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NPTEL ONLINE CERTIFICATION COURSE

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

Module 4:
Safety measures in design and operations
Lecture 4: safety in planning and design stages

Friends welcome to the fourth lecture on safety in planning and design stages which is the lecture under the module four where we are talking about safety measures in design and operation this is an NPTEL online course on HSE organized at IIT Madras.

Let us quickly see what are those challenges in deep water exploration because nowadays we all understand that oil exploration has moved from shallow deep to ultra-deep waters the platform geometry the operational mechanisms the equipment stools etc. being used for deep water exploration or production are significantly different in terms of the technology updates compared

To the earlier ones therefore it is required that all people and personnel involved in the process planning design construction decommissioning needs to have a strong update which is essentially circumscribing safety standards as well let us quickly understand what are those common challenges when we talk about deep water exploration.

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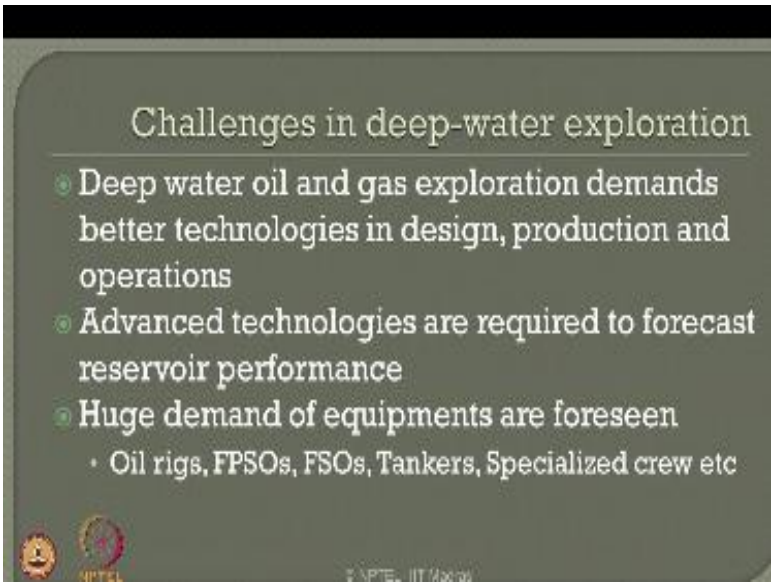

Deep-water oil and gas exploration demands better technologies in design production and operations because we do not have investments towards high capital cost and the time lag for the production facilities, so we should have the state-of-art proven tested technologies which can accommodate the weather conditions variations in design uncertainties and loads arising from deep water conditions of short distances in terms of its design structural analysis production operational features etc. therefore advanced technologies are on the demand which are required to be used and these technologies are also used to forecast the reservoir performance which is essentially important for checking the feasibility of any platform in a given location.

Therefore there is huge demand of equipment's which are forcing in terms of oil rigs FPSO's, FSO's, tankers and specialized crew etc. so when there is huge demand of these kind of equipment's is also important that the personal train to safely operate these equipment are also on high demand so these challenges,

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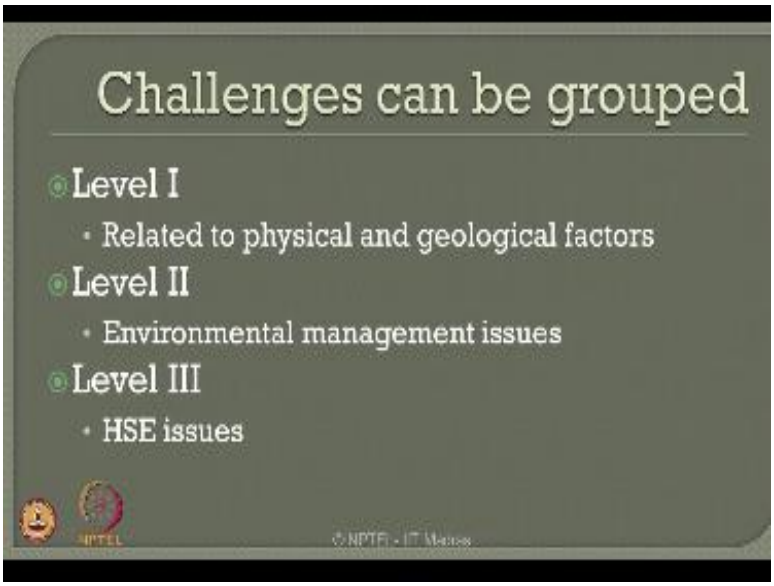

Can be now grouped very easily at level one we can group them related to physical and geological factors. At level two we can group them related to environmental management issues and at level three we can group them which are issues related to safety alone.

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When you talk about level one issues they are very simple and straightforward the challenges are posed to overcome technological and geological challenges which come which may come in way when you talk about deep water exploration production the challenges are posed to provide comprehensive support services it is necessary to provide huge capital outlay there is also necessity for providing development which are effective solutions to shorten the production and delivery time that is a very important aspect ladies and gentlemen because the production delay will always enhance the initial investment towards operational features of the platform one should also like to invest in terms of exploring green sites to find new deposits there is a demand of the day.

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When you talk about the challenges in level two issues which are related to environmental management cases challenges in this case are posed to managing sustainable resources effectively to minimize the qualified technical personnel because technical personnel are also equally expensive as that of equipment's we must think of lowering operational cost of the entire project we must also able to attract expertise and investors from all over the world to invest on the platform production it is important that we must try to overcome.

The territorial disputes between the water sharing basis for oil and gas exploration it is important that there are issues related to managing impact of recession and financial crisis plays a very important role in any new development of platforms in deep water exploration one should also learn how to manage uncertainty in oil prices because that governs the whole economic boundary of the new exploration in general.

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Come in 2 hitches issues in level 3 we can focus on the deep water exploration exclusively under the following heads protection of personal and plant from hydrocarbon releases and gases and therefore we should enable safe inventory of gases one should be able to think about the reduction in noise level of the platforms which is Avery important hazard cost the workpeople or workforce on platforms one should also have thought process focusing on mitigating extreme weather conditions because as we move towards deep and ultra-deep waters the scenario in terms of environmental or weather conditions also become highly uncertain it is important that.

We should play A role in educating the players in oil gas industries about the importance of safety neglecting safety or sidelining safety measures will never lead to a successful production history safety lessons go beyond protecting life and assets but also the environment this Isa very important education which is To be imparted to people not only people working on plant but also to the public because canvassing HSE will certainly lead to a sustainable business.

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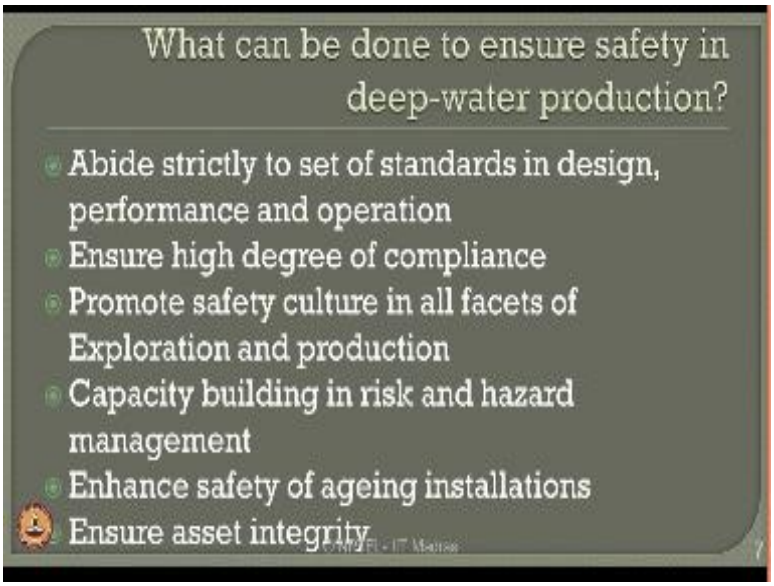

Now the question asked in mind is what can be done to ensure safety in deep water production one should abide strictly to the set of standards in design performance and operation violation of safety norms in terms of standards and design will cost havoc in terms of oil production when we move to ultra-deep waters, One should also ensure a very high certain degree of compliance in terms of standards to be followed in the above regulations it is important that one promote safety.

Culture in all facets of exploration and production is important to encourage capacity building in risk and Azad management in the given industry enhance and safety of aging installations ladies and gentlemen it is very important that aging installations force a special kind of threat and problems in terms of safety therefore one should ensure asset integrity in terms of focusing on enhancing safety on aging installations.

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Let us quickly talk about the braces on safety in exploration and production stage alone

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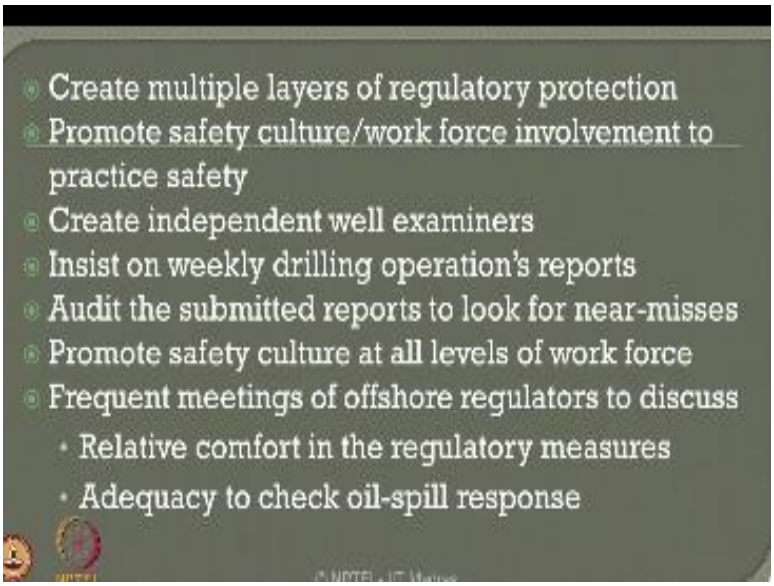

One should create multiple layers of regulatory protection which are implemented in exploratory and production stage promote safety culture and workforce involvement to practice safety create independent weld examiner's and honor their reports in terms of near miss events insist on weekly drilling operations report which is very important feedback they enhance safety especially during the drilling operations, audit the submitted ports to look for the near miss events and educate people on board to talk about the near miss events.

Therefore, one can mitigate one can plan for near mitigation of these occurrences in the near future. Promote safety culture at all levels of workforce no exemption to anybody frequent meetings of offshore regulators to discuss relative comfort in the regulatory measures and adequacy to check oil spill responses are important steps involved in terms of managing safety for deep water exploration and production facilities.

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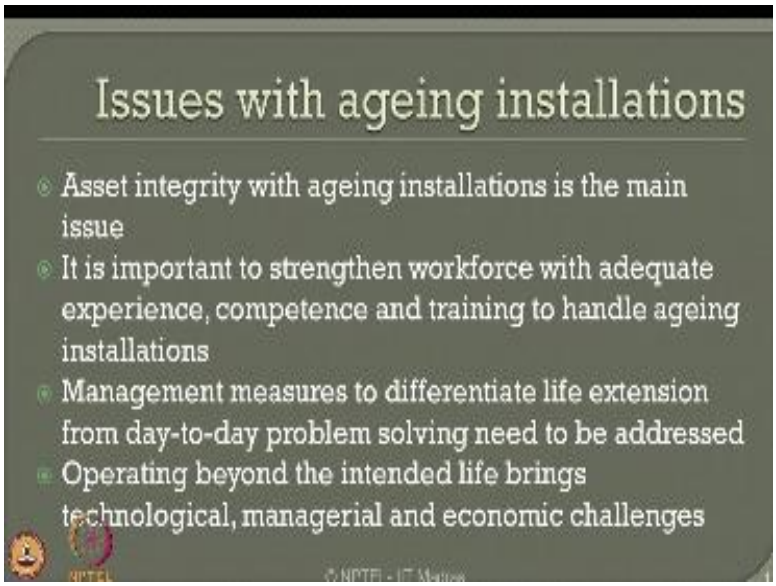

As i said in the beginning we will talk about aging installations there are special issues which are related to as installations asset integrity with aging installation is one of the main issue in the present scenario it is very important to strengthen the workforce with adequate experienced competence and training to handle aging installations management measures to differentiate life extension should be understood from day to day problem solving need to be addressed very carefully it is very important friends to understand what are those differences between the life extension of an aging installation to that of managing edited a problem in these kind of assets which are aged enough to cause problems because of material degradation because of process degradation etc.

Operating beyond the intended life is one of the major problem which brings technological managerial and economic challenges automatically inherent because of the aging installations.

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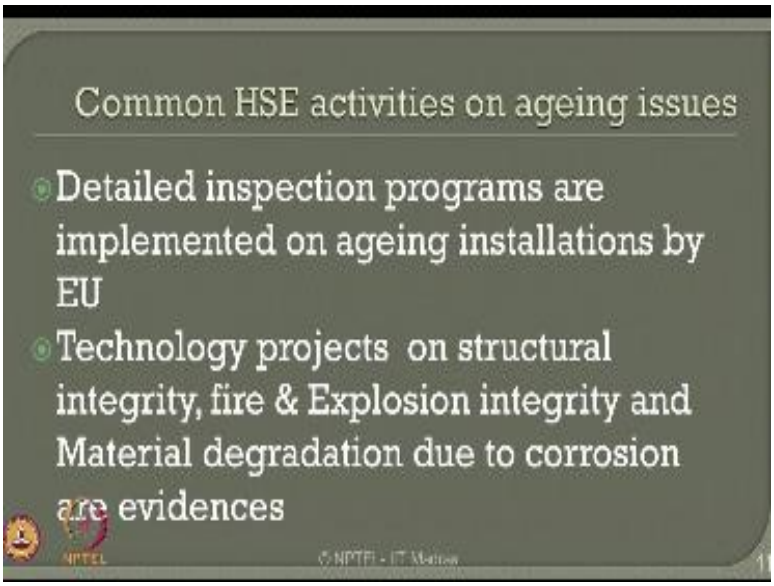

Let us quickly see what are those common HSE activities which are focused on aging issues detailed inspection programs are necessary and they should be implemented on Aging installations by European Union etcetera this is a very salient example which the global standards can follow so that the aging installation inspections becomes very vital we really wanted to improve safety standards which is one of the common practice in European Union the present scenario.

Technology projects on structural integrity fire and explosion integrity and material degradation due to corrosion or evidences which are seen in the recent past which has shown high and huge investments in terms of understanding their deterioration processes on aging installations.

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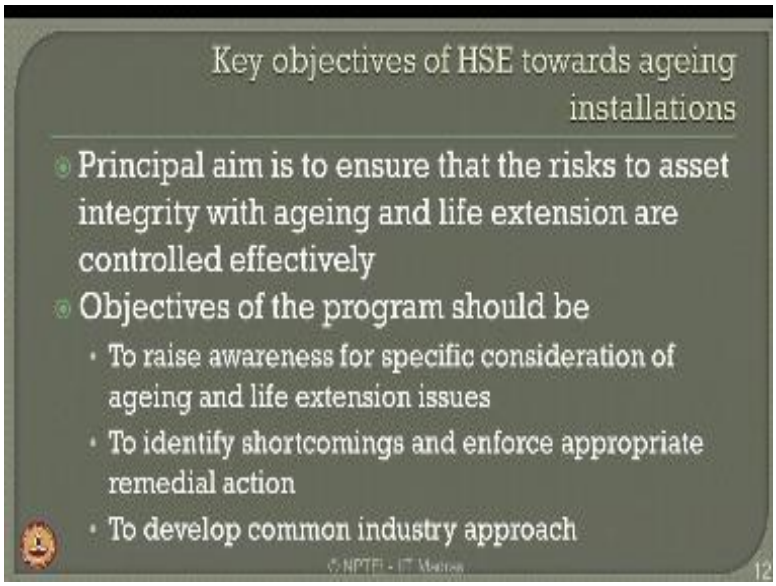

Therefore what are the key objectives of HSE towards aging installations principal aim is of course to ensure that the risks to asset integrity with aging a life extension or controlled effectively objectives of this program should be to raise awareness for specific consideration of aging and life extension issues to identify shortcomings and enforce appropriate remedial action to develop common industry approach which is very vital in terms of HSE management especially on ageing installations.

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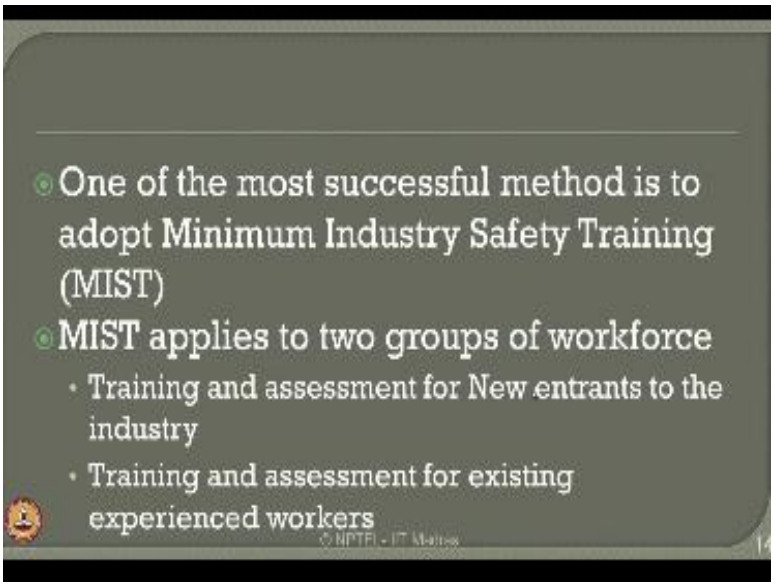

A basic and fundamental question comes in safety is how to improve HSE culture by and large in operational plans, friends it is important that one of the most successful method seen in the previous practice is to adopt minimum industry safety training what we call as MIST friends it is important and you will agree strongly that industrial safety training is a very vital part of enhancing practicing implementing and deriving benefits from safety implementation programs.

So one should be sure that minimum industrial safety training is important to all personnel working on board as well as public near around the plant, mist applies to two group of work force namely one is the training and assessment for new entrants to the industry the second is training assessment for existing experienced workers friends please understand the second point is more important it is not that you are experienced therefore we can be exempted from training and assessment there are different modules of training an assessment which are imparted to people who are experienced in comparison to that people who are new entrance to the plan therefore mist inapplicable to both set of workforces.

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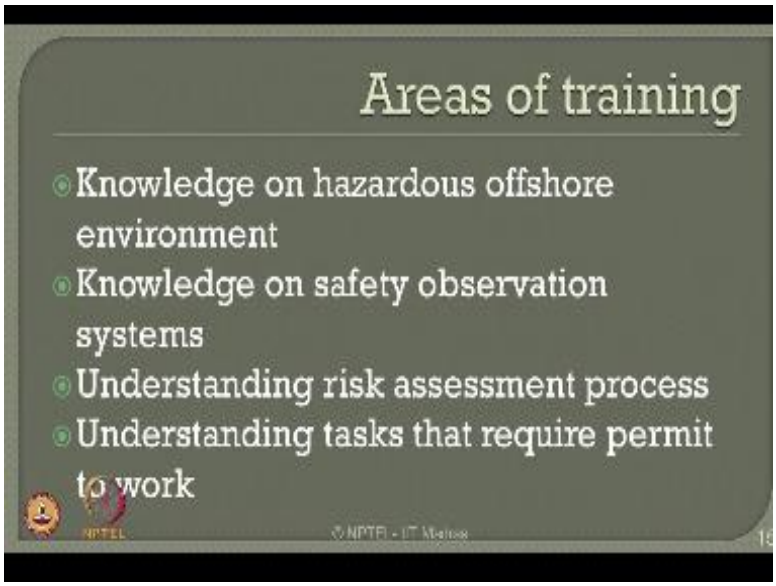

Let us know focus on what are those are what could be those areas of training where these people can be imparted knowledge on hazardous offshore environment is Avery vital and basic knowledge to be imparted to these people knowledge and safety observation systems is very important because if we equipment used especially in offshore production come with lot of safety in will inherent safety one should know an updated knowledge on the safety observation systems in terms of science, alarms, signals, warnings, sirens etc. as a part of the safety program implemented to these workforce personal.

Understanding risk assessment process is also a very important educational level of understanding which should be imparted to these people understanding tasks that require permit to work is a very vital area because most of the accidents happen because this permit to work culture is even moderately violated.

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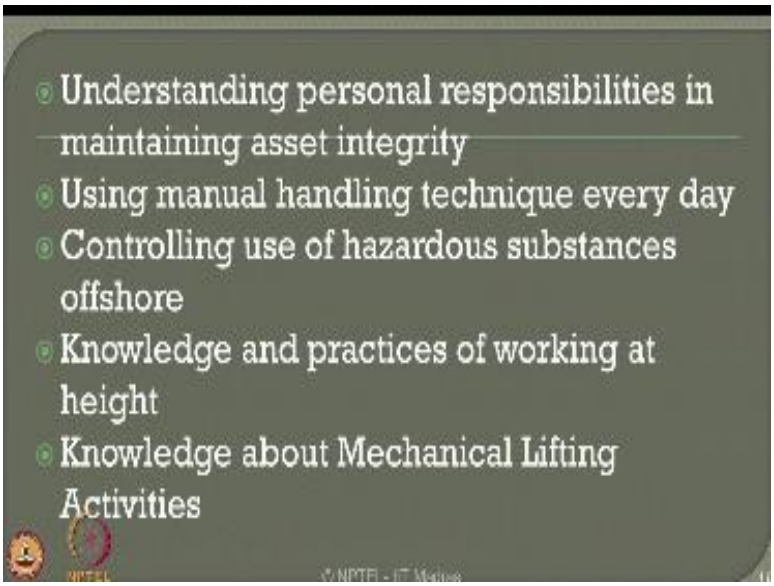

Understanding personal responsibilities in maintaining asset integrity is an inbuilt culture which will be promoted in almost all oil gas industries if you really wanted to ensure asset integrity management, using manual handling technique every day is Avery important issue people should follow the instructions given in the manual for equipment handling they should strictly abide to those instructions and safety precautions given by the manual or by the manufacturer strictly in abundance.

Controlling use of hazardous substances offshore is one of the vital strength which can be ensuring safety practices in offshore industry knowledge and practices of working at height is also nevertheless important knowledge about mechanical lifting activities is imparted to people working on board especially on crew members which is Avery vital responsibility on the management side team part very trained personnel to use mechanical lifting systems on board.

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Now one can ask a very interesting question is the managerial perspective what would be the deliverables or the results are visible outputs by implementing minimum industrial safety training to the workforce personnel on board, it essentially helps to address legal compliance that is most important it meets employee responsibility for ensuring that employees are trained and they are being made competed for this respective job. Globally respected quality assessment process is arising from mist; mist gives you a robust assessment which has verifiable and traceable records in terms of training.

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The second interesting benefit which is drawn from implementing mist is that it enables employers to set standards for workplace improving safety improved competency improved efficiency and therefore improved protection to the environment are insured by implementing mist in your workforce.

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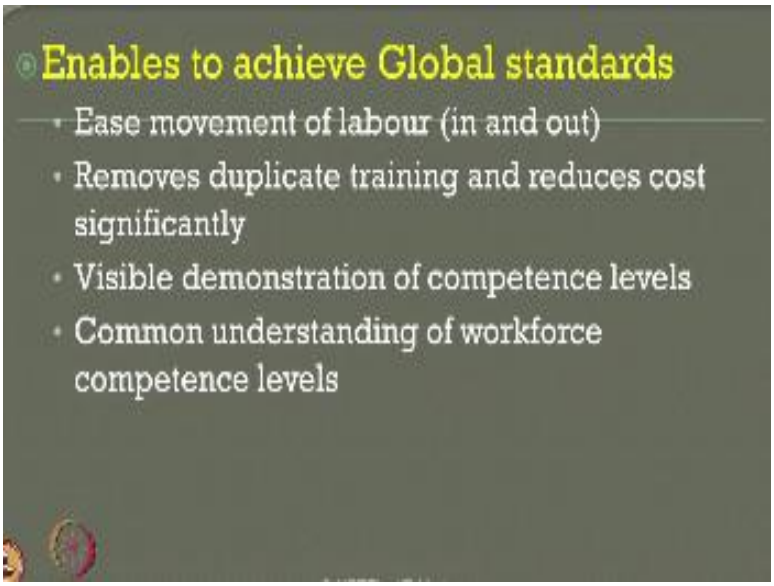

The third benefit could be it enables to achieve global standards dear friends it creates easy movement of labor both in and out there is a common workforce which can be shared by different industries in the world because all of them are equally trained on all of them are equally competent, it removes duplicate training and therefore reduces cost significantly towards intensive training it has got a visible demonstration of competence levels because trained personnel always practice and implement safety therefore accidents are reduced by and lost to Avery significant effect, there is common understanding work force competence levels which means that a teamwork is always progressive and is always competence enough to meet the safety standards that are required for oil and gas Industries.

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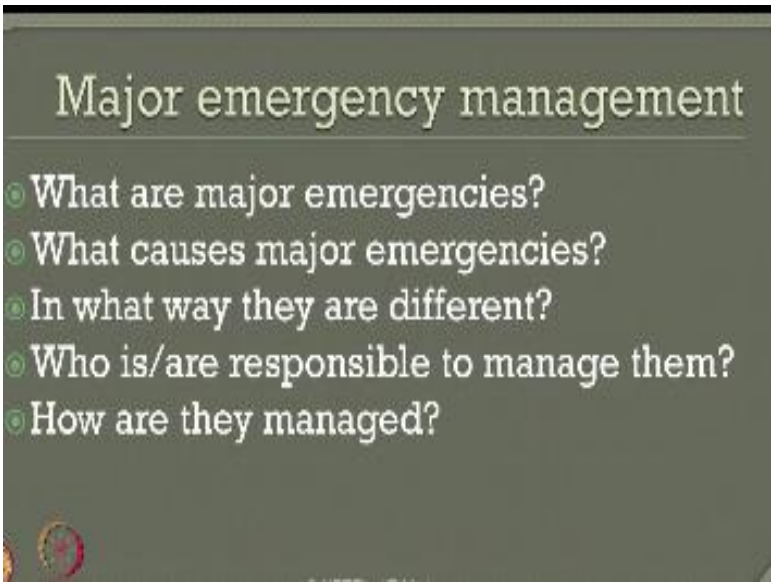

Another area where people should focus on safety standards in design and planning stages that emergency management the moment we talk about emergency management there are major emergency management which are very vital for improvising safety in oil and gas production facilities what are major emergencies one should i have a very detail list in a given production unit what causes these major emergencies one should have a very clear question and understanding about this in what way they are different from other kind of emergencies who are responsible to manage these emergencies should be Avery known answer to for all people working on board how are they managed is very important you have got a plan to manage these major emergency events.

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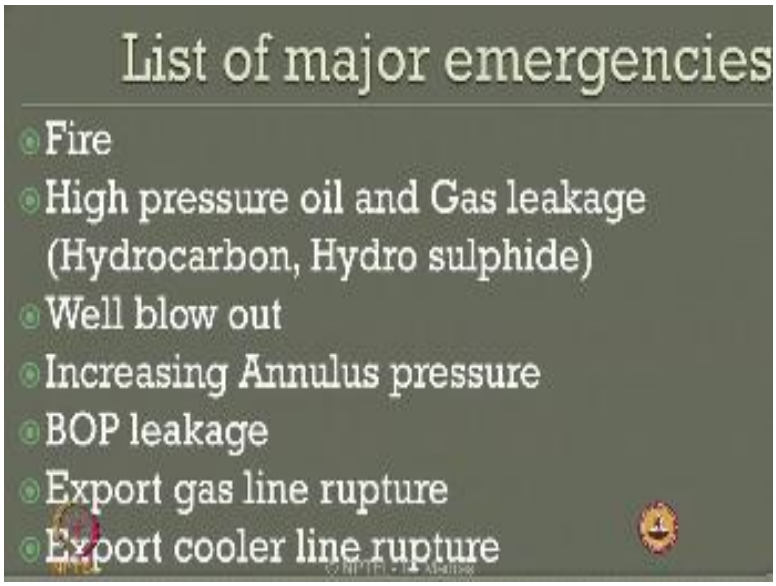

Now let us quickly see a brief list of major emergencies which are arising in offshore exploration and production facilities fire high pressure oil and gas leakage maybe hydrocarbon hydrogen sulfide etcetera well blowouts increasing annulus pressure blowout preventer leakages export gas line rupture export cooler line rupture,

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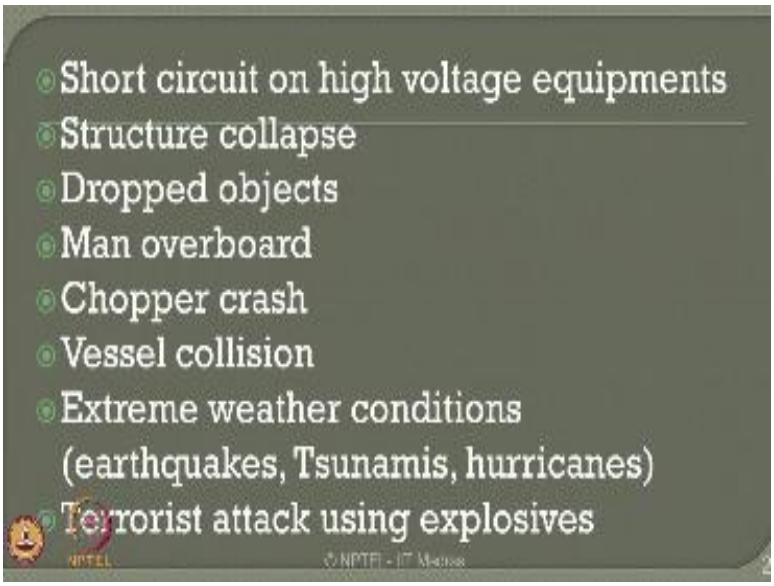

Short-circuit on high voltage equipment structural collapse of the system emergency arising from dropped objects emergency arising from Man Overboard emergency which comes from chopper crashing which comes from vessel collision which also comes from extreme weather conditions like earthquakes tsunamis hurricanes etcetera and of course most importantly dot the least terrorist attack using explosives and so birch.

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Once we understand what are those minimum industrial training to be given to people why are they important what are the benefits derived from implementing minimum industrial training standards to my work force and how to manage major emergencies then the major focus comes towards loss control measures ladies and gentleman is very important in offshore industry risk and reliability are closely associated to the cost factor arising from these benefits any risk which does not cause financial loss is not important in oil gas industry. So last control measures becomes very important because this is an economic parameter which guides what is the investment towards risk mitigation or risk propagation control techniques available in industry.

So what are those lost control measures which can become a focus in oil gas industries risk assessment and insurance coverage is one for most area so it is important that they are highly vulnerable environment it needs proper risk management the competent risk survey needs to be conducted identifying hazards causes consequences mitigation means equipment affected or it should be detail understood and study an exam estimating potential loss which arise from bearing of these standards is very important you must be able to establish risk levels in all scenarios and recommendation should be made for continuous improvement of safety implementation standards in the industry.

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Now the question comes if risk is undesirable can we talk about risk mitigation methods provide adequate systems to prevent initiation and escalation of risk problems ensure good flow of transparent communication between the work force onboard, impart high level of training and employ only competent personnel to do a specific job conduct mock drills periodically which will help them to manage all possible major emergencies, it is important that please ensure 24 hours readiness with the workforce to mitigate or to manage or to address preparedness related to emergency existences which can happen in the plant any time.

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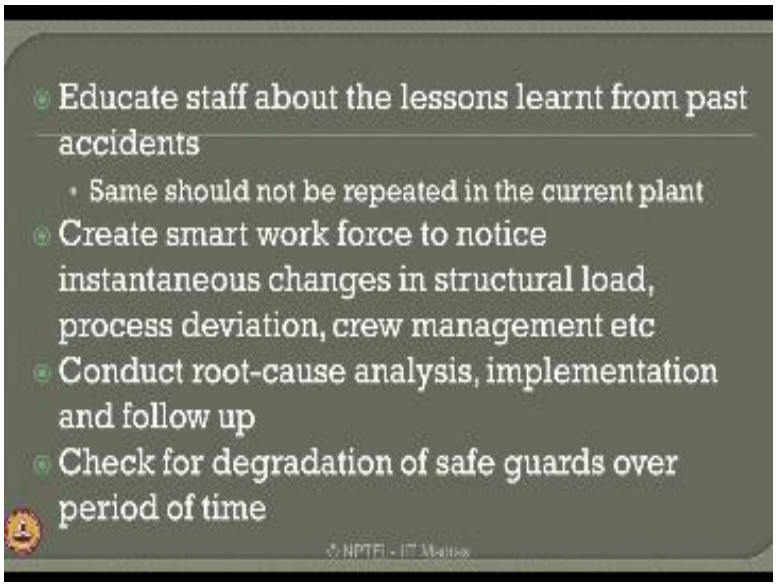

Educate Staff about the lessons learned from the past accidents it is very important that they at least should not get repeated in the current plant. Create smart workforce to notice instantaneous changes in various items like structural loading process deviation crew management etcetera because anything which is preventable is always acceptable in risk mitigation methodologies conduct root chord analysis implementation and follow procedures so that safety reports are well deliberated decipher and understood and of course the recommendations from these reports are in properly practiced and implemented when they are within the boundaries of alarm region.

Check for degradation of safeguards because every equipment as I said will come with the safeguard mechanism however they can get deteriorated in due course of usage and time therefore check for the degradation of the safeguards and keep on updating them over a period of time.

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Consider practical and economic feasibility before you advise any recommendations for safety audits non-conforming safety is an offence this culture should be promoted check for any exceptions and do not allow any exceptions on violation of safety culture on board avoid leaning on safety violation and temptation, conduct lost control to a segment wise, section wise, operation wise and area wise, because this is one of the industrial area or important segments where safety culture can be brought down to its highest implementation standards if you make.

People to understand what are the losses which are foreseen because of violation of safety norms, do not compensate and compromise on slow progress and unplanned shutdowns by reducing safety steps in a given process of course very important increase the number of decision-makers in critical decisions involving safety violations.

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Let us summarize very quickly what are these important steps which is to be followed in terms of safety in planning and design stages wherever disasters happen please check for the following what was the safety norms followed a prior to the disaster how risk assessment was done in this case of the plant what are the mitigation reports which are prepared based on risk assessment and have they been implemented in terms of the recommendations please check for these questions and try to answer them wherever disasters happen in the industry.

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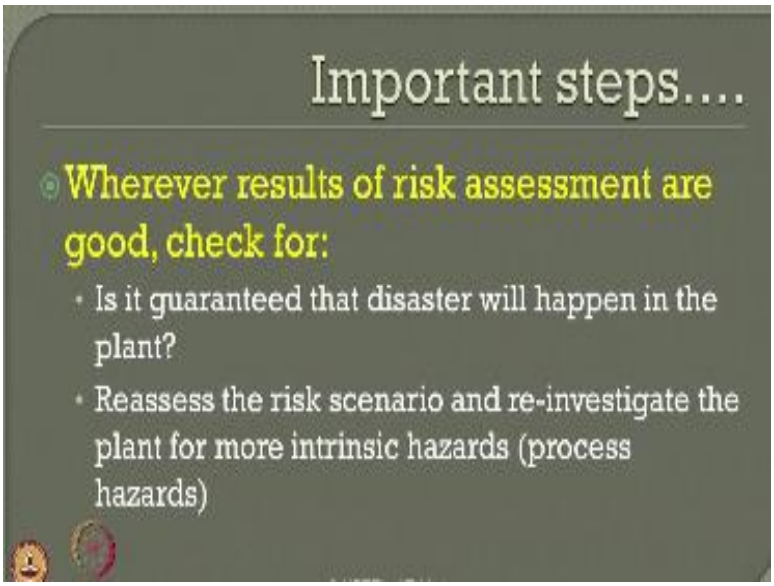

The second step could be wherever results of risk assessments are available in a very a standard check for the following please ask a question is it guaranteed that disaster will not reoccur in the same plant if so reassess the risk scenario and reinvestigate the plan for more intrinsic hazard process hazards in particular.

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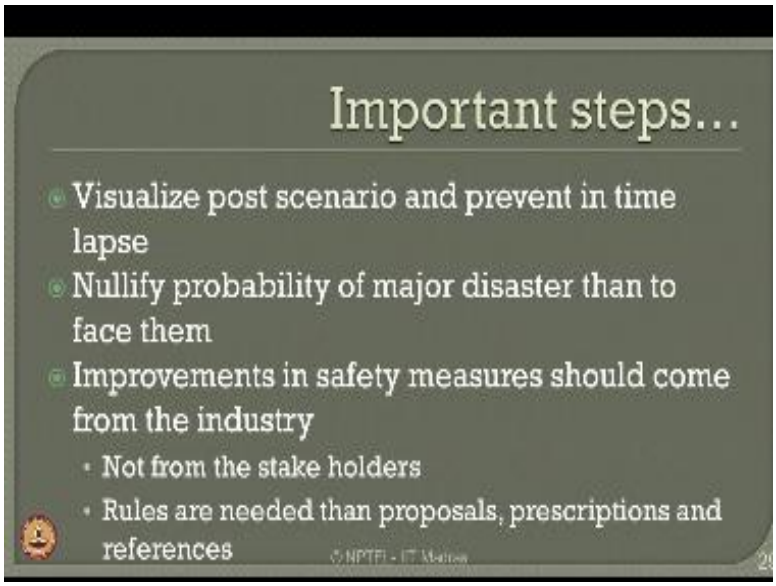

The third could be visualized post scenario and prevent in the time-lapse costs because of this nullify a probability of major disaster than to face them, improvements in safety measures should come from the industry and not from the stakeholders, rules are needed than proposals prescriptions and references friends in this lecture we talked about a very good summary about

what are the different steps which need to be practiced to ensure safety standards what is minimum industrial safety training what are the benefits what are general major emergencies which come from offshore production facilities what are those challenges which come from deep water oil exploration and soon I think the summary will help you to put safety guidelines in planning and stage guidelines etcetera thank you very much.

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