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LPG Storage Area Safety Monitoring by Artificial Intelligence

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ABSTRACT

LPG storage area safety monitoring by artificial intelligence method communication safety alarm entire responsibility persons in the plant.
gas occurrences in the Subsurface using various methods and tools that were available In Upstream Gas Industry. Further reachingthe Reservoir and taking out the Gas from those to the surface .The gas have to transport and store to get purity tor supply to the Required user. Here the Midstream peoples plays a vital role in . The drilled Gas have to transport from the occurrence to The destination Refinery so it have to be planned well and many Safety procedure have to be done to avoid any problem in those loading and unloadingit must be Maintained in perfect temperature condition and perfect storage Tanks either above the ground or the underground Again there Are some safety procedures to be followed which were approved by the Government safety norms. This article deal about the Process and procedures in transporting and storage of fuels from Upstream to midstream to downstream .

INTRODUCTION

Salem steel plant gas storage area was large capacity (1500 tons) I n southindia.there production purpose lot of gas using salem steel plant by stainless steel . LPG gas storage is very difficult in atmosphere conditions . Lot issues faced every years loading and unloading at the time now presently program logical control methods followed .
Now nepermison w project implement ARTIFICAL INTELLIGENCE method (under project) with chieft explosive control officer new delhi
Standards like the Occupational Safety and Health Administration (OSHA) guidelines and standards serve as guiding principles…
In most industrial environments where there is the risk of explosion or fire because of the presence of flammable gases or vapors, a mixture of compounds is likely to be encountered. In the oil, gas and petrochemical industries the raw materials are a mixture of hydrocarbons and chemicals, some of which may be being altered by a process.

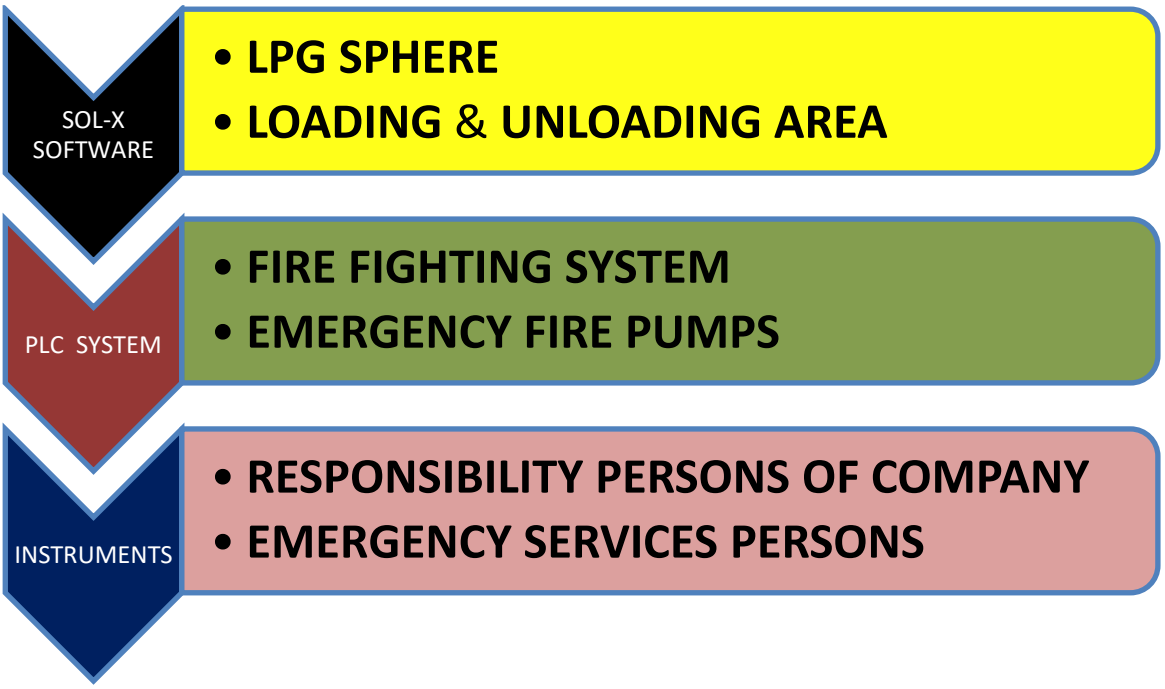
1 .CONTROLLED BY
FIRE FIGHTHING SYSTEM
IFFS
2. USING SOFTWARE
SOL-XPVT
SAFETY COMMUNICATION MANAGEMENT SYSTEM

PETROLEUM ACT – 1934 (30TO1934)

Workers in the oil and gas industries face the risk of fire and explosion due to ignition of flammable vapors or gases. Flammable gases, such as well gases, vapors, and hydrogen sulfide, can be released from wells, trucks, production equipment or surface equipment such as tanks and shale shakers. Ignition sources can include static, electrical energy sources, open flames, lightning, cigarettes, cutting and welding tools, hot surfaces, and frictional heat. The following OSHA and NIOSH documents provide guidance on recognizing and controlling these hazards:

- Storage and handling of liquefied petroleum gases 1910.110
- Fire protection 1910 Subpart L
- Flammable liquids 1910.106
- NFPA 10 Standard for Portable Fire Extinguishers
- NFPA 30 Flammable and Combustible Liquids Code
- NFPA 2113 Standard on Selection, Care, Use, and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire

SOL-X PROTECTS WORKERS GLOBALLY WITH IN INDUSTRIAL SAFETY SOLUTION



LITERATURESURVEY

2.1 SAFETYINVOLVEMENTINOILANDGASINDUSTRY

The world in oil and gas industry has been knownas one of the industry that always involved in safety. According to the statistics from the U.S. Bureau of Labor . The number of employment in the industry of oil and gas keep on increasing. With the increasing amount of employment in the industry,the chances of accident stooccur also increase.in her paper states that as the operational risk faced in oil and gas industry increases, the safety of environment and human continue to be the top priority in the industry.

This emphasize that a process safety management(PSM) or Safety Management (SM) system that fully integrates the change in management methodologies across multiple facilities, workers and technological advancement to avoid catastrophic incidents and in addition to increase the overall safety of an operation. defined Safety Management (SM) System as several processes that collaborate and work side by side for the purposeofimprovingsafetyandalsoinordertoreducethenumberaccidentsoccur into ZERO. Researcher suggest that from the past investigations and researches, directly or indirectly, accidents happens are basically can be caused by 3 aspect, which are either people itself, or by the combination of these aspects. Hazards created can be relate closely to these aspects . Therefore, quotes that Safety Management system are mainly focused on manage technology, facilities and personnel, the Management of Change Process also should be addressing to these 3 elements in order to have a holistic management system. However, the management of change must be evaluated carefully and reviewed, including by carrying out hazard analysis and consultation with safety engineering expert

as changes made have safety implication and as accidents often occur after changes implemented .According to researcher the suggestion of implementing and executing an Occupational Safety and Health Management System at every workplaces camein to attention during the International Labor Conferenceatits 91st session on 2003, where the Conference Conclusions was to plan a world-wide approach on occupational health and safeties.

2.2**Key to effective Safety Management**

Researcher suggests that effective systems of safety management needs continuous process of training, applying, examining, taking action, and management assessment that can be achieved with proper key elements, which are: Management
– by identifying safety needs and hazards, planning and formulating safety managementandprovidingproceduresonhowtocontroloreliminatehazardsinthe work places. System (Proactive)– A proper and effective safety management system that take in to consideration of all those affected by the system which also identifying and correcting any complication regarding safety before accidents happen. Implementation – Implement the safety management system globally across all operations in the company once the systems have been established and prepared. Assistance during implementation and training on the systems should be done step by step from management to all personnel.
Measuring – Monitoring, evaluating, and gathering feedback based on the system implemented. Review/ Action – Reviewing feedback to determine what recommendation of changes should be made to the system and implementing and take action to adjust and improve the system. Improvement Process – Steps to improve the systems from measuring and review and taking action are being done continuously.

CHAPTER-3

METHODOLOGY

Methodology of the project comprise of 2 phase, which are Preliminary Phase

OrLiterature review Phase and Data Collection Phase.
Figure.no:1Methodologyof oil andgasindustry

1. **Preliminary Phase** :Literature survey phase is the stages where it is to identify all the objectives, problem statement and the scope of work of this project includingto get the overall overview and background

study of the topic. Data from journals, thesis, researches, books etc. are searched and used.

2. Data Collection Phase is the stages that collect, analyses and obtained from the main data questionnaire and also data from the research found in the Preliminary Phase to achieve the objective of the project. Pilot Study is also done where the questionnaire will be administered and clarified by professionals in oil and gas and then will be refined. From the comments of the professionals, finalized questionnaire will be developed in order clarified questionnaire. This is to ensure the suitability and the effectiveness of the questionnaire

3.1 IFFS (INDEPENDENT FIRE FIGHTING SYSTEM)

types of life safety systems in place and operational. The Office of Access Control & Security Systems is responsible for life safety plan review prior to installation on all construction and renovation projects, and to ensure that all life safety systems are inspected, tested, operational and unobstructed. Access to fire protection system equipment and devices (fire extinguishers, fire alarm pull stations, sprinkler heads) should never be obstructed. The following is a synopsis of CSU fire protection systems

PORTABLE FIRE EXTINGUISHERS

Portable Fire Extinguishers are considered the first line of defense to combat small fires limited in size. They are required even when a facility is equipped with sprinklers, standpipes and hoses or other fire protection equipment. Fire extinguishers must be appropriate for the types of activities in the area they are located in, and must be labeled as such and located in a visible location.

AC&SS facilitates monthly checks of fire extinguishers to ensure proper charging.

FIRE ALARM SYSTEMS

Fire alarm systems are present in all University buildings. Main panels are located strategically in each buildings, attached to which are a various types of enunciating devices (smoke detectors, heat detectors or specialized detectors) that when triggered, will activate the fire alarm system. Manual pull stations are present and when used will also sound the fire alarm.

Special building operational systems that may be connected to the fire alarm system include, but are not limited to: elevator recall, door closures, door releases, air handler unit shutdown, damper closures, smoke control activation and other smoke, heat and fire protection devices.

Fire alarm systems are designed to alert occupants to evacuate the building, and may include a visual and audible component. When the alarm is sounded, occupants should immediately leave the building according to each department's emergency evacuation plan. DO NOT USE ELEVATORS – be monitored by the CSU Police Dispatchers, any person who has first-hand knowledge of an active fire emergency should notify the CSU Police Dispatcher by DIALING 9-1-1 from any campus telephone. Cell phones users should also DIAL 9-1-1 and tell the operator to connect you with CSU Police.

FIRE SPRINKLERS

Fire sprinkler systems are integrated systems of pipes connected to independent sprinkler "heads" for controlling and/or extinguishing a fire. Care needs to be taken to ensure a minimum of eighteen (18) inches of clearance is constantly maintained between the lowest point of the sprinkler head and any furniture or stored items. Never suspend anything from sprinkler heads. If you notice items suspended from sprinkler heads, please remove and immediately

FIRE PUMPS

Fire pumps are essentially components of a sprinkler system's water supply. Connected to the public water supply for a building, the fire pump will activate when the sprinkler system detects a drop in pressure from the activation of a sprinkler head subjected to enough heat above its design temperature somewhere in the building.

STAND PIPE SYSTEMS

Standpipe systems are a series of pipe that are connected to a water supply for the fire department to fight fires. Dry standpipe systems provide hose outlets throughout the building. Outlets are connected to a riser, and then to a Siamese connection somewhere at street level outside the building. Fire trucks are used as pumpers to provide water from fire hydrants to the Siamese connection and pump water upward throughout the building.

SPECIAL FIRE SUPPRESSION SYSTEMS

There are certain types of operations that require specialized fire suppression systems. Carbon dioxide, dry chemical and FM 200 (replaces halon) systems are used as alternatives to sprinkler systems in areas where water is considered incompatible with or would likely cause additional damage to the items in a protected room. Kitchens with commercialized cooking equipment are required to have specialized ventilation and fire suppression systems. Libraries with special collection rooms, some laboratories and hazardous and chemical waste storage areas, and computer server rooms are also locations where specialized fire suppression equipment may be present

Testing and Inspection

Fire safety systems are tested and inspected in accordance with applicable fire code regulations. Copies of testing are forwarded to applicable building administrators, defined as the building single access control coordinator (SACC). Any deficiencies noted during the inspection are addressed by an outside vendor with expertise in fire alarm systems.

3.5. MOCK DRILL IN LPG STORAGE (COMMAN TO ALL GAS UNITS)

TESTING SPHERE AFTER AI METHOD OPERATIONS

FIG 3.5.1 SPHERE ACCIDENT

FIG 3.5.2 AI METHOD SPRINKLER OPEN

FIG 3.5.3 FIRE FIGHTING TEAM WORKING

FIG 3.5.4 RESPONSIBILITY PERSONS IN ACCIDENT AREA

FIG 3.5.5 .AI METODS SUCCESSFULLY MOCK DRIL DONE

3.2 DELUGE VALVE CONTROL PANEL

FIG 3.2.1

FIG 3.2.1Deluge Valve OPRATION AREA

In normal operating conditions the deluge valves are held closed by the water pressure in the control chamber. In fire conditions water is released from the control chamber through the opening of the solenoid valve in the control trim, and the valve latches open under the effect of the water supply pressure.

A deluge fire protection system has unpressurized dry piping and open sprinkler heads. The system is directly connected to a water supply and when the system is activated, a deluge valve will release the water to all the open sprinkler heads. The valve is opened when activated by a heat or smoke detection system.

How is a Deluge System activated? The sprinkler heads on a Deluge system are fused together and operate as one when activated. The valve is opened when activated by heat or smoke detection systems. Once activated, the water is released into the piping and out of the sprinkler heads

Deluge Fire Suppression System is a sprinkler system with an empty pipe system, meaning there is no water stored in the piping network. The water is instead stored behind a control valve. A typical Deluge system will have a control valve, a dedicated water supply, and a sprinkler operated detection system

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3.3 SPRINKLER SYSTEM

The water from the sprinkler head will cover the area where the fire is located and will continue to operate until the fire department can fully extinguish the fire.

Types of sprinkler systems permissible by NFPA 13, Standard for the Installation of Sprinkler Systems, are; wet, dry, preaction, and deluge.

Water sprinkler systems use water to suppress fires in buildings. The fire sprinkler pump distributes the water via the pipe-system and discharged by the sprinklers. Fire sprinkler systems use water to suppress and in best case to extinguish fires in buildings.

FIG 3.3 .1 FUSE BULB

FIG 3.3.2Tesing in AL METHOD

3.4 COMMUNICATION FOR RESPONSIABITY PERSONS

COMMUNICATION SOFTWARE AND ITS USES

Communication is defined as the process of transferring information involving at least one sender, a message, and a recipient from an individual or a group to another. An application or program that is created to pass information from one system to another digitally is known as "communication software." Communication software forms part of communication networks with device elements listed in the Open Systems Interconnection Framework (OSI Model) according to its function. File transfer protocol (FTP), messaging apps, CALL FOR PRSONAL NUMBER and email are the best-defined instances of communication software.

The concept of emailing can be dated back from the early 1960s as a means of communication between multiple users. Following emailing, text chat functionality was introduced on multi-user computer systems. In 1996, instant messaging with the buddy list was introduced, and the Voice over Internet Protocol (VoIP) communication software became popular. VoIP software allowed users to make phone calls using the internet.

COMMUNICATION SOFTWARE IS USUALLY SYNCHRONOUS OR ASYNCHRONOUS.

Synchronous communications are those that happen in real-time. Instant messaging, video chat, phone conversations, web conferences are a few examples of synchronous types of communication.Asynchronous communications involve a time delay. The

- transfer of files or content takes a while, such as sending an email, forum discussions, news stories, and comment sections.

TYPES OF COMMUNICATIONS SOFTWARE

Unified communications system. This offers phone support, ticketing, intranet, VoIP, and other enterprise tools, including reporting and analytics. It is usually used for customer support or outbound sales as a help SSdesk or contact center solution.

Web conferencing. This involves text, audio, and video exchange capabilities and is used for several purposes such as video presentations, employee training, conference calls, client onboarding, tutorials, and webinars. It is useful for organizations with global clients, remote teams, or a lengthy web mailing list.Live chat. This is a standalone app that can be embedded within digital channels such as a website, social media page, newsletter, and custom app. Live chat apps also offer marketing software features including lead qualification and nurturing, provide analytics on web visits and FAQs, or integrate with the CRM for shared data.

SIGNIFICANCE OF COMMUNICATION SOFTWARE

The advantages of communication software in an organization include the following:

Remote Work. Global businesses require communication tools to keep employees connected in real-time to perform daily operations, collaborate, or address urgent situations. A suite of communication software tools leveraging cloud and mobile enables teams to assign tasks, coordinate, and communicate instructions from anywhere using an internet connection.

Productivity. Direct communication with teams prevents errors such as missed deadlines and the usage of live chat, email, and VoIP tools have a recording feature to ensure that employees are accountable for their tasks. Remote teams can be connected through mobile devices to quickly coordinate daily on urgent tasks with the office.

Integration. Most live chat, email and other messaging apps can be integrated with bigger systems such as CRM software, project management systems, and help desk software tools. For example, feed live chat messages into CRM for leads, convert emails into specific tasks, or upload recorded training sessions in the knowledge base.

Capture information. Communication apps can archive message exchanges and audio and video calls, so that important details such as customer queries, discussions, and meeting minutes can be stored. They also include features such as sorting customer inquiries for leads, referencing discussion points, and preparing minutes. Reduce expense. Most communications software solutions can be accessed using a smartphone or tablet, considerably reducing hardware costs. And most communication tools that can exchange messages, audio/video calls, and files are available for free. Expensive PBX and landline licenses and hardware can be replaced with cloud-based communications software at an affordable monthly fee.

DATA ANALYSIS METHOD

The data analysi softhesurveyisdonerightafter whenthedatacollectionfrom the questionnaireand literature review has beendone. All thedata andresultsobtained from the questionnaire distributed will be then analyzed according to its suitability .The result will be .Dataanalysisis a part of the methodology approach in order to evaluate and combine all the data collected. The data analysis of the questionnaire is done byu sing the Average Index (AI)Formula,andRelativeImportanceIndex(RII).Fromthedataacquiredfromthe questionnaire, the scores are developed and analyzed be using following formula based on its importance marks.

RELATIVE IMPORTANCE INDEX(RII)

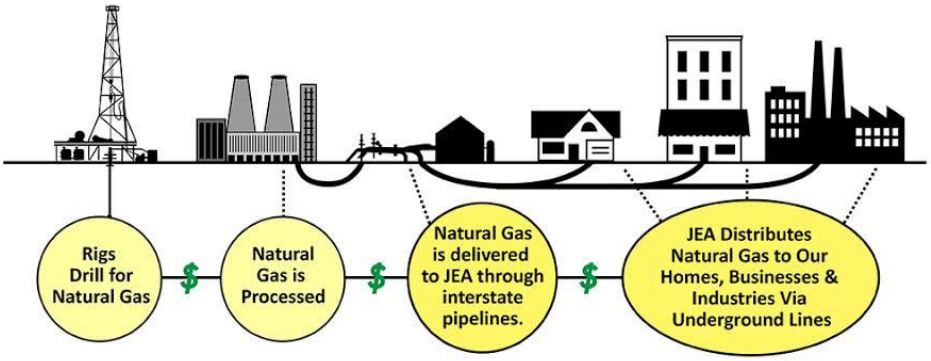
The data acquired from questionnaire results is analyzed by Relative Importance Index (RII) method where the data were put into an Excel Spreadsheet in order to determine and rank the relative importance of the 'Importance of Safety Management System in Oil and Gas Industry'

3.6 IADCHot WorkHazard Recognition

Falls Workers might be required to access platforms and equipment located high above the ground. OSHA requires fall protection to prevent falls from the mast, drilling platform, and other elevated equipment. The following OSHA and NIOSH document sprovide guidanceon recognizing and controlling this hazard .Ergonomics and Musculoskeletal Disorders.NationalInstituteforOccupational APIS9RecommendedPracticeforWell Control API 74 Recommended Practice for Occupational Safety for Onshore Oil and Gas Production Operations not properly. Further, administrative controls such as operating procedures must bedevelopedandimplementedtoensuresafeoperations. The following OSHA and NIOSH documents provide guidance on recognizing and controlling gthese hazards

Hot work, welding, flame cutting operations Personal protective equipment use Power sources (lockout/ tagout provisions, safedistance from powerlines) Working in the heat, long shifts Provide personal protective equipment (PPE). When engineering control salonecannot protect worke rover expo suretochemicals, noise, or other hazards, the employer must provide PPE.Communicate the hazards, and train workers. Havea plan for contractor safety andtraining. Promotea transparent open environment through various training techniques and team exercises. for their safety. Machine maintenance: Prevent workers from machine failure and keep them safe by conducting regular maintenance checks. Employees should keep

Figure.No:2.METHODOLOGYgasindustry



SAFETY IN OILANDGAS INDUSTRY

4.1 Common Hazards&Prevention

Occupational safety is a key concern in any line of work, but especially so in high-risk industries such as the energy sector. Oil and gas workers face a host of potential dangers in their work environment, like falling equipment and hazardous chemicals.

With a higher possibility of being struck by hazards, workplace safety becomes all the more crucial — organisations should place the well-being of their workers at the heart of their culture and values.

In an interview with McKinsey & Company, Bernadette Spinoy — then senior vice president of health, safety, and environment (HSE) from the major global oil and gas player Total—talks about how inculcating a collective mindset in which workers choose the right behaviour even when no one is watching can lead to a successful safety culture transformation.

To encourage this collective behaviour, this article will cover 5 ways on how safety can be achieved in the oil and gas industry.

4.2 USE THE PROCESS SAFETY APPROACH

Process Safety Management (PSM) is important as improper storage, use, and manufacturing of hazardous chemicals in process industries can have serious impacts. Process industries such as oil and gas typically involve transforming raw materials into finished products through chemical, physical, or biological processes. These complex processes are also high-risk in nature and hence demand strong and well-defined process safety management.

4.3COMMUNICATE WITH EMERGENCY RESPONSE ORGANISATIONS

When disaster strikes, quick and accurate communication is essential. Developing a disaster communication plan ensures that everyone involved has the information they need. A disaster communication plan outlines how to distribute information during a crisis and ensure that everyone is on the same page. Individuals who aspire to help safeguard communities through a career in disaster management would do well to understand how to effectively create and implement disaster communication plans. health professionals who will be able to take action and help minimise the consequences in the event of an accident. Developing a collaborative relationship with these organisations can also be beneficial to the workers by increasing awareness of emergency and safety equipment

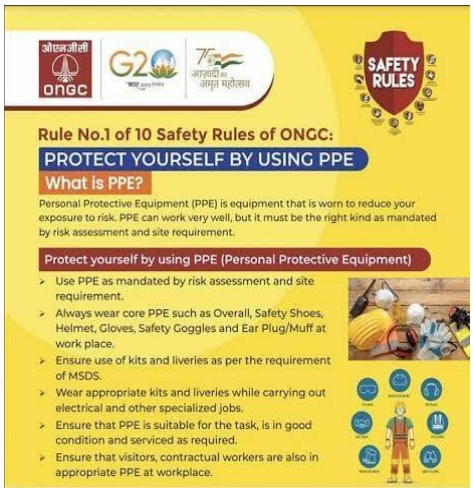
1. Confined Spaces Workers often must work within confined spaces, where there is a higher risk of health hazards such as asphyxiation or exposure to toxic chemicals. The ignition of flammable vapors or gases is also a possibility, in the event of small or narrowareas whichwouldposition workers directlyinthe danger zone.

CHAPTER-5

5.1 SAFETY HAZARDS ANDRISKSIN OILANDGASINDUSTRY

Safety in Oil and Gas Industry: Common Hazards & Prevention Oil and gas operations, gas extraction industry Occupational safety is a key concern in any line Interview with McKinsey & Company, Bernadette Spinoy — then senior vice presidentofhealth,safety,andenvironment(HSE)fromthemajorglobaloilandgas player Total—talks about how inculcating a collective mindset in which workers choose the right behaviour even when no one is watching can lead to a successful safetyculturetransformation.Toencouragethiscollectivebehavior,thisarticlewill cover 5 ways on how safety can be achieved in the oil and gas industry. Safety HazardsandRisksinOilandGasIndustryPersonalprotectiveequipment,hazardous energy. According to the Occupational Safety and Health Administration (OSHA) Falls Workers often must work from elevated platforms or equipment. This posesariskofslips,trips,andfallsthatcouldcauseseriousbodilyharm.Accessing these places via a ladder, would thus require more precautions to safely guide workers. Vigilance and proper safety training are essential.

2. Confined Spaces Workers often must work within confined spaces, where there is a higher risk of health hazards such as asphyxiation or exposure to toxic chemicals. The ignition of flammable vapors or gases is also a possibility, in the event of small or narrow areas which would position workers directlyinthe danger zone. Machine Hazards Oil and gas extraction involves working with or around dangerous machinery. Workers could get struck by or caught between unguarded Explosions&FiresTheignitionofflammablegasesorvaporscanalsoresult in explosions or fires, which can wreak damage on a large scale in such a Physical Strain Oil and gas extraction is a physically demanding job that, even withthesurplusofmachines,oftenrequiresmanuallabor.Certaintasks,suchasthe lifting of heavy loads or equipment, can continuously exert a strain on workers' bodies over time. Poor workplace ergonomics negatively affects safety in this area and can increase the risk of injury.



5.1 TIPSTOPREVENT ANDREDUCEHAZARDSIN OIL ANDGAS INDUSTRY

While safety risks cannot be completely eliminated, they can be significantly reduced through awareness of potential hazards and how they can be avoided. Use these 5 safety tips to help improve worksite safety.

1.ESTABLISH GOODSAFETYCULTURE

Oil and gas automation and digitalization .While there are manual steps that can ensure overall safety, such as Encourage an environment of open communication and respect. Embrace a personal approach to safety training and dedicate time to allow workers to get to know each other. Building more substantial personal connections with fellow workers will inherently build trust and camaraderie. Implement a 5S system Improve the workflow

and reduce waste with a 5S system. Apply strategic labeling techniques to direct, warn and communicate informationto workers. Color-codematerialsinthe workplacetomakethem easier and quicker to find, including specific tools .

Basically, there are two types of safety engineering: Process Safety and Occupational Safety. Process Safety focuses on preventing fire, explosions, and accidental chemical release in process facilities. Occupational Safety & Health focuses on personal safety. Safety at Oil & Gas plants

CHAPTER–6

Process Safety in oil and gas

Since inception, Process Safety begins with an idea & continues through various stages of development.

Process Safety Life Cycle:

Process Initiation > Equipment Specification& Build>DesignStage> Equipment Installation>ProcessOperation>Management&Maintenance>Decommissioning Identification of any hazardous situation followed by preventive measures is a pre- requisite for safe operation. It involves an in-depth knowledge of the materials in use, process operation, equipment specification & the facilities

Process Safety Management Includes:

Inherently Safe Design from concept to commissioning and normal are those were operation/ maintenance Designuser-friendly plants which can with stand human error sand equipment failure without tseriouseffect son safety, environment, productivity,andefficiencyProcessDesignAnalysisHazardAnalysisRiskAnalysis

Guidelines for estimating Losses 6.3ApproachtoRisk Assessment

Ensure Competence and adequacy of resources Work within the defined safe operatingsystem.TakecontrolofchangesthatcouldimpactprocesssafetyMaintain up to date documentation. Establish line management monitoring of safety system and procedure Conduct independent audits of management & technical parameters Analysisand investigation of

The threat of legal action for noncompliance Loss of valuable Assets Potential for serious injury or fatality in worst case scenario Loss of Production and income Unwelcoming media attention Damage to company's Reputation Potential for increased Insurance Premium Commitment to Process Safety Commitment is the first step in safeguarding that a culture of process safety is embedded within a business, and includes the following elements: Leadership/Management commitment; Accountability/roles and responsibilities; Process safety culture; Company standards, codes & regulations; and Workforce and stakeholder involvement.

PROCESSSAFETY

Process Safety has a better approach than the traditional approach to accident prevention. There is a practice of foreseeing hazards before incidents/accidents occur.Thereismoreemphasisonasystematicratherthanatrial-and-errorapproach to identifying hazards and estimating the probability of their occurrence and subsequent consequences. In Oil & Gas Industry, accidents tend to happen infrequently but when they happen, they lead to catastrophic results, rapid over pressure, rapid decomposition of thermally unstable substances or mixtures and runa way exothermic chemical processes, implemented to ensure satisfactory protection of personnel working with in oil & gas process industries. The main component of an effective EHS management system

example of the safety hazards in theoil andgasindustry.InoneOilandGasworksite,leaksandcoldventsprovided the fire source for the fire accident. Unfortunately, there are more hazards than workers at the Oil and Gas worksite. Embracing the API Rules to Live By gives a company a charter to implement robust oil and gas safety standards and guidelines to mitigate specific hazards. For instance, the Tag out/Log out procedure is a preventive measure to keep the process liquid thermal, chemical, and hydraulic sources locked and tagged to eliminate unexpected energy releases. API Rules to Live By strengthens safety by determining and eliminating potential hazards

Onshore safety and Offshore safety

Nationa for Occupational Safety&Health (NIOSH) has reviewed fatality data. It has concluded that about 70% of events were connected to critical safety hazards like bypassing safety controls, Line of Fire, Hot work, driving, energy isolation, and confined space. Therefore, onshore safety stresses the need for the 'Live Saving Actions' that help mitigate worker exposure through proper training, knowledge transfer, and awareness of critical safeguards. The fatal Piper Alpha oil platform explosion Is a reminder to enhance offshore safety measures. An Oil and Gas company enhances offshore safety by adhering to API's prevention-oriented

. Organizations take a cue from API's Oil Spill & Emergency Preparedness and Response program to adopt a proactive approach in strengthening first responder training and ensuring responders have enough information to handle oil and gas emergencies. For instance, you can benefit from issue-based training covering fire incident data or liquefied natural gas incidents to roll out effective responses in demanding situations.

OSHA Safe + Sound Week spreads occupational safety & health. If your organization is keen on upholding oil and gas safety, OSHA Safe + Sound Week helps adopt the proactive approach to identify hazards early on and eliminate injuries. Apart from its awareness, the program engages workers, highlights safety practices, and empowers organizations with workplace safety

CHAPTER-7

Transportation Safety,Pipelinesafety,Rail safety

A tanker truck is carrying oil crashes after striking a utility pole. Then it leads to fatal accidents and massive oil spills, causing further damage. Therefore, transportation.The gas transmission pipeline of the Tennessee Gas Pipeline exploding proved to be fatal in 1965. In 2020, US pipeline of the Tennessee Gas Pipelineexplodingprovedtobefatalin1965.In2020,USpipelineincidentstotaled upto578,leadingtoexplosions,firerelease,orlossoflife,asperStatista.Measures like Pipeline Safety Excellence are adopted to ensure safe pipeline operations and safety to enhance safety standards. The importance of safety in the oil and gas industryreflectshowrailsafetyhasbeenstrengthenedbysupplementingfirefighter training, first responder training, and a slew of safety procedures recommended by API.

Oil Spill&Emergency Preparedness and Response

Organizations take a cue from API's Oil Spill & Emergency Preparedness and Response program to adopt a proactive approach in strengthening first responder training and ensuring responders have enough information to handle oil and gas emergencies. For instance, you can benefit from issue-based training covering fire incident data or liquefied natural gas incidents to roll out effective responses in demanding situations.

Refinery&Plant Safety,Occupational Safety,ProcessSafety

LOPflarepilots,and in getting released into the environs, petroleum engineering health risks, and other hygiene hazards, increase the chances. To augment safety, organizations must embrace refining operational and safety standards developed by API to achieve process and occupational safety performance enhancements. Occupational

hazards rear their ugly heads in every industry. As per the Census of Fatal Occupational Injuries, nearly 489 oil and gas workers losttheirlivesbetween2013and2017.areas visited by employees can help restrict access to individuals to specific regions and augment safety standards in the process.

Fire protection standards

can adapt the eight fire protection standards cutting across operations to address safety hazards in the oil and gas industry. , organizations adopt API guidelines to bolster fire protection. For example, take Drilling & Well Servicing Operations that involve Hydrogen

CONSUMER SAFETY,PROTECTING PUBLIC HEALTH.

Furthermore, when normal operations give way to planned or unplanned turnarounds or shutdowns for maintenance, there are even greater risks of worker injuries. With more workers onsite for repairs and tight schedules to adhere to, and when every hour of downtime impactsthebottomline, creating Preventive measures to address safety hazards in the oilandga sindustry. Forinstance, consumerre fueling safety guidelines issuedby API advocate avoidance of ightmatchesandsmokewhilerefuelingorreleasingmetalladderswhileperforming

PROTECTING AGAINST FALLS FROM HEIGHTS

Totoxicgasesincreasessignificantlyduetopoor ventilation where gases can build up over time. Depending on the working environments,full- airpurifying respirators can beused to help prevent breathing in toxic gases and fumes. Furthermore, respiratory to alert workers when dangerous gases are present so that they can take steps to evacuate unsafe environments. By combining technologies, workers can benefit from timely detection and ultimately life protection, allowing them to return home safely after each shift

API occupational safety and health standards

When Deepwater Horizon Oil SpillortheTrans Canadarupture isputinperspective, thedireneedforstandardstothwartpipelinedisastersorotheroccupationalhazards risesinrelevance.With API Occupational Safety and Health Standards, safety gets afaceliftwithAPIRecommendedPractice54forembracingstandardstosetupsafe and healthy working conditions at the drilling and servicing operations. Regarding operational safety, oil and gas safety standards about API Recommended Practice 74 empower organizations to promote safe oil & gas production operations. From drilling and service operation stop public and personnel safety, API occupational and health standards equip organizations with API Recommended practices to enforce safety management and healthy working condition.

CHAPTER-8

Risk management programs

RISK MANAGEMENT must be tailored to a company's specific risks, and often those risks correlate to whatever industry that company is in oil & gas companies areparticularlychallenged,becausetheyareacriticalinfrastructuresectorwithlittle room for error and they operate in complex environments, which means plenty of risksthatdemandattention.Let'stakealookat what thoserisksare,andhowoil& personaldataofemployees,commitextortion,andthelike.Theenergyindustrymust develop cybersecurity risk management strategies to protect from cyber threats.

FINANCIAL RISKS

Oil and gas are commodity products, with pricing much more volatile than other markets. Natural resource pricing is heavily influenced by the underlying costs of collecting and refining them, in addition to the actual price of the raw materials.oil&gascompaniesthereforeneedtohedgetheirrisksbyinvestinginoptions,futures, puts, and other financial instruments to reduce the threat that price volatility could leave the business operating at a loss for long periods

SUPPLY AND DEMAND RISKS

Supply and demand shocks are a risk for oil and gas companies, especially since operations in the energy industry require a lot of capital and time to bring to full capacity. The use of technology and artificial intelligence (AI) tools enable companies to increase their business effectiveness.it's also challenging to manage

ENVIRONMENTAL RISK

Energy industry operations directly affect the environment, including greenhouse gas emissions, climate change, oil spills, and solid and hazardous waste.For this reason, oil companies are under heavy pressure to protect the natural environment as much as possible. Energy companies needto seek ways tominimize harm tothe environment, communities, and people generated by the processes that sustain our way of life. Safety Risks

WHAT RISKS DOOPERATIONAL TECHNOLOGIE SPOSE?

Theoilandgasindustryhasembracedadvancedoperationaltechnologies(OT)such asrobotics,digitization,andtheinternetofthings(IoT).Thetechnologiescanexist –company's operations; and carry their own class of risks to address. Industrial controllers, such as programmable logic controllers (PLC), distributed control systems (DCS), and supervisory control and data acquisition (SCADA) systems, comewithalonglifecycle:15to20years,comparedtothreeorfiveyearstypicalof other enterprise IT.This means oil & gas companies must be sure that new IT risks don't overwhelm long-lived industrial control systems. They need to assess how emergingrisksmightaffecttheircontrollers,andassurethatanynewthreatscanbe patched even with legacy software running the controller systems. Risks from the Internet of Things.More companies within the oil and gas industry rely on the internet of things (IoT) to gather data to monitor OT. These sensors, cameras, and embedded analyticssystems connectthe OTenvironment with the IT environment. For example, a natural gas company may need to monitor the

RISKSFROMEMPLOYEES

Whileallindustriessuffer fromemployeecyber

provideoversight.Enterprise IT networks that interact with OT networks, however, can lead to cyber risk. Most companies struggle with securing their data environments, and those in the oil and gas industry are no different. Anywhere the IT networks interact with the OT network can be a significant security issue.

Risks From Lack of Cyber security Staff

. For example, software, network architecture, and devices essential for company operations are usually the focus of enterprise risk mitigation.Additionally, the oil and gas industry adds a second layer of network infrastructure to assist OT monitoring.Asaresult,detectingallpointsofnetworkdangerbecomesincreasingly tricky.Inmanycases,theoilandgascompaniesneedtosegregatetheirOTnetworks and keep the IT infrastructure data from migrating tothe OT risk regions in a user- friendly,color-codeddashboard.

share the results with your C-suite and board of directors.companies in the energy industry struggle to maintain appropriate risk management programs. They need an effective workflow tool communication and task management among internal and external stakeholders

CHAPTER9

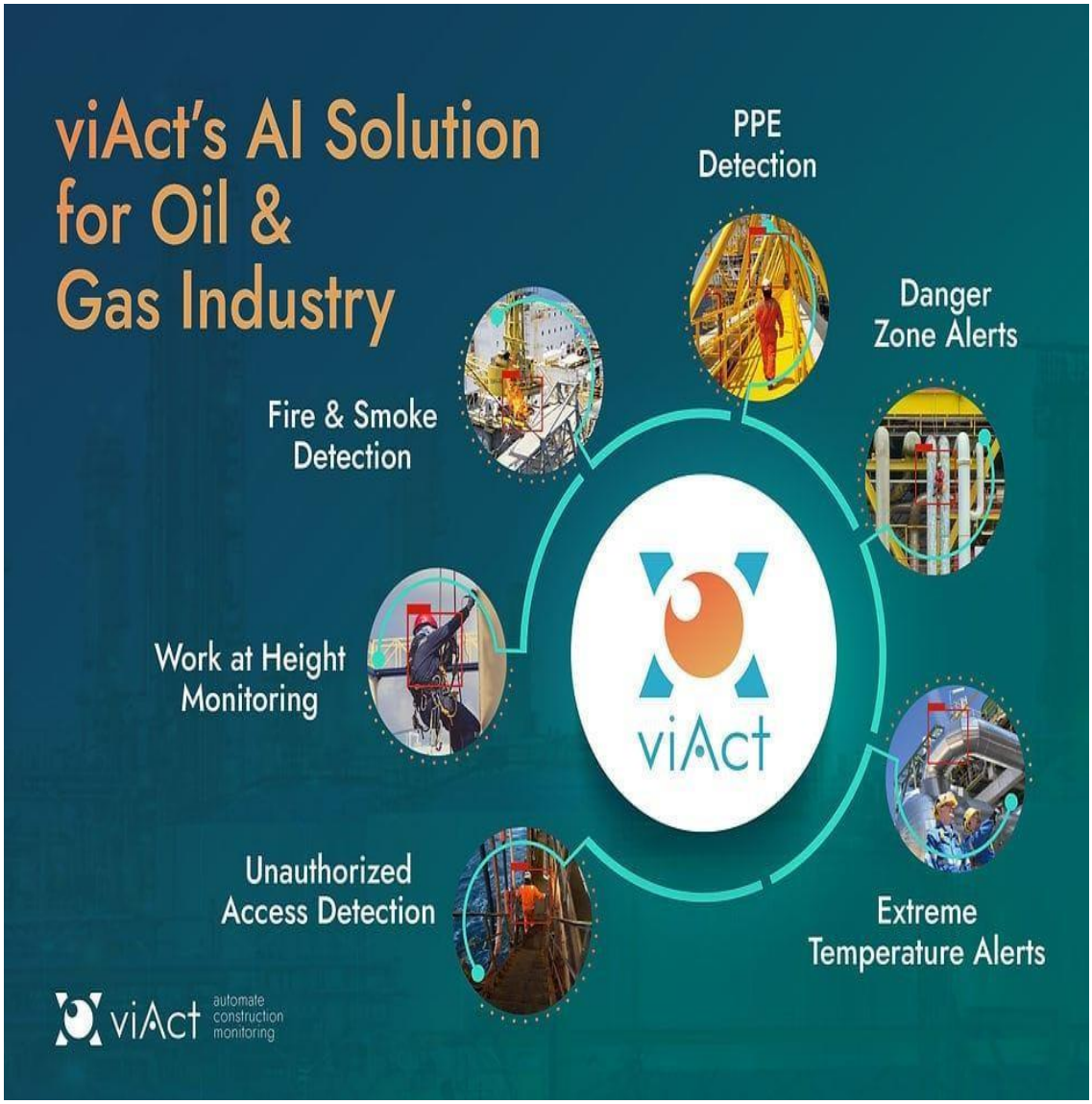
SAFETYADVANCEMENTOFOILANDGASINFUTURE

Figure.no: 5safetyadvancementofoilandgas industry

ADVANCEMENTOF OIL AND GAS INDUSTRY SAFER PLACE TO WORK

Advanced technologies like AI and its subsidiaries have been emerging these days with great number of potentialities to cater to the various problems faced by the mankind

TheOil&Gas industry time, one of the most dangerous industries can benefit the most from AI and its subsidiaries like Video Analytics The oil & gas jobsites involve a complex network of pipelines. Improper threading in pipelines or any defect like leakage can develop serious risks to the men & materials in the jobsites coupled with losses to the factory and budget resources. Therefore, it is crucial to detect even minutest of error. However, it is not feasible ThisiswhereAIanditssubsidiariescancomein.WithAIfordefectdetection,even minor de fectscanbeeasilydetectedandtimelyactioncanbetakentopreventlosses and avoid accidents. In addition to this, oil & gas plants offer extremely critical working environments. The workers inthisindustry are highly therisk of injury as they have toworkunderdifferenttemperatures,workinconfinedspaces,getexposedtotoxic gases,andsoon.Notadheringtopropersafetyprotocolscanresultingravefatalities. But manual safety monitoring of such large number of workers round-the-clock is cumbersome, ineffective and erroneous. However, AI- powered video surveillance system (VSS) canseamlesslymonitor theworksites tomake surethat proper safety



CHAPTER-10

CONCLUSION

communication software equips users with a quick and efficient means of communicating and offers a time-effective alternative to passive mediums such as emails or in-person meetings. Similar to other collaboration software, these systems are increasingly necessary for teams to work together and deliver ACCIDENT on time.

REFERENCE

1 Ontario Ministry of Labour. (2013,October02). Work Place Hazards: FAQs. Retrieved June 30, 2014, from Ontario Ministry http://www.labour.gov.on.ca/english/hs/faqs/hazards.php

2 Rains, B. (2012). Increasing the Agility of Process Safety Management Systems. Abu Dhabi International Petroleum Exhibition & Conference (p. 8). Society of Petroleum Engineers

3 .Chauhan, N. (2013). Safety and Health Management System in Oil and Gas Industry

4.Leveson, N. G. (2011). Risk Management in the Oil and Gas Industry. Testimony: Senate Committe on Energy and Natural Resources, Massachusetts Institute of Technology (MIT), Aeronatics and Astronautics Department

5.Litvak, A. (2013, November 30). Oil and gas fatalities spike with boom. Retrieved June 29, 2014, from Pittsburgh Post- Gazette: http://www.post- gazette.com/business/2013/12/01/Oil-and-gas-fatalities-spike-with-boom

6.Bigliani,R.(2013,May).ReducingRiskinOilandGasOperations.Retrieved September 13, 2014

7.Watson, J. L. (1993). Effective Safety Management Systems. 68th Annual Technical Conference and Exhibition of theSociety of Petroleum Engineers (p.87). Houston, Texas: Society of Petroleum Engineers.