926 has forced oil and gas companies to comply it. Hydraulic fracturing, a

common technique in extracting gas from unconventional reservoirs have resulted to lots of environmental concerns and issues with the water table. Therefore, oil firms should pay greater attentions to health and safety issues with broader operation concerns through the various stages of the value chains.

Fire Prevention and Emergency Response: One of the main concern in upstream and downstream of oil and gas is Fire prevention. Hydrocarbons are highly flammable and also vessels pertaining Crude and gases may lead to explosion in case of failure of relief valves. Adequate sensors, Alarms, Sprinklers, Siren, Emergency and rescue provisions.

Conclusion:

The upstream and downstream value chains of the oil and gas industry face lots of challenges which have been clearly evaluated to protect environment and prevent any future harm. These challenges have constrained lots of activities in the oil and gas industry and crippled lots of processes. However, it has also become quite clear that information technology and automatic devices including robotics are highly needed to solve these challenges in the oil and gas industry as well as every other industry in the twenty first century. Identifying challenges of oil & gas industries, resolving them through technology, Innovation and effective control measure give positive results in economic development of society and protect to environment.

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Challenges to control work place risk in Construction Industries

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ABSTRACT

Construction industries is Hazardous prone industries. To control workplace risk in construction industries is challenging job for any organisation. Each and every year several people killed, several injured, huge losses of property and harm of environment, create obstruction in social as well as country development. In past few decades, Construction industries have created huge employment opportunities & playing vital role in social development as well as development of country. The main objective of the paper is to analyse the challenges (Negative impacts) that arises at construction site during controlling workplace risk. The study also indicated the challenges arises during construction activity during Selection of resources like manpower, contractor, Tools, Tackles and impacts of Accidents to organisation.

Keywords:

Challenges to control workplace risk in construction industries, Safety Management system (SMS) in construction industries, Risk control at construction site, Loss Control

1. Introduction:

India is Developing country and here construction industries playing vital role in country development. Construction industries has positive and Negative impacts. Positive impacts always shown good result for organisation as well as country and negative impacts shown bad result for organisation as well as country. To create employment opportunities, economic development of country are results of positive impacts. Negative impacts is injury, death of person, damage of property, harm to environment is bad for organisation as well as country and it may cause of project delay, Poor organisation reputation, prosecution by respective legal or govt. authority, Employee morale decreases etc. Costs of accident are direct & indirect cost and indirect cost of accident is several times more that direct cost. Accident rate in construction industry in India are several times more than manufacturing or other sector industries.

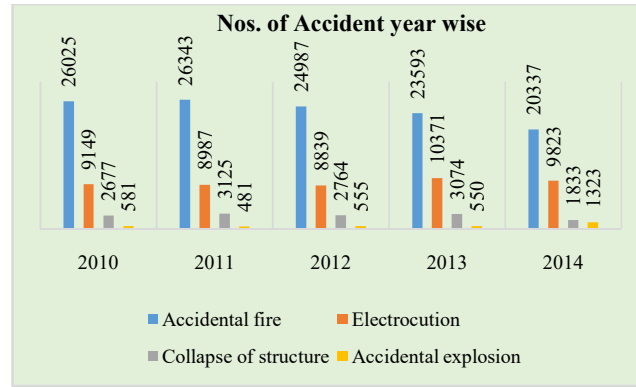
2. Literature Review & Risk in construction Industries

2.1 Literature Review

Dr. Sindhu J. Nair and Shahnawaz R (2017) carried out a study on occupational Health Safety Management system in an organisation with objective to improve safety culture and reduce accident. Study done to collect data of Accident from NCRB India and other different sources and found that due to poor safety awareness, numbers of People Killed, Several injured and huge organisational losses and maximum injury or Fatal occurred in industries are due to fall.

As Per NCRB India in year 2010-14, numbers of accident occurred in different sector in which more accident occurred in construction industries.





Number of accident cases in year 2010, 2011, 2012, 2013 and 2014 (India) as per National crime record bureau

2.2 Risk in construction Industries

Risk in a construction industries are Person falling, Material falling, failure of lifting equipments, collapsed of structure, vehicle collision, Vehicle Toppling, Electrocutation, Fire, Explosion, Toxic gas release, Snake bite, diseases that create due to occupation of construction activity etc. Risk depend on Probability of hazardous event and its consequence. Major Numbers Injury or Fatal occurred at construction site are due to fall hazard. Poor management commitment or no interest of employer in field of safety, Inadequate resources, ineffective enforcement of Safety norms, rules and regulation like factor increases threat of risk at construction workplace and it may cause of harm.

The National Crime Records Bureau, Government of India published data on the accidents reported in India in construction industry in year 2012-2013 are:

Sr. No.	Causes of Deaths	Total Number of Deaths	
		2012	2013
1	Electrocutation	8750	10218
2	Falls (Fall from Height Fall into Pit/Manhole, etc.)	12319	12803
3	Fire (Short Circuit)	1439	1690

The Table show highest death at construction site is due to fall.

3. Objective

- Analyse challenges in construction industries.
- Problem identification.
- Control work place risk at construction site.
- Reduce work injury & cost arises due to Accident.
- Increase productivity.
- To increase economy of country.
- Fulfilling statutory requirements.

4. Challenges to Control workplace risk in Construction industries

Controlling Risk on workplace in construction industries is challenging Job due to following reason

- Dynamic Nature of work
- Less organized sector
- Poor Safety Culture & behavioural Issue



- Inadequate of resources
- Unskilled Manpower's
- Frequent rotation of Manpower

- Language barrier due to migrated Manpower
- Poor method or no any criteria of Contractor selection.
- No provision of welfare facility or Inadequate welfare facility
- Poor method of work place Risk evaluation or Risk evaluation by less competence & less experienced personnel etc.
- Poor interest of senior organisational personnel in safety etc.

Dynamic Nature of work: Continuous changes in construction activity are cause of threat to construction workers. It creates obstacle to identify hazard and minimise risk As low as reasonable practicable (ALARP). Potential sources of harm in construction industries vary activity to activity and location to location.

Less organized sector: Construction industries is less organised sector where the employment terms are not fixed and not regular in numbers of construction industries. In numbers of states and country, government have made Health Safety related rules and regulations but not followed by employer due to ineffective enforcement from government ends. Less man-power and investment, Agricultural laborers, Unskilled manpower and changing their job as per construction activity etc. constitute unorganized sector.

Poor Safety Culture: Poor Safety culture is main parameter that create obstacle to control workplace risk. Cause of poor safety culture may be poor management commitment, Behaviour issue of employees, Unawareness & ineffective implementation of Safety norms, Rules & regulation, No provision of safety awareness program and poor health of workmen are factor of poor safety culture.

Inadequate resources & Unskilled Manpower's: Inadequate resources like manpower, Personnel Protective Equipment (PPE's), tools tackle and Unskilled manpower increased threat of risk. Unskilled manpower unable to identify threat of harm and safe method to perform their task.

Frequent rotation of Manpower: Frequent rotation of manpower create stress among construction workmen and they loose their confidence and unable to access risk in their work.

Language barrier: Language barrier create threat. Such manpower not aware about risk due to language barrier. Proper communication in local language and other language that could understand by workmen help to easily understanding and controlling workplace risk.

Poor method or no any criteria of Contractor selection.

Poor method or no any criteria of Contractor selection always increase threat among workmen at construction site. Organisation or client not identify certain guide line to evaluate and select best **contractor during tendering phase**. Best contractor means they have adequate resources like manpower, Personnel Protective equipment, Tools & Tackles, Strong financial condition, ensured compliance related to safety, Health & welfare at previous construction worksite and have relevant experience. Best contractor selection is major challenge that help to control risk at construction workplace.

Inadequate welfare facility: No provision of welfare facility or inadequate welfare facility always increase risk of harm at construction workplace. Canteen, Drinking water, toilet & urinals, Changing room, rest room, hygienic environment like facility reduce work place risk and help to control accident and diseases that create due to inadequate welfare facility. So contractor should ensure welfare facilities and clients must ensure its compliance.





Apart from this, Poor method of work place Risk evaluation or Risk evaluation by less competence & less experienced personnel can cause of threat because potential sources that can cause harm not identify due to such factor and it may lead to cause of accident. Poor management commitment or no interest of senior personnel of organisation in field of safety are also major cause of threat of risk. No provision of Safety induction and safety related awareness program always hamper to construction site safety culture. So, To control workplace risk in construction industries is challenging job.

5. Controlling work place Risk in construction Industries:

To control Risk at construction site, need to identify and accept to challenges and Proactive approach to be adopted. Potential source of harm of construction site can be controlled to Eliminate Hazard or Isolate Hazard or Substitute materials/ process or Engineering control or Administrative control or use of Personnel protective equipment (PPE's) or To adopt two or more method together. PPE's is last consideration that used to control risk because it not prevent likelihood of hazardous event, it only minimise the severity of Hazardous event. Safety culture is important parameter that help to prevent accident or harm. Regular Supervision required of site by competent supervisor and safety Awareness Program including Training must be conducted regularly. Assigning duty to worker as per their previous experience and such job should be carried out under close supervision under experienced personnel. Effective enforcement of safety norms, work permit system and effective method to select contractor with certain guideline and criteria help to make Accident free to construction site.

Experience & competent safety personnel play vital role in hazard identification and risk assessment. Health Surveillance must be carry out at regular interval. Communication among manpower to be maintained in local languages. Ensure standard parameter to select suitable resources like skill manpower. Ensure welfare amenities. Equipment, Tools and Tackles must be good working system. Ensure Safe Site operation by suitable planning.

Ensure site related compliance as per the Building and Other Construction Workers (Regulation of Employment and Conditions of Services) Act 1996, Building and Other Construction Workers (Regulation of Employment and Conditions of Services) Central Rules 1998, Building and Other Construction Workers Welfare Cess Act 1996, The National Building Code of India 2005 and respective applicable state or government rules, regulation and codes. To Prepare Safety Management plan and effective implementation is best way to control workplace risk.

6. Conclusion

Risk control is challenging Job in construction industries due to Less organized sector, Dynamic nature of work, Behaviour issue, Inadequate of resources, Unskilled Manpower's, Language barrier with migrated manpower, Poor method or no any criteria of Contractor selection, Inadequate welfare facility, Risk evaluation by less competence & less experienced personnel, Poor interest of senior organisational personnel in field of Health safety and ineffective enforcement of Safety norms and procedure.

Management commitment, Effective planning, reporting, Training, suitable resources selection, effective enforcement of safe law like parameter help to control construction workplace risk. All factor that create challenges to control workplace risk during construction activity should be identify and adequate control measure must be taken to avoid any future harm. Compliance should be identify with the help of respective state or country laws, rules, regulation, codes, non-conformance observation and through proactive approach. Effective risk control method help to control organisational harm, increasing business opportunities and maintain better relation with stakeholders.





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Principle of Safety Management

Safety management begins with incident management. Unsafe Act & unsafe Condition are basic cause of any Accident. When both conjugate at one point then accident happened.

In other words, Human and mechanical failure are causes of accident.

Unsafe Act: Committing mistake by person or any act that may lead to accident is known as unsafe act. Following are example of unsafe act:

- Working without wearing safety helmet & safety Shoes
- Working at height without wearing full body harness.
- Taking Rest in working Areas
- working or Taking rest below Hanging Load
- Over speeding
- Operating equipment without qualification or authorization.
- Lack of/or improper use of PPE
- Operating equipment at unsafe speeds
- Failure to warn
- Bypass or removal of safety devices
- Using defective equipment

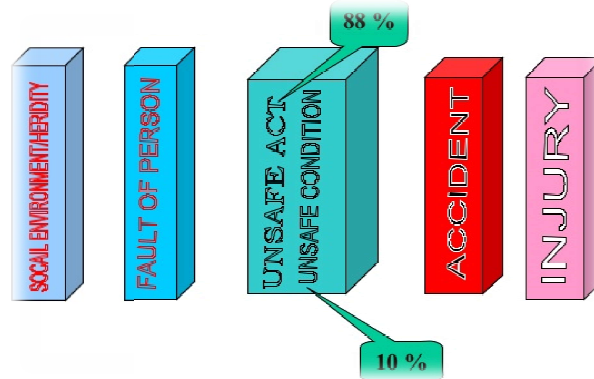
Unsafe condition: Any sources or situation or conditions that have potential to create accident is known as unsafe condition. Following are example of unsafe Condition:

- Damage welding Cable
- Mechanical guard not Provided on rotating parts
- Defective sling or lifting equipment.
- Defective work platform
- Floor or platform Opening, Pits
- Poor housekeeping
- Defective tools, equipment or supplies
- Inadequate supports or guards
- Congestion in the workplace
- Inadequate warning systems
- Hazardous atmospheric conditions etc.



Domino Theory

Domino theory say that 88% Accident occurred due to unsafe act, 10% due to Unsafe Condition & 2% due to natural calamity.

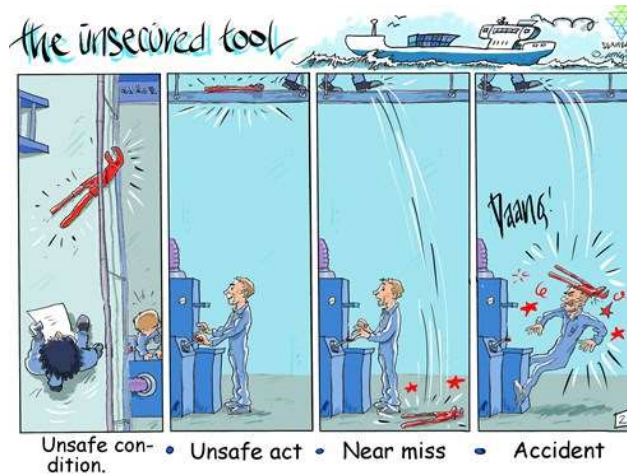


Example of Non-conformance:

Example (I):

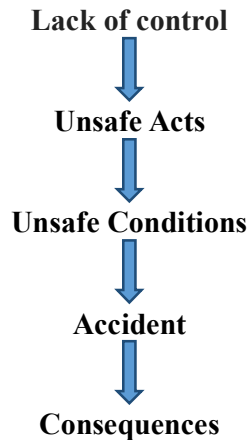


Example (II):





Chain of events



Injury or Property Damage or Harm to environment or Combination of these

Consequences of Accidents

Direct Consequences:

- Personal injury
- Property loss
- Environmental Damage

Indirect Consequences:

- Lost income
- Medical expenses
- Time to retrain another person
- Decreased employee moral

Cost of Accidents

Costs of Accident are two types, Direct Cost & Indirect Cost. Indirect Cost is several Times more than Direct Cost.

Direct Costs:

- Fines in the criminal courts.
- First- aid or medical cost.
- Workers sick pay.
- Overtime to make up for the lost time.
- Lost production time whilst dealing with the injury.
- Compensation payable to the victim.
- Increase in insurance premium and indemnity payment.

Indirect Costs:

- Loss of staff morale in the organization.
- Damage to public image and business reputation.
- Cost of recruiting and training temporary or replacement of labour.
- Cost of remedial action following an investigation.
- General difficulties in recruiting and retaining staff.





- Compliance with any enforcement notice served.

Accident prevention strategies

Accident can be prevented to control **unsafe acts & unsafe condition.**

To eliminate workplace hazard i.e unsafe condition is best option to prevent accident.

Hierarchy of Hazard Control

1. Eliminate the hazard
2. Isolate to hazard
3. **Substitute Process/ Material**
4. Engineering control
5. Administrative control
6. Personnel Protective Equipments (PPE's)



Hazard can be controlled at work place as per hazard control method.

PPE's is last consideration because it doesn't eliminate hazard, it minimise severity of harm.

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