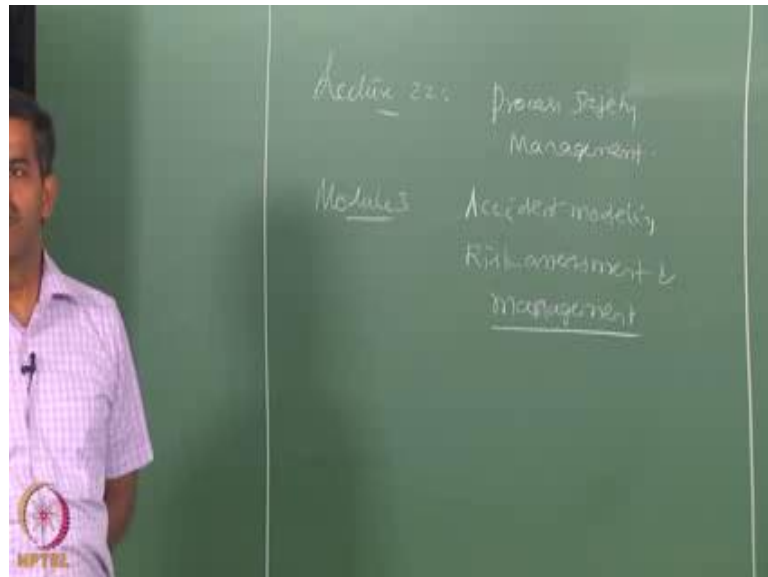


**Health, Safety and Environmental Management in Offshore and Petroleum  
Engineering**  
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**Indian Institute of Technology, Madras**

**Module – 03**  
**Accident Modeling, Risk Assessment and Management**  
**Lecture – 22**  
**Process Safety Management**

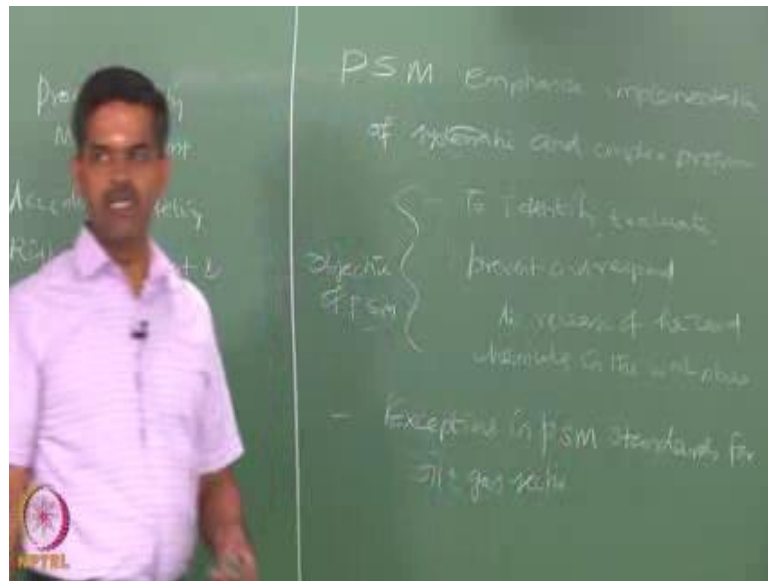
Friends, welcome to the 22nd lecture, where we will talk about some more details on process safety management.

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In this lecture, we will also talk about a list of software, which are generally used for H S E practices – safety practices. This will be the concluding lecture in module three of online course on H S E practices in offshore and petroleum engineering. We are talking about lectures on module three, where we discussed accident modeling, risk assessment and management.

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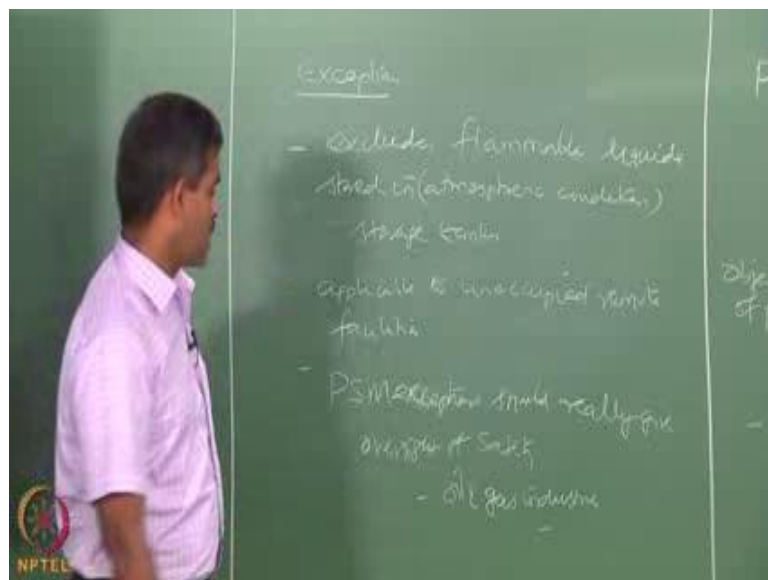
The moment we talk about process safety, generally, the P S M standards, that is, process and safety management standards in oil and gas companies emphasize implementation of systematic and potentially complex program. So, P S M actually emphasizes implementation of systematic and potentially complex program. The main objectives of this should be to identify, evaluate, prevent and respond to release of hazard chemicals – to release of hazard chemicals in the work place. So, that should be actually the main or the principle objective of P S M. Interestingly, P S M has certain exceptions for oil and gas operations. Let us look at them now. Let us see what are these exceptions.

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First, let us see why such exceptions are allowed. So, this is a very common question, which one will have in his mind – why do we allow exceptions for oil and gas sector. Interestingly, it is for the prime reason that OSHA has begun a separate rule making for its unique nature of operation. So, oil and gas sector has unique nature of operation. So, all the general standards as applicable to any process industry and safety management program cannot be implemented blindly for oil and gas sector – number 1. Number 2 – there are other industrial standards, which are stringent upon the operations at oil and gas platforms, for example, OSHA. So, when you are following these kinds of standards, which are much most stringent and specific upon the nature of operations happening in oil and gas industry, one can have exceptions from the general rules and regulations of process safety management.

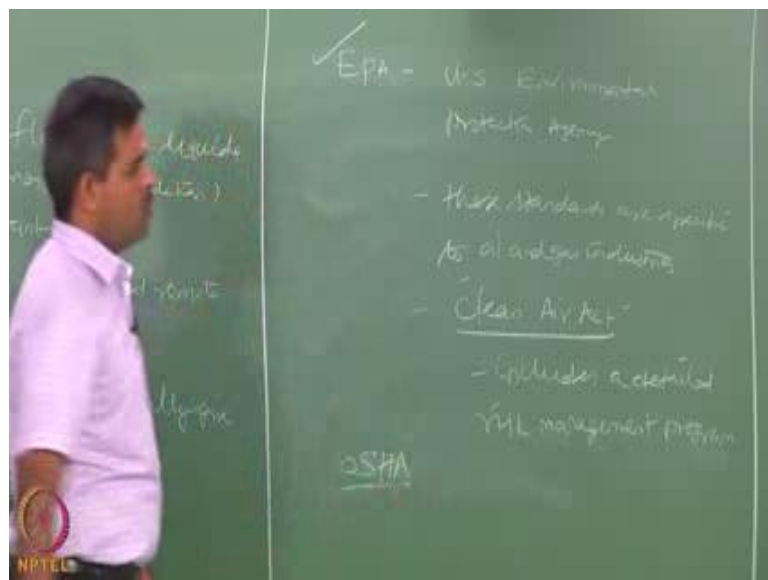
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So, therefore, the classical exceptions are P S M excludes flammable liquids stored in an atmospheric storage tanks; that is, one classical exemption what P S M gives as far as oil and gas sector is concerned. P S M standards normally are applicable to unoccupied remote facilities. The above exceptions, which are classical, are justifiable under practical conditions, because this has imposed limitation on applicability of P S M standards to oil and gas exploration production operations. The main reason as I earlier said, the main reason of such exceptions are oil and gas facilities, are already in strict compliance with numerous safety standards, which are tailored to the operations that happen on oil and gas sector alone.

For example, while most of the atmosphere storage tanks in use at oil and gas facilities are currently exempted from P S M standards, they must however compare to OSHA requirements of flammable liquid standards as well as other state and local safety standards. So, do not think that P S M exceptions should really give oversight of safety, because oil and gas industries have other standards, which are useful in terms of flammable liquid standards as given by OSHA, which are much more strict and stringent compared to general standards applicable to any process industries as recommended by a P S M program. There is one more parallel agency, which is also implementing standard stricter than P S M to oil and gas sector, that is, E P A.

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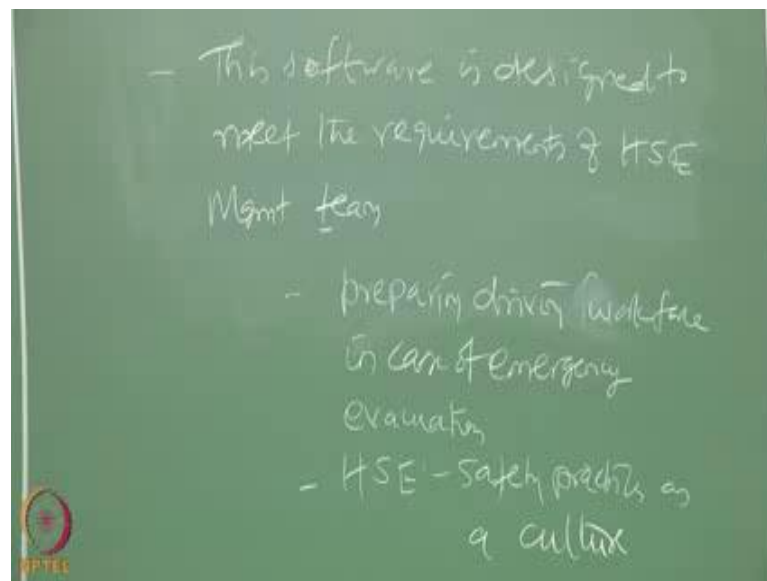
That is called United States Environmental Protection Agency. These standards are specific to oil and gas industries with modulations applicable with the greater emphasis on examining these facilities to their compliance with general duty class of clean air act. That is a very interesting program, what a module has in E P A. That is called clean air act. So, this will have rules, which are stringently imposed on oil and gas industry with greater emphasis on examining these facilities for a very clean air pollution free risk management program.

So, this also includes here detailed risk management program, which is recommended for a strict compliance in oil and gas industries. Therefore, when you have got parallel agencies like E P A like OSHA, whose standards – whose standards are much stricter

and very particular; which is emphasizing better risk management program on oil and gas sector. So, therefore, there are certain classical exemptions given in process safety management program, which are otherwise very generic for any process industry, of course, including oil and gas sector.

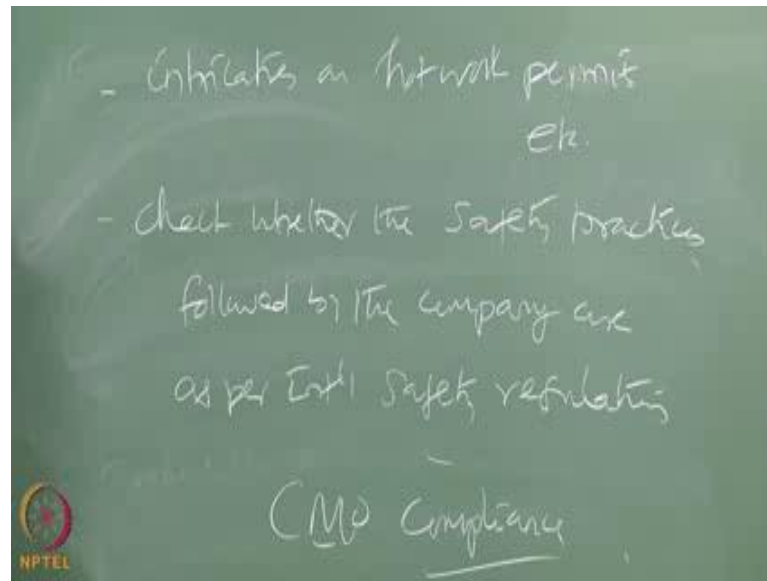
Having said this having realized the importance of accident modeling, risk management and assessment, let us come quickly on the converging stage of this whole program, where we are going to talk about software, which is generally used in H S E management specifically. We are not talking about software, which are used for modeling accidents, which I already said in the beginning, etcetera. When we use them, there are references given in the N P T E L website. Please look at them and try to have hands on experience on these softwares. We are not talking about H S E management program in general with more emphasis on safety practices.

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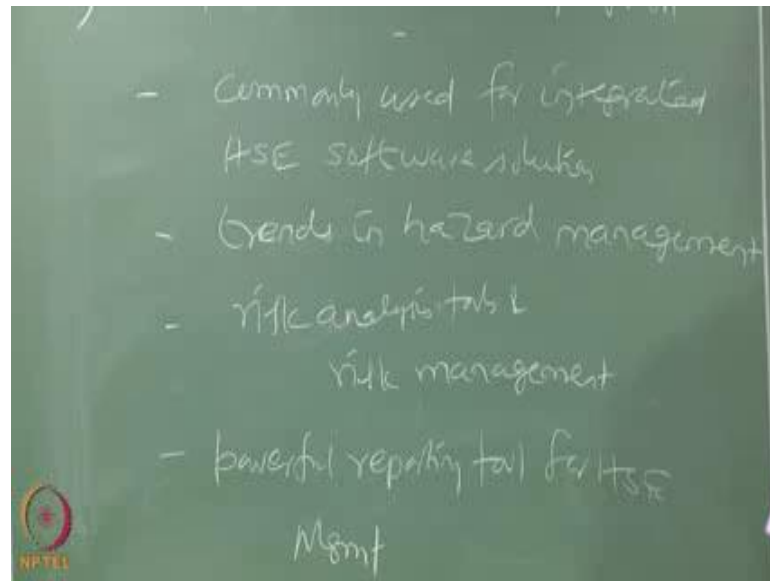
So, let us say software used in H S E management. The first one could be C M O compliance. C M O compliance is one of the commonly used software in H S E environmental management in offshore industries. This software is designed – designed to meet the requirements of H S E management team in terms of preparing your driving work force in case of emergency evacuation – H S E or let us say safety practices as a culture.

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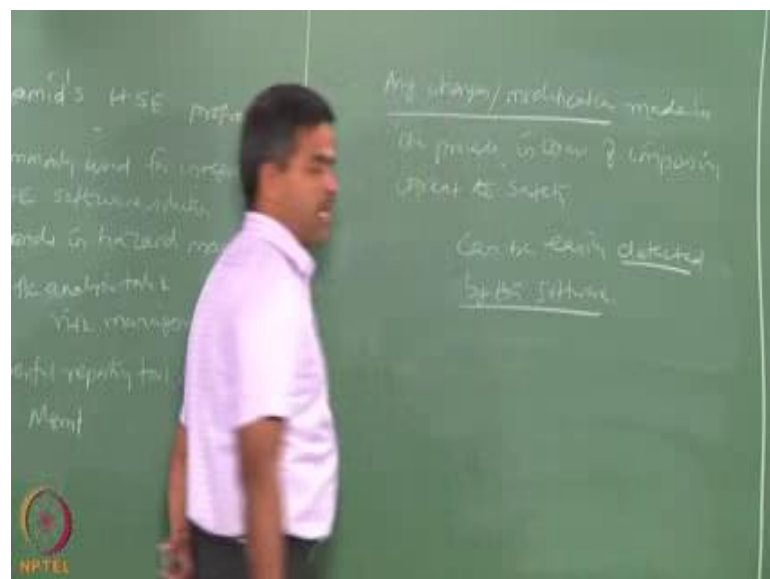
Intricacies on hot work permits, etcetera. This is helpful to ensure that the process and practices follow or safe and supported by international safety regulations. That is very important. They also check whether the safety practices followed by the company or as per international safety regulations. That is why it is called C M O compliance. It checks the compliance of or follower of the safety practices with respect to the international safety regulation. That is very important. C M O compliance is easy to access, easy to use and provide valuable real time reports to all the team members of H S E management. Therefore, implementation and practicing and following this particular software; it is very easy and it is very effective tool to manage H S E processes in terms of its safety adaptability to international safety norms.

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The second software is which is very commonly used in H S E management is Spiramid's. This is one of the again commonly used tools for integrated H S E software solution – software solution. It deals with trends in hazard management, risk analysis tools and overall risk management. This is one of the very powerful reporting tools for H S E management.

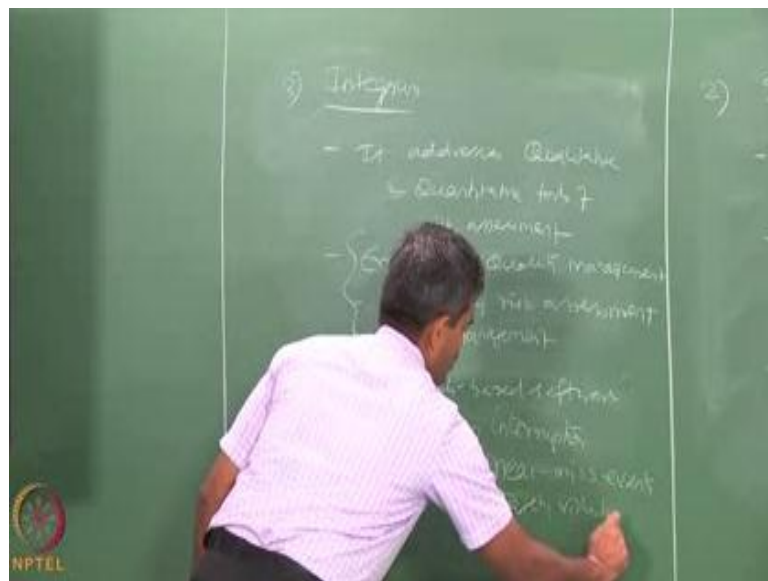
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So, any changes, modifications made in the process in terms of imposing threat to safety can be easily detected by the software. It means any changes or modifications done either

in the equipment layout or in the process modification or in the hazard scenarios, etcetera can be easily modeled and can be easily reported and detected by Spiramid. So, that is very important. This software can be used to play a large role in compliance, minimization of risk and overall very interestingly saving for the business in terms of economy prospective, because it also handles successfully the risk management tool for the industry.

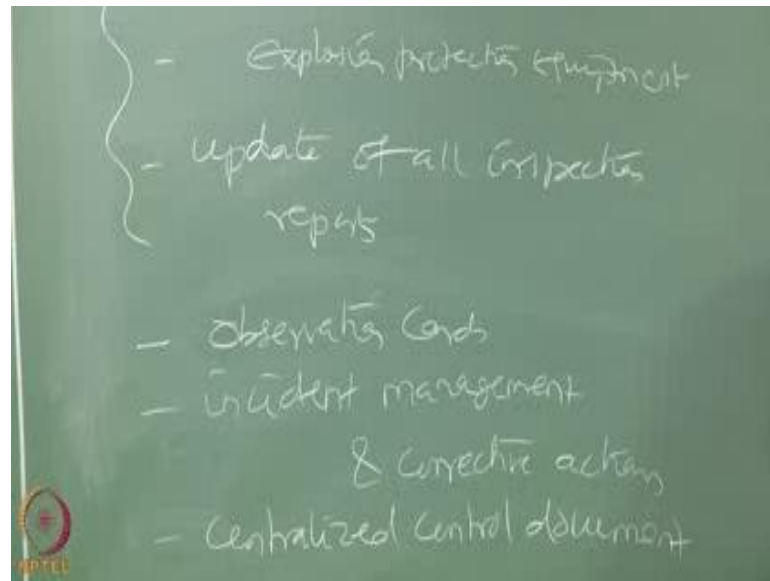
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The next software, which is also commonly practiced in H S E industry, is Integram. Integram is actually global leading software for H S E management, which talks about qualitative and quantitative risk assessment. It addresses both qualitative and quantitative tools of risk assessment. It also talks about environmental quality management. It also deals with third party risk assessment and management, which can be customized as per our useful rules and regulations followed by the industrial practices. It is ideally suitable almost for all oil and gas sector industries. Integram, interestingly is web-based software. So, any authorized login to this software from any sector of oil and gas industries located in a specific region can also have a very interesting human interruption in terms of reporting, near-miss events; reporting safety violations, reporting failure of safety and protection equipments, failure of explosion protection equipments.

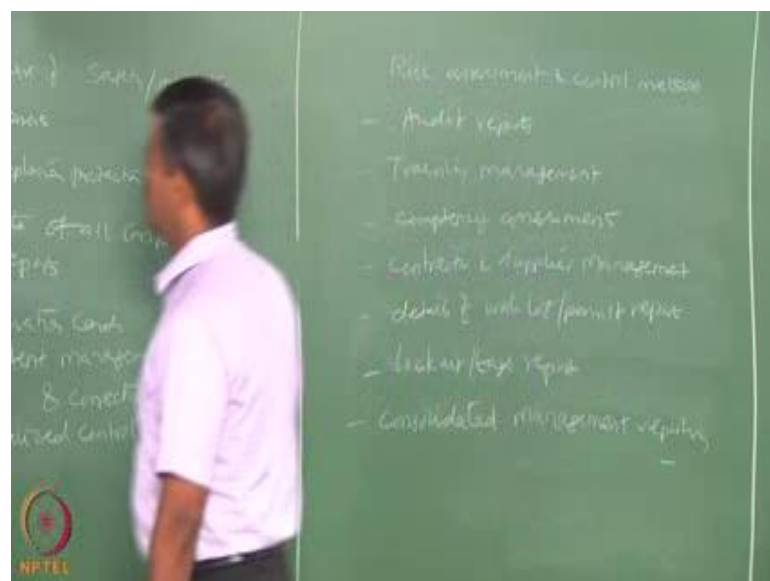


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And most importantly, update of all inspection reports. Since it is web-based, there can be a very wide entry of lateral data, which can be interconnected or intrac connected within the industry of a specific group of companies, which can have first-hand information about very vital documents, which are all necessary for an up keep of safety program. This has got something called observation cards. These are some of the modules, which are very popular in the specific software. Incident management – incident management and corrective actions, centralized control document.

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Risk assessment and control systems, audit reports generation and checking, calendar for training management, which is a very important part of capacity building in offshore industry, competency assessments, contractor and supplier management, details of work lock or let us say work permit, reports, details of lockout and tags report; and overall, your consolidated management reporting.

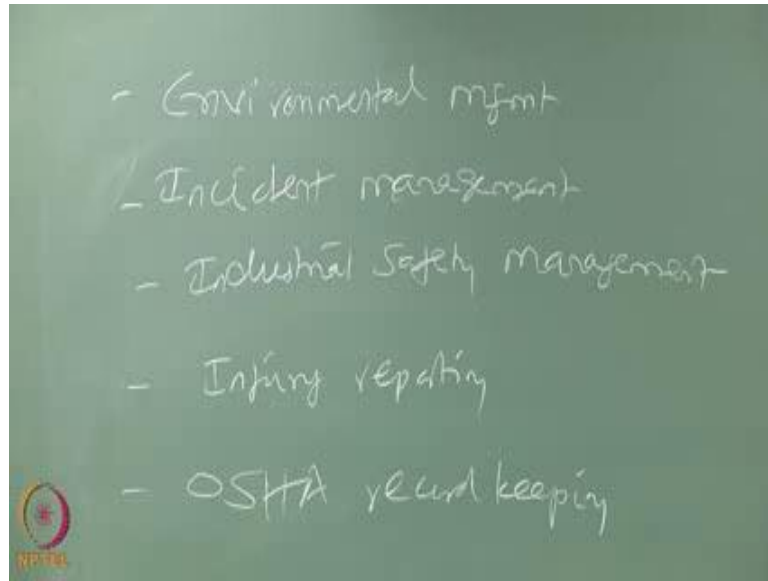
So, one can see this particular software has a very integrated supporting system, which is very useful for a third party management in the risk assessment and management. And, since it is web-based it has got a very interesting connectivity of intranet facilities between the companies of a similar group located in a specific situation. All these functions, which has been discussed, can be combined in one application allows therefore, the Integram software to be very useful application for clientship in offshore industry. The functionality of Integram software ensures that only changes are replicated; by therefore, it provides a fast reliable service for remote locations.

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The next resource commonly used is Rivo. Rivo actually provides a solution for total safety management of a software platform. Rivo actually includes audit management. It includes corrective and preventive actions, hazard management and control, risk assessment and prevention, etcetera.

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It also talks about environmental management risk assessment, incident management and industrial safety management. Interestingly, injury reporting, which is very vital; inspection management, occupational health management and OSHA record keeping, which are some of the important features of this software, which also extends to use safety risk assessment, training management, waste management. So, this is one of the important application tools, which is used very commonly in oil and gas sector.

So, friends, in this lecture, which was the concluding lecture for module three of H S E practices for oil and gas industry, we discussed about some of the important aspects of process safety management, which is a very generic form; however, we focused on exceptions, which are offered by P S M to oil and gas sector. We also saw the rules and the important regulations, which are followed by oil and gas industry, which are much more strict in comparison to the standard regulations of P S M applicable to any process industry. We further extend our discussion to discuss on what are the important software tools, which are very commonly used for H S E management in terms of safety practices.

So, friends, with the overall set of lectures in module 1, 2 and 3, where we talked about environmental management, we have talked about dispersion risk assessment models and we talked about accident modeling risk assessment and management in the whole. I hope you would have followed the lectures in detail.

Assignments and tweets are posted in the website; a list of reference and textbooks are available in the NPTEL website of this course. So, I hope you will follow the entire lectures in order and take an exam at the end of the semester, so that you qualify to get a certificate issued by I I T madras and the NPTEL portal. So, wish you best of luck and a good reading. Always keep a positive hope, so that we keep on implementing all these practices, what we have studied so far in real time world, so that let us build very interesting, safe and healthy oil and gas production systems for the nation as well as for the world.

Thank you very much. Good luck and bye.