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NPTEL ONLINE CERTIFICATION COURSE

Health, Safety & Environmental Management in Offshore and Petroleum engineering (HSE)

Module 3:
Environmental issues and Management
Lecture 7 – Loss prevention: Methods and Practices

Friends welcome to the seventh lecture where we will talk about loss prevention few methods and good practices how to aim a class prevention as applicable to oil and gas industries this lecture is a part of third module which is focusing on environmental issues and management we are now discussing the third module courses on health safety involved management and the infidel IIT Madras. After understanding detail dispersion methods and techniques.

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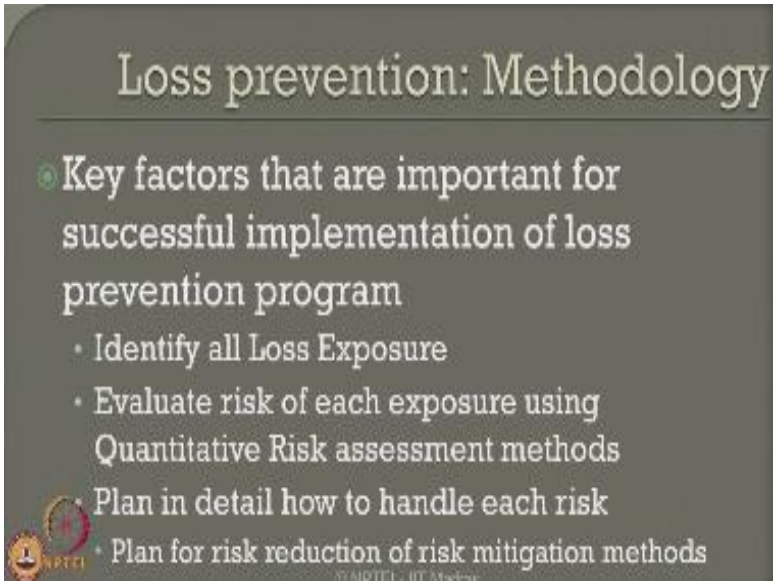

What we discussed in few lectures ahead we now talk about what different methodologies which is generally adapted for loss prevention this lecture is an extract what we understand from Mr. Jisuthi Patel who is global ambassador of American Society of safety engineers we thank you

sincerely for his knowledge base dispersion of this particular technique on loss prevention thank you sir further interesting and good leg lengths on loss prevention methodologies.

Let us quickly see what are those methods which can be creating a healthy practice in oil gas industries if you ask me an important question what would be the key factor that are most important for successful implementation of loss Prevention Program all of us do agree that loss prevention is very vital for good success of any business industry especially in oil gas industries, once you identify all the last exposure which are rising from the process industry.

One should be able to evaluate risk of each exposure using QRA methods which has been discussed in previous modules one should be able to plan in detail how to handle each risk that arise from this process industries, so when we talk about planning should not only focus on the risk reduction techniques but also should address risk mitigation methods if any arising from these kind of process industries.

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One important question which comes in mind is if I am focusing on loss prevention one should be able to know or one is came to know what are the different sources of process which comes in

oil gas industry there are many sources which contribute significantly to the loss and therefore practice loss prevention we must focus on these forces individually they can arise from personal they can arise from equipment failure one can also result from material inventory one can also of course cause from the environmental issues which are related to the production systems in oil gas industries.

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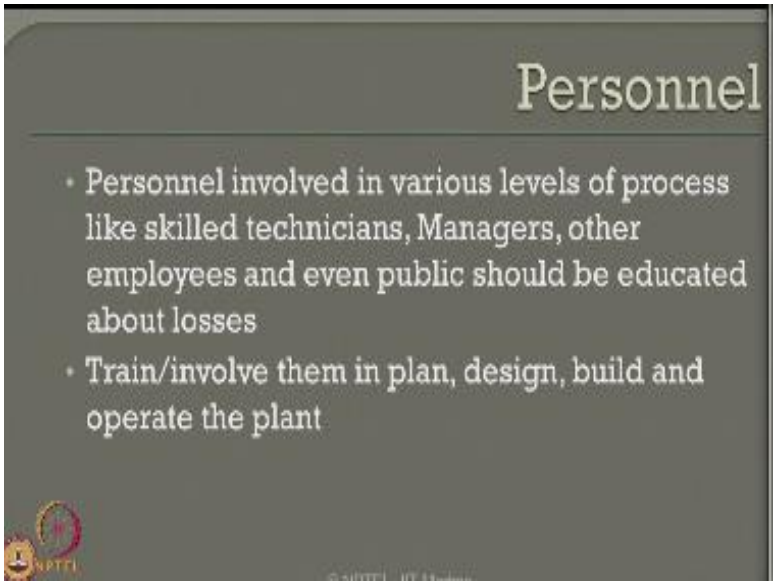

Let us quickly see each one of them in detail now when I talk about personal safety or valuation of personal safety culture which can lead to losses let us see what are those causes which can result in significant loss in production industry like oil and gas industry only related to personal safety personnel involved in various levels of process like skilled technicians managers other employees and even public should be thoroughly educated about various types of losses which can arise from oil and gas industries.

One should get programs which can train them in detail about these loss prevention methods while training or talking out the training program it is important that we must involve them in every stage of such training programs for example in planning designing stage building stage and during the operation of the plant it is very important friends that contribution from various levels

of people including the public is very vital for good successful implementation of loss prevention program.

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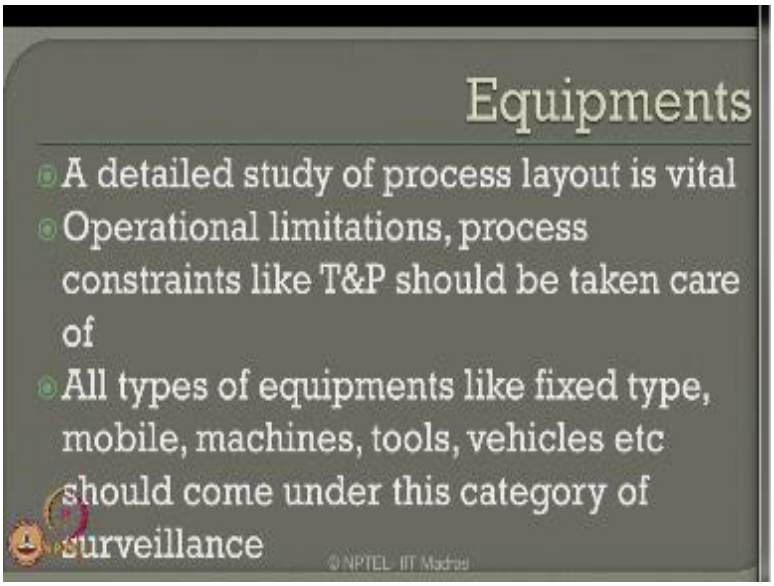

When we have talked about reasons or causes for loss which arise from equipments your detailed study of process layout to understand the different categories of equipments and the loss that could arise from each failure of equipment is very vital for any process industry operation limitations process constraints like 100 volt temperature and pressure the equipment can successfully in efficiently work should all be taken care of when we start planning loss prevention that arise clearly from equipment source.

All type of equipments should be included in such studies which can contain or include the list of fixed type equipment mobile equipments like crane etcetera simple missionaries tools and plants mobile vehicles all should come into this category therefore losses that could arise from in efficient working or miss handling or miss proper planning and schedule of maintenance of this equipments should be considered is a global issue for loss prevention that clearly arise from making puns point of view.

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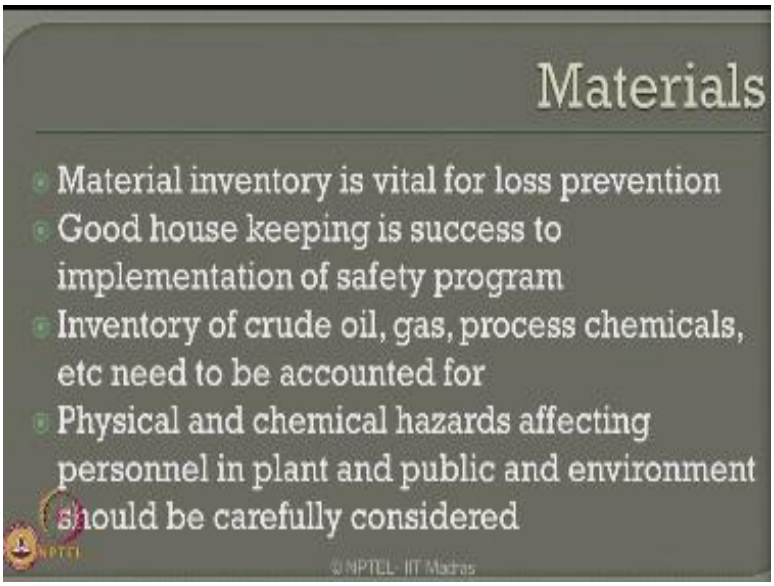

The third aspect of course is the material inventory we all understand when gas industries do have accidents because of large stock of inventory which are hazards as in nature, so material inventory becomes a very vital source for loss prevention to make the program more efficient, good housekeeping of course we saw in the last lectures is a vital key to successful implementation of any safety program.

Inventory of crude oil gas process chemicals hazardous chemicals etc need to be accounted for very critically if one is interested to a net loss prevention that arise only from material handling alone physical and chemical hazards affecting personal in the plant and public and the environment should be carefully considered in the enlisted when we talk about the stock of material inventory which are hazardous which can result in serious losses which can cause from oil and gas industries not only to the personnel to the plant and also to the public and challenging the safety of the society.

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The force source of course is environment we must focus on the problems arising from the weather conditions which are critical one should also take care of the operation and temperature and pressure under which the ambient atmospheric pressure etcetera under which the process takes place one is also interested to know the windows diagram the direction velocity of course the rainfall and humidity conditions of the operation season of the plant one should also take care of the terrain and other obstructions which are surrounding lee present in the process plant.

One should also take care of the stock of plant surrounding the industry because it is very important safety is not only to the plant or the equipment it is also to the public safety on environmental safety as for as oil gad industries are concerned, so one is important to know what is the type of population the nature and the age group surrounding the plant living in that community because environmental protection becomes a foremost aim of any loss prevention program.

Therefore one should address social-economic conditions of the people living in the plant near by the plant and of course the environmental conditions which are very important which can result in a good loss prevention program one should also focus on enough on lighting in vegetation etcetera which is surrounding the area of location of the plant especially when the process industries are located on show for oil production or processing.

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Interesting question comes from what are those causes for the loss why losses should occur loss essentially arise from injury to human it can result from human sufferings which can also be a result of economic and aspects which arise from these classes one is very seriously disturbed if the loss results in property damage which can be even minor to get of a major, loss of course can also arise from incidents undesired events can result in economic and societal loss it can be human injury of damage to property of production upset which can all result in total loss to the avert to the plant or to the society or to economic constraint of the country.

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No one can focus on what would be those unsafe conditions of that place which can also become important potential causes for creating significant loss in oil and gas industries one can look at substandard conditions which are present in work place.

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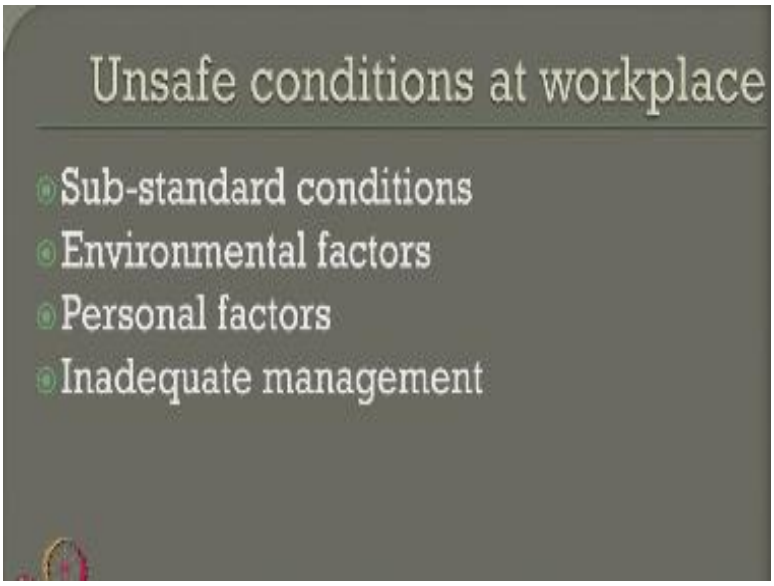

One you look at the environmental factors that contribute for loss occurring in the plant of course personal factors are very important in that case in adequate management is also important therefore one should be able to focus on efficient management programs to make it effective at the workplace.

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One should also focus on what would be though substandard conditions which can result in causes for making loss in a given plant.

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Operating equipments without proper training and supervision of vital reason why we are talking about substandard conditions failure to adhere to warnings is also an important aim or objective area where one can focus on loss prevention failure to security instructions making safety devices in the operable is also one of the serious reason why these substandard conditions are becoming title causes for creating economic loss in working industry like oil and gas industries.

Removing are bypassing safety devices which is common in few plants in process industries is also been seen as one of the vital reason why they can be also resulting in significant loss in oil gas industries of course using defective equipments for the want of replacement of new equipments is also very important reason which can cause a serious loss to the industry loading equipment beyond capacity is of course one over seen factor which is a general practice in most of the process industries.

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One can also say improper positioning of task one can see non servicing of equipments has important reason for a potential cause of losses skipping schedule of periodic maintenance use of drug at workplace are also important reasons why they can also be potential causes for creating economic loss as work industry, of course very important factor which we all agree is over working hours given to the personal because of production target achievements.

Improper lighting and ventilation of course economic conditions and environmental condition serving the area is also an important reason to which can result in a potential cause for resulting good loss economic as well as societal arising from the oil and gas industries.

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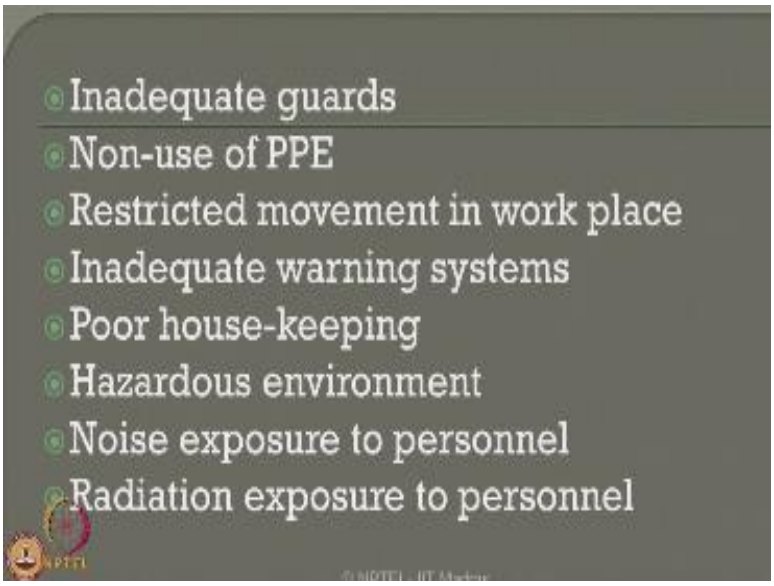

Inadequate guards non-use of personal protection equipments restricted moment in work place what we talk about industrial hygiene in adequate warning systems which are not available in the design itself or improper working poor housekeeping hazardous environment present in the situation noise exposure to personnel will all become serious psychological reasons why they can result in economic loss which arise from oil and gas production units.

The most important aspect in the present scenario is a radiation exposure to personnel which causes a few will serious effects on overall target of loss prevention programs.

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Let us quickly see what are the environmental factors which can also result or become important causes for creating loss in oil gas industries inadequate design standards inadequate purchasing standards inadequate maintenance standards inadequate work standards normal wear and tear use of abnormal methods of process can all add to the weather conditions.

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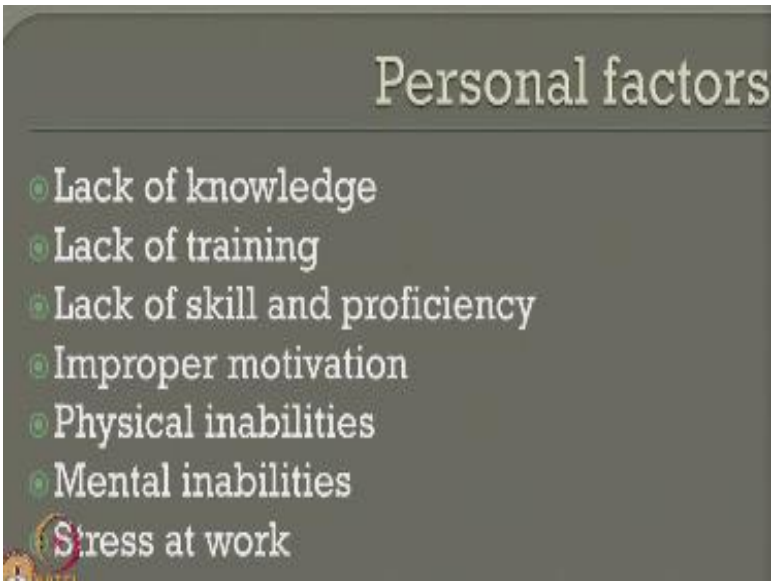

Let us quickly see what are those personal factors that can affect or which can cause significant implementation of successful loss prevention program lack of knowledge of any specific situation of course lack of training is a very important item which is responsible as a personal factor for causing loss in an oil gas industry lack of skill and proficiency improper motivation to the personal people working in the plant physical inabilities mental in abilities put together become important personal factors which can cause serious losses for the plant.

Of course most importantly the fatigue or the stress at work to the personal is a very important vital characteristic which can cause a serious loss to the production units.

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So look at the causes for losses inadequate loss prevention program is one of the vital reason if the program does not address good principles and practices of loss prevention this can itself do a collapse model of loss prevention program. Inadequate program standards we do not follow any standard procedure in implementing loss prevention programs standards define are not in complete but at the same time they are not completed as well.

Inadequate compliance which standards is very important because a lack of capacity building motivation and enforcement becomes a very serious problem we'll talk about inadequate loss prevention program as a vital failure for implementation of such programs in process industries like oil gas industry.

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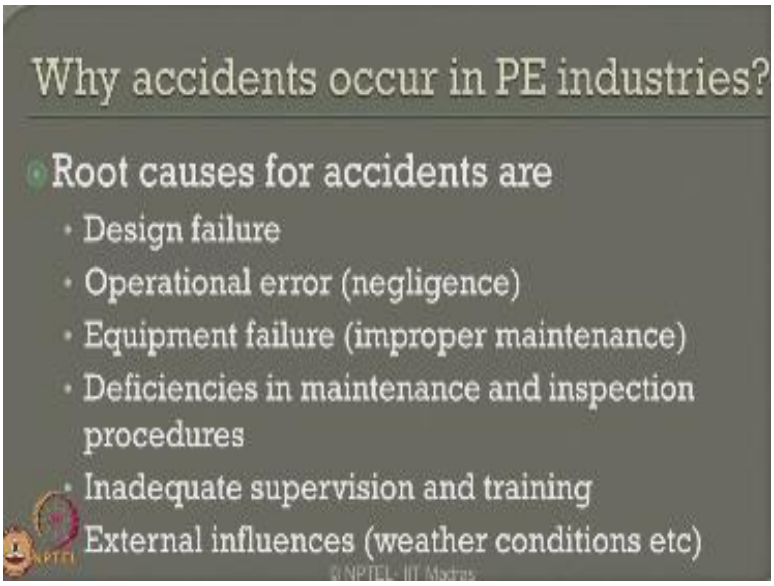

Now interesting question occurs in mind in professional executives is why accents do occur in petrol engineering industries very important there are many reasons let us see only a root causes which are erasing which are resulting in accidents one can be a very important reason like a design failure can also be caused because of operation error what we put as negligence in the whole extent identification scenario one can also see that equipment failure which arise from improper maintenance also become potential reason for accidents in petroleum engineering industries.

Deficiencies in maintenance program and inspection procedures also fall prey to cause of accidents in petroleum industries of course inadequate supervision and training and external influences like weather conditions do also result in leading to potential accidents in petroleum industries.

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We look at each company individually what would be that role of a design failure in the overall accident lead in a given problem essentially the design failure comes from non complaints of codes and standards if we are not able to complete the design with international regulations of codes and international standards obviously the product what you design or the layout what we produced for the process industry will be incompetent in safety regulations.

There could be additional reasons like improper choice of material for manufacturing temperature and pressure accidence not adequately forcing the design stage itself there can be lack of emergency shutdown mechanism in the whole design process itself or there can be lack of isolation layout in the design which not properly planed in the original preliminary stage of design itself.

They all can lead to what we call a symbol set of failure called design failure which can result potential accidents which can affect an effective loss prevention program in general.

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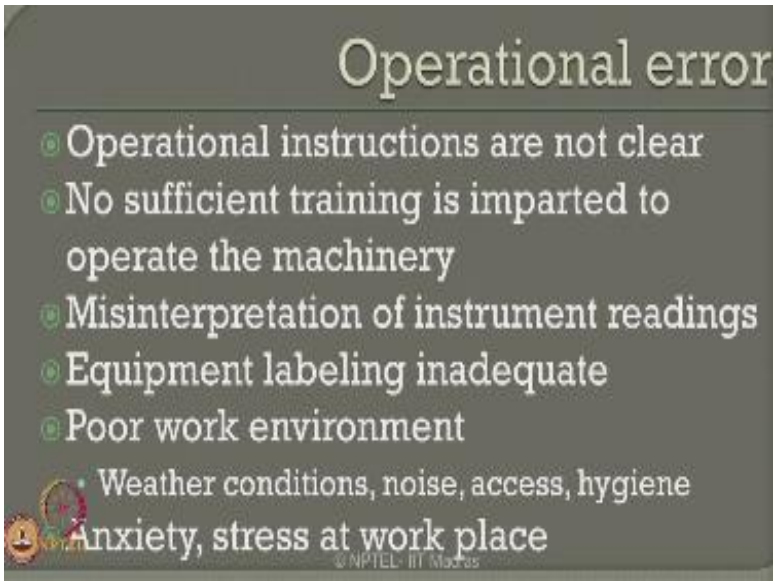

There are reasons why operation errors can also cause accidents operation instructions given to operate the equipment are not very clear they are ambiguous no sufficient training is imparted to the personal to operate the machinery with high degree of safety this interpretation of instrument readings is one of the important reason why operational errors which are otherwise called negligible errors can also result to serious potential accidents in petroleum industries.

Equipment labeling becomes in adequate in certain areas poor work environment like for example weather conditions noise level accessibility for maintenance and repair hygiene conditions also play very significant role, which come under one single Sipco on operation errors which can lead to accidents in petroleum industries, of course most importantly as I said in the beginning anxiety stress that work place is a very important factor which contribute to an operational error significantly that can result in accident in petroleum industries.

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The third subset which comes from equipment failure may arise from defective manufacturing engineering faults not identify why equipment manufacturing stage itself failure mode effect analysis or failure mode affect criticality analysis are not complied with the proper results and recommendations made by these analysis, dry run not completed and inspection reports not implemented in the equipment manufacturing stage itself.

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The fourth subset can be arising from with me maintenance deficiencies corrosion rate not interpreted in treated properly in the design and analysis preventive maintenance culture is totally absent in industry you only go for corrective measure not preventive measure, periodic inspection therefore is not carried out or even it will credited not documented properly which does not result in effective periodic corrective maintenance in a given system.

Hazop reports and Hazid reports are not circulated and not deliberated within the department for improving the functionality of the program or the department itself friends as we all know hazop report id one of the important source which identifies a potential hazards present in a given plant in a mark situation which can also be an important tool to correct the errors during operation stage of the plant itself.

These reports recommendations should be deliberated within the safety team of the given problem or the project therefore successful implementation of the recommendations made by this studies are very important which can avoid maintenance deficiencies as a periodic inspection given to the equipments in the plant.

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The most important subset in terms of inefficient implementation of loss prevention program can also arise from inadequate personal training facilitating is a very important culture which should be promoted in oil, oil gas industries there is no periodic workshops and capacity building conducted by the industry no update on new operational standards are given and told to the people or personnel who are working on the plant lack of training during emergency shutdown is a very important aspect which causes serious accidents in petroleum industries because people are not tree during emergency shut down operations.

Lack of mock safety deal is a very vital aspect which is focused on inadequate training aspect in loss prevention programs lack of hold safety meetings is of course an important reason why people result in serious accidents in petroleum industries lack of clear written instructions lack of incentives and encouragement given to people for good safety practices is also a very important culture which promote safety working environment in the plant which is friends unfortunately absent in more and more or in oil gas industries.

Most importantly as where are agree near miss events are important tool and source of information which can prevent accidents by and large to a very great extent.
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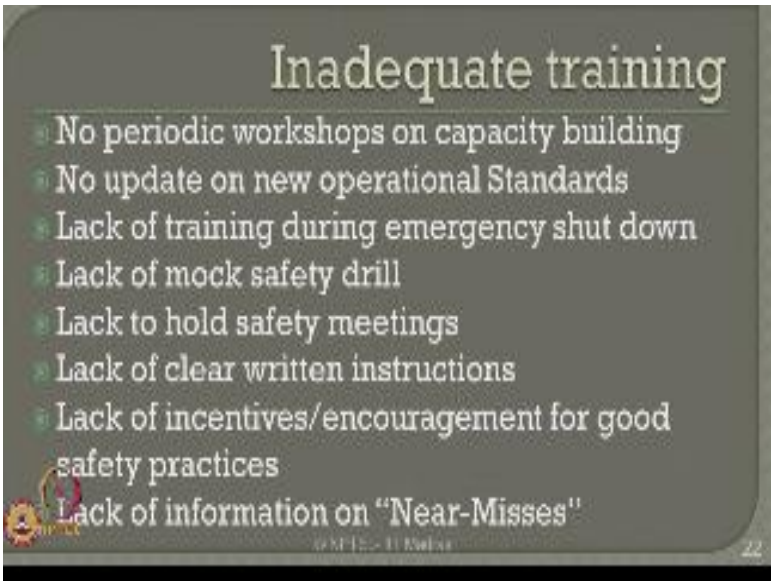

Lack of information about these recognizes or near miss events are very important part which is forming an inadequate training in the implementation of loss prevention programs. If you ask me a fundamental question what will be those causes which can result.

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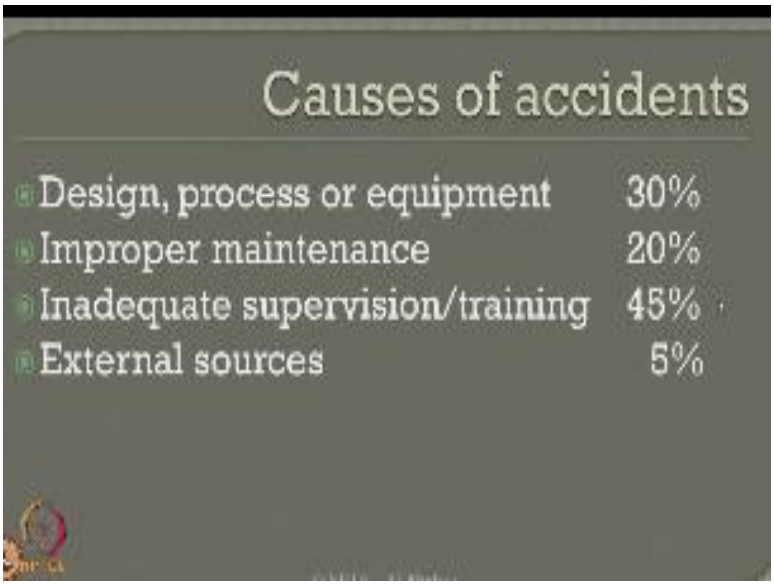

Accidents as a summary we can see design failure process failure or equipment choice wrong selection can amount to about 30% of accidents improper maintenance can result in about 20% percent inadequate supervision and training to personal can contribute about close 45% and of course please understand friends the external sources which are raised from unforeseen events or close to only five percent on the other hand we looked at the summary of the table of statistics about 95% is only within the hands of the safety executive or a plant right from the design stage to the other training stage.

If they are properly implemented and training programs are conducted periodically to have an effective capacity building friends we can easily avoid close to 90% of accidents costs in the oil and gas industries are in the process industries in general.

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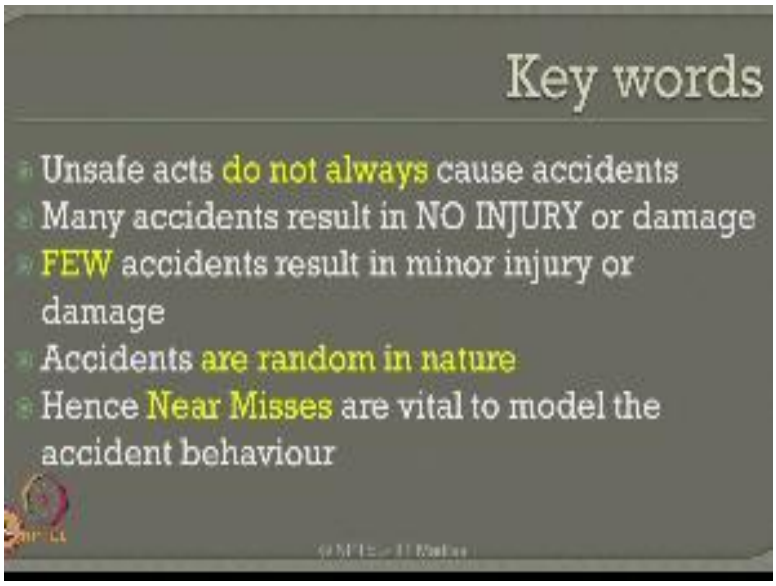

Not most importantly let us see what are the keywords which can lead to successful implementation of loss prevention programs please understand unsafe activities do not always cause accidents. many accidents result in no injury damage scenario a few accident result in minor injury or damage in petroleum industries accident of course are very random in nature therefore to model them and understand the consequences very clearly one should focus on near miss events which are becoming very vital to model the accident behavior of any process industry, this is very valid statement for oil and gas industries as well.

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Now let us talk about loss prevention in a micro a level and we focus on good principles and practices which can be adopted for loss prevention ,the most important aspect in loss prevention program is please adhere to standard operating instructions. one should aim to develop good job procedures that lead to loss prevention where engineering instrument controls are not possible by default, sit and develop good safe working practices for the good avoidance of accidents develop safety rules for common exposure which is very important implement rules by education and also enforce them strictly.

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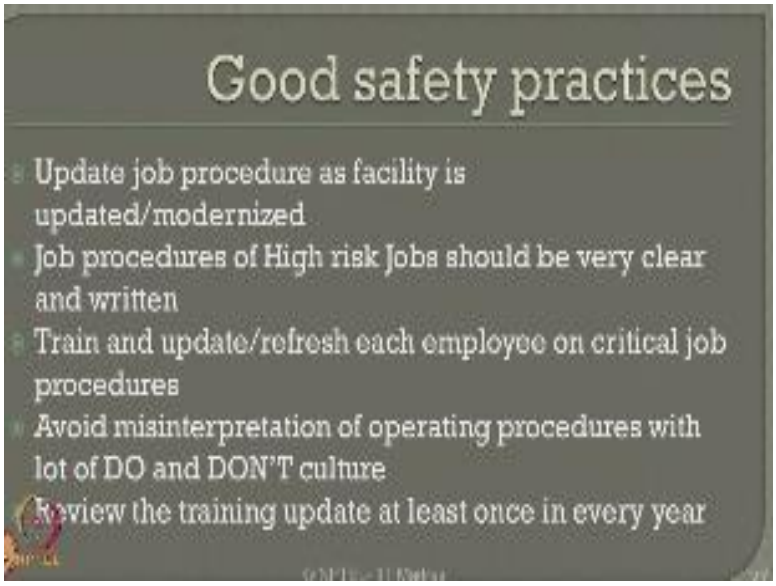

The second aspect could be what would be this good safety practices which can be inculcated in petroleum industries please update the job procedure as facilities updated and modernized it is very important when you keep on modernizing a given facility you must also have an education program or attaining program which updates the job procedure to be carried out through that modernized facility job procedures of high-risk job should be very clear and written documentation.

Should be available on this train and update or conduct refresher programs for each employee at least on critical job procedures which is very mandatory to implement good safety practices. avoid misinterpretation of operating procedures with lot of do's and don'ts culture in the given plant review the training update at least once in every year to update good safety practices in a given industry

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Frame good safety rules how to do it encourage participation from every level from CEO to the worker keep rules to a minimum and simple, kindly frame were in such a manner that they should be enforceable avoid unnecessary rules to strengthen the existing safety rules that is that not work because we already said in the first module rules-based Gene and goals base the gene are different implementation and consequences on safety implementation programs in general in every process industry.

Update this safety rules in accordance with the near misses reported in the plot promote good industrial hygiene culture in the given working environment.

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He encouraged people to use personal protection devices or equipment's personal protection becomes a very important aspect now one is important or interesting to know what would be their personal protection for which a management could be responsible major areas are PPE special equipment or the following I en phase hearing head respiratory organs hand an arm body and leg foot fall drowning electric shocks and radiation these are some of the areas where personal protection becomes responsibility of the management involved in oil and gas industries.

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Now the question comes to implement successfully a loss prevention programs we are agree we must conduct lot of inspections. now let us see a list of inspection which are very important which needs to be conducted to implement successfully a loss prevention program planned and schedule inspections which are periodic in nature should be conducted regularly other list of inspection can be supervises general inspection which is done as a routine during a every duty, the third can be superintendents quality inspection which is very important report in terms of inspection the fourth could be an executive fire safety tours conducted periodically which can also be a form of inspection the next could be critical items inspection.

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One can also have what is called pre use equipment inspection one can also look at employ reporting about substandard conditions as also a part of inspection, inspection report and complaints of this report a very important document which becomes an important aspect of effective safety implementation program one can also conduct planned job observations periodically which is also a part of periodic inspection spot job observations are very effective to correct errors which can arise from special kind of critical jobs.

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Therefore for the effective implementation of loss prevention program what one should do, train the employees at all level in inspection methods and techniques list areas of operation critical items with high risk of loss material handling and equipment etc. set instruction responsibilities and schedules in order develop a system of reviewing the reports which are generated from these set of inspections conducted by people at different level, set up a thorough remedial action and follow the program very seriously and of course analyze our inspection findings a near miss events to make the failure program very successfully implemented or loss prevention achievement in terms of its higher efficiency.

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One can ask me the question what are those varies inspections carried out in terms of its type of inspection there are various types of inspection available one is what is called informal inspection we generally done every day by everyone present in the plant, the something call critical item inspection which are carried out by specialists these inspections are specific on items those are liable to cause accidents they are generally focused on parts likely to fail or predicted to be become substandard because of wear and tear of the equipment working.

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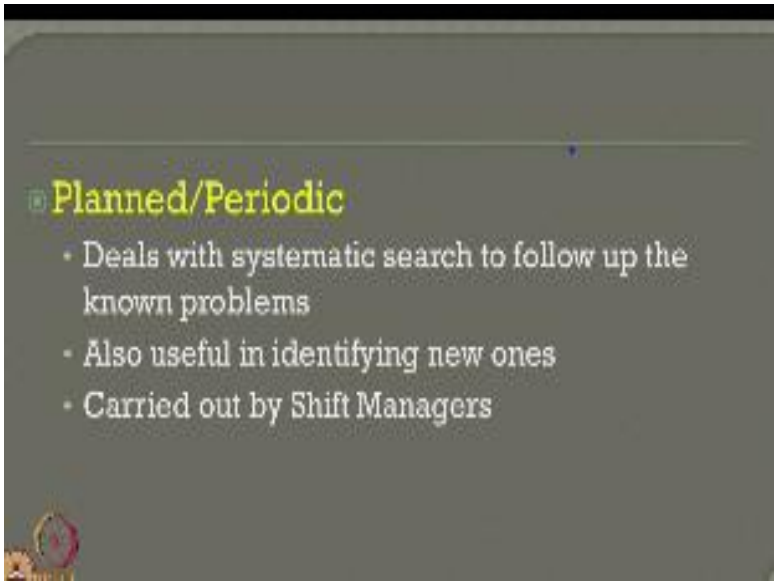

One can also conduct planned and periodic inspection which is carried out generally by the shift managers they deal with systematic search to follow the known problems its very useful in identifying the new ones in a given process industry.

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Now inspections have both benefits of the order and signs of the disorder inspections do eliminate accidents and fire causes it prevents based energy it maintains good use of precious space it keeps supply inventory at the minimum it controls the property damage to the maximum it recreates about appearance involvement of working for the people it encourages better work culture it impresses the customer when they inspect the plant are during the quality inspection studies it reflects the run organization.

It minimizes janitorial work it makes job easier and of course very pleasant to working, we look at if you look at the science of disorder which results from inspection clutter and poorly arranged the areas will all get arranged that properly when you have periodic inspections untidy finding of material can be avoided filed on material damaging other material can be completely avoided items no longer needed can be removed blocked I always can be paid off by periodic inspection material stuff in corners and out-of-the-way places can be corrected and put in proper place material gathering gets rusted and dead from the disease can be avoided completely the excessive quantities of items in terms of inventory can be removed from the work spot
overcrowding because of storage areas and shells can be reorganized properly old flowing bins and containers can be revisited broken continues in material improper alignment can be corrected as a result of good inspection.

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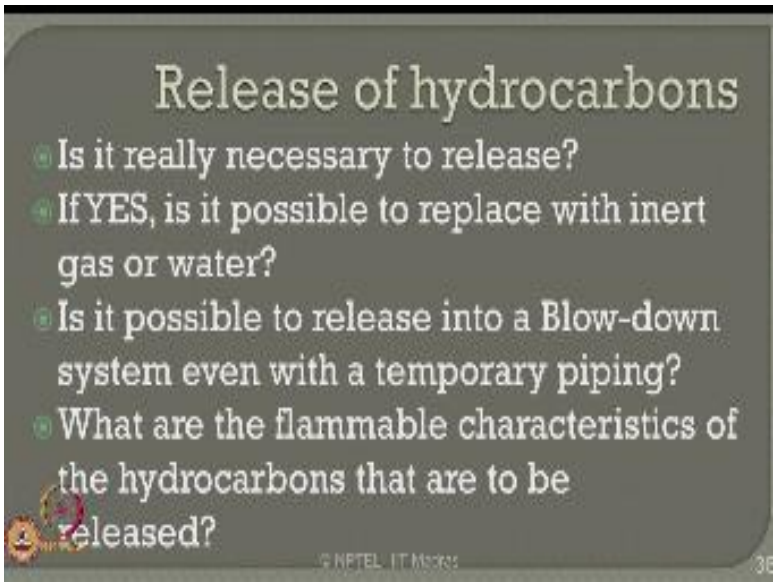

Process safety inspection becomes also important in terms of good work culture if you look at the release of hydrocarbons the questions asked in terms of process safety related to hydrocarbons or the following is it really necessary to release in hydrocarbon in the environment if the answer is yes is it possible to replace with inert gas of water is it possible to release the hydrocarbon into a blow down system even if you have got to spin on a temporary typing no harm on that whatever flammable characteristics of the hydrocarbon that are to be released should be known in advance.

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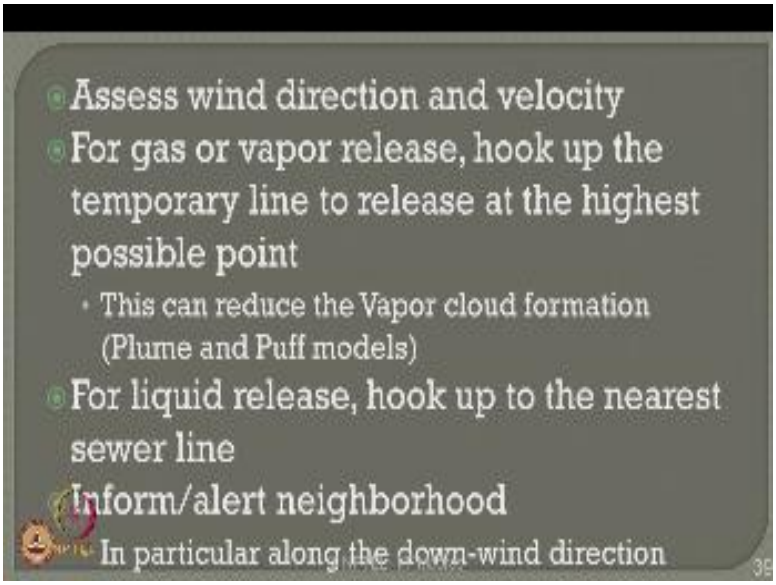

One must assess the wind direction and velocity at the specific place where at the carbon is proposed tube released for gas or vapor release hook of the temporary line to release at the highest possible point because we saw in the previous lectures how the plane plus models can be used to reduce vapor coke formation from the modeling part for liquid release hook up the point to the nearest fewer line so that the safe disposal of either carbon is ensured please inform or alert the neighborhood in such a manner especially the neighborhood located in the downwind direction regarding the hazard as nature of the release hydrocarbons.

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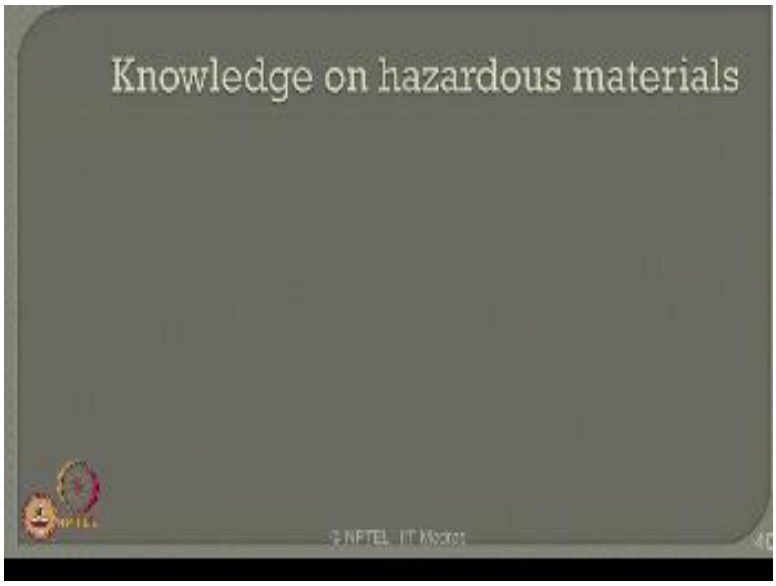

Now ladies and gentlemen is very important that one should have a thorough knowledge on different hazardous material which are generally released in the process industries like especially oil gas industries.

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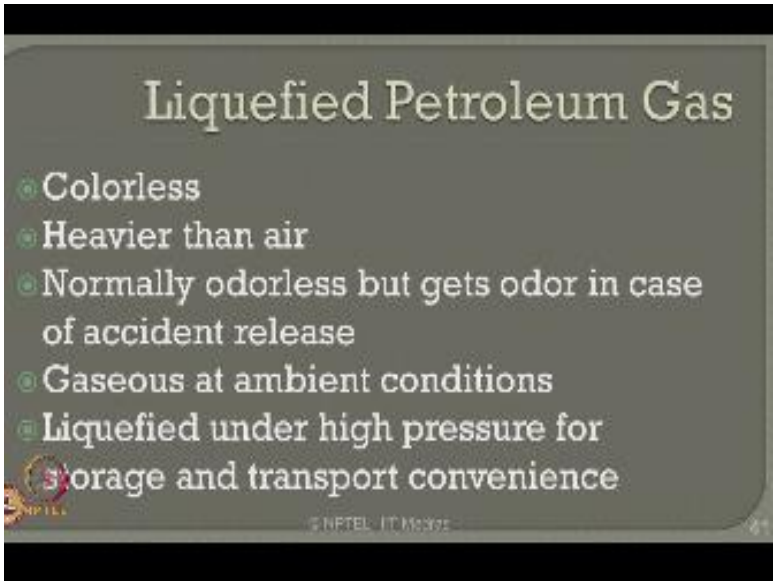

As a first case we talked about liquid petroleum gas which is LPG when I important characteristics of LPG which we all know but still as a summary let us present it here generally it is colorless it is heavier than air normally order less that gets water in the case of accident release it is generally gaseous at ambient conditions is liquefied under high pressure for storage and transport conveniences LPG.

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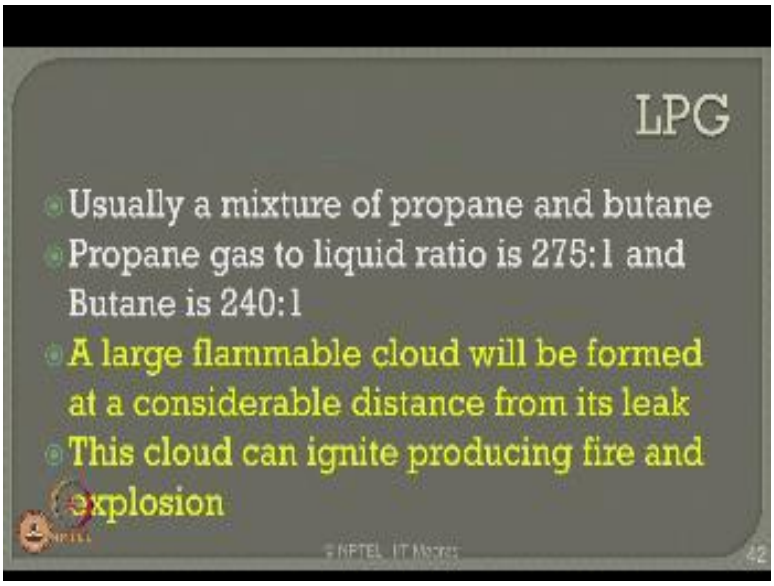

LPG specific properties usually a mixture of propane and butane is what you have in LPG propane gas to liquid ratio is about 275:1 and that I've butane is 240:1 it means these two content of LPG can expand volume Lesley over 300 times as the tougher ratio in terms of liquid. A large flame will call therefore can get form at the very considerable distance from its the source of leak which can result in what we call vapor cloud expression so this cloud can ignite using in fire and expression if the resource of ignition present under a VCE combination.

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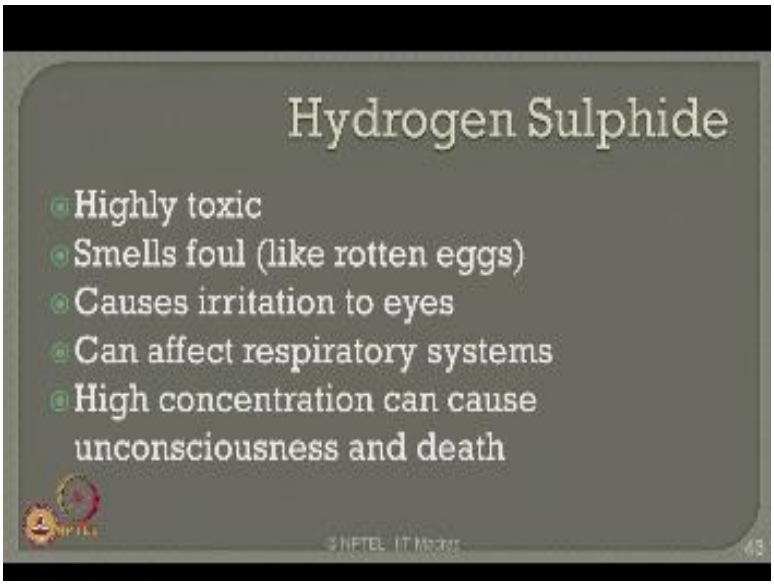

The next hazardous chemical which generally released is hydrogen sulfide it is highly toxic in nature it smells very fall-like a rotten egg it causes irritation twice it can affect respiratory systems of human being if is it a high concentration can cause unconsciousness and death to people on board.

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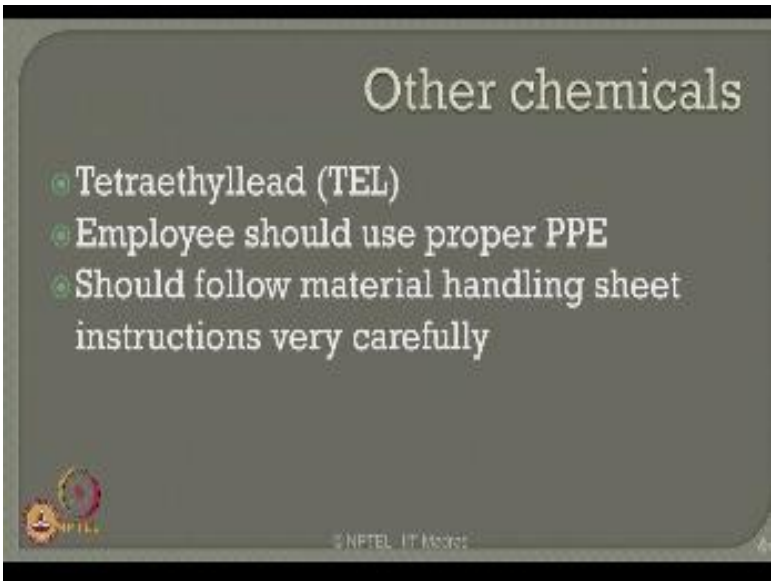

Other chemicals like acid or for example tetra ethyl lead which is abbreviated as TEL employee should of course use proper personal protection equipment's to discharge such chemicals one should follow material handling sheet carefully instructions given the sheet for safety disposal of such chemicals.

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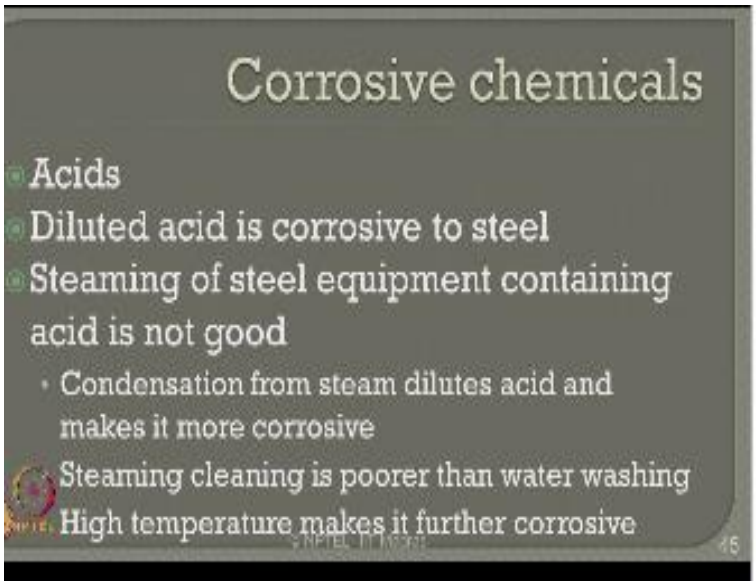

There are corrosive chemicals which also disposed off assets a very important diluted acid is corrosive to steel too clean any equipment which is filled up with acid people generally use steaming procedure steaming of ceiling equipment containing as it is not a good procedure because condensation from steam can dilute acid and makes it more corrosive steam cleaning is therefore very poor compared to water washing high temperature makes it further corrosive.

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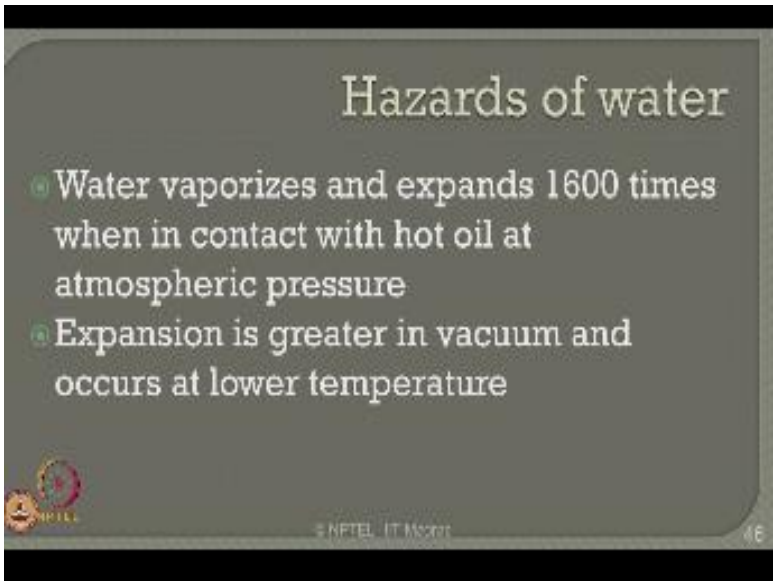

When you talk about hazards which arise from water, water vaporizes and expands about thousand six hundred times when it comes in contact with hot oil at atmospheric pressure expansion is greater inland occurs even at the lower temperature.

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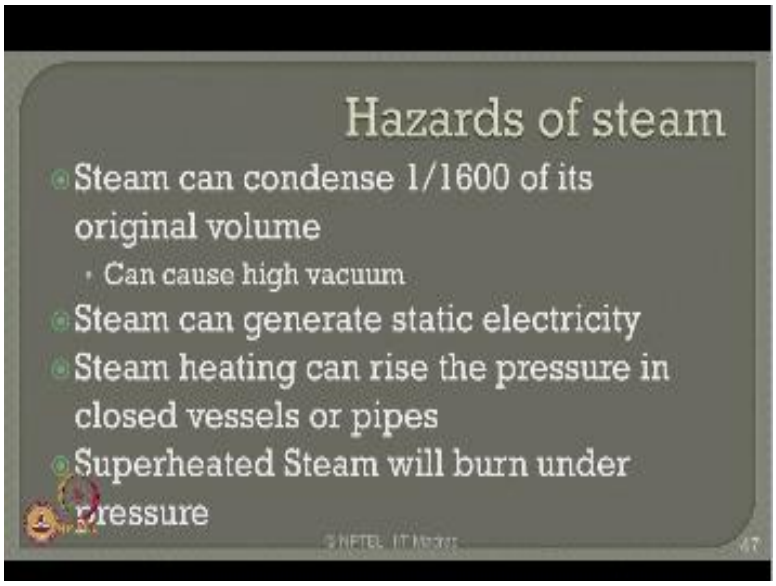

When I talk about hazards of steam, steam can condense about 1/ 1600 of its original volume which can therefore cause high vacuum steam can generate static electricity which can be one of the important source for fire and ignition steam heating can raise the pressure inside the closed vessels or pipes we can result in explosion. Superheated steam will of course born under pressure.

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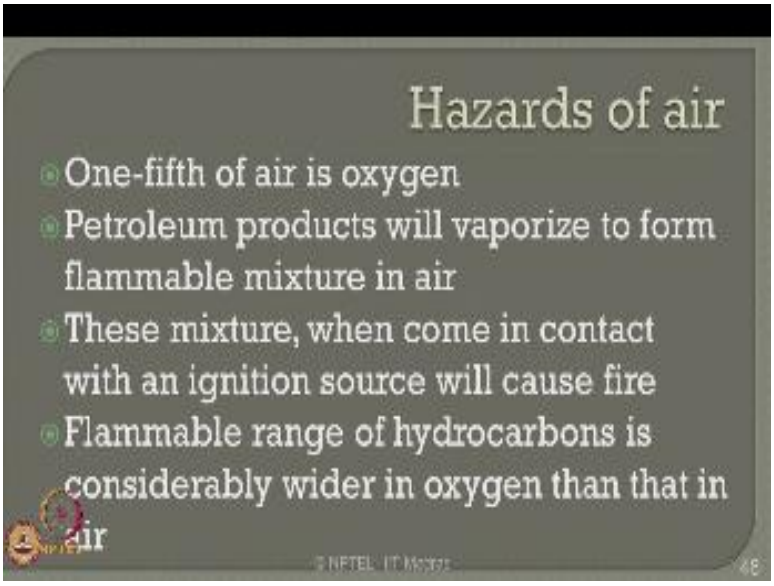

Then of course hazards which arise from air one fifth of air is oxygen petroleum products we all know will get vaporized to form flame of mixture in air these mixture when come in contact with an ignition source will set in fire flame will range hydrocarbon is considerably wider in oxygen than that in air.

In this lecture we talked about good procedures safety practices which can implement efficient and successful plan of loss prevention program they also see some basic characteristics and hazards chemicals generally released from my oil and gas industry sources this lecture hope will give you a good idea and hands-on experience on how to deal with put loss prevention program in oil gas industries thank you very much you

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