Management Responsibility for Offshore Safety

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The paper discusses the extent of management's responsibility for health and safety and, against the background of the high level of risk associated with the exploration and exploitation of subsea hydrocarbons, explores how employers in the offshore industry need to control and monitor their activities so as to ensure that shortcomings do not give rise to danger. Mention is made of the main elements of a Safety Management System.

Key Words Safety Management Systems, Permit to Work Schemes, Auditing, offshore Safety.

MANAGEMENT RESPONSIBILITY FOR OFFSHORE SAFETY

BACKGROUND

1. It has long been recognised that technical solutions alone cannot themselves provide adequate precautions to minimise the possibility of disasters, accidents and property damage, and the axiom that satisfactory health and safety standards can only be achieved by positive management is as true for offshore oil and gas exploration and production as it is for any other hazardous industry. However, compared with most industries, offshore there are big differences of emphasis arising out of the quantities and pressures of the hydrocarbons present, the problems of escape should anything go wrong, the workforce living cheek by jowl with the process, the mode of transport to and from the work sites and all the problems associated with conducting activities in an hostile marine environment.

2. Most accidents, if not all, are the result of human failings linked to ineffective management control. Even those which at first sight might be attributed to hardware failures can be linked to the degree of management control exercised over the specification, design, construction or installation of the item of plant concerned. Following an accident or disaster it is difficult to separate out technical shortcomings from failures of operational management control but a review of recent disasters shows the latter to be the predominant causation factor. In the case of the Piper Alpha disaster, the immediate cause of the gas leak leading to the initial explosion was a breakdown in communications about the state of the plant but it could be argued that the way the platform had been designed played a major part in the ease with which the fires and explosions subsequently developed. On land a similar plant would most probably occupy an area of around an acre.

3. But who within an organisation is responsible for the achievement of positive health and safety management.? Management equates to control. Responsiblity for its success or failure must reside with those who are in command, starting at the highest point. The principles of managing health and safety are no different to any other form of management whether it be overall company management, financial management or managing physical things like in a speed or position control system or as in process control. Achievable objectives have to be set and agreed, methods and procedures devised and established for delivering those objectives and a monitoring feedback loop provided so that adjustments can be made to ensure that any variations between the objectives and outputs are kept to a minimum.

4. The idea that health and safety needs to be managed in the same way as any other activity is not new. The links between health safety and management appeared in the 1889 Mines Act, the 1971 Mineral Workings Act and the Health and Safety at Work Act; elsewhere the practicing of these principles by Du Pont can be traced back to the early 1920's. Numerous papers and publications have been written on these principles and they are well understood by informed safety practitioners. The difficulties lie not in understanding these principles but in their application. In broad terms these arise due to the problems of measuring health and safety performance and to the long time constants of the health and safety control loop. The direct measures of health and safety performance are the frequency of disasters, accidents and incidents of industrial ill health. However, the numbers of such events are so small that they are not of statistical significance but in the long run might well prove to represent incident levels and levels of risk that society would deem to be unacceptable.

ELEMENTS OF A SAFETY MANAGEMENT SYSTEM

Objectives

5. Health and safety objectives should be set at the highest level within an organisation. They should be in clear terms that demonstrate corporate acceptance of the responsibility for ensuring that the organisations activities do not place at risk the health and safety of persons whether they be employees or others who might be affected. The normal starting point would be an all embracing mission statement. Although this in itself is very important since it is a declaration of a firm commitment, it needs to be broken down into objectives to which individuals, whether they be managers or workers, can relate. Collectively the objectives should form a coherent strategy for safeguarding the health and safety of persons and for generating a climate for progressive improvement. At least some of the objectives should be in direct measurable terms, for example, the achievement of risk levels below a specified figure, reductions in accident rates, performance of a minimum number of inspections by management, timescales for updating safety procedures, the introduction of quantified progressive improvements etc.

6. Safety objectives should at least cover all aspects and activities that can have an influence on health and safety.

Line of Accountability

7. There should be a clear line of command and accountability for the control of health and safety standards that extends from Board level right down to the lowest level of supervision. This should, in general, be identical with that for controlling the business activities and should be clearly visible to all concerned. It should reflect the business culture of the organisation concerned. Different organisation might have different approaches to the management of their businesses and so the lines of command and accountability will not be the same.

However, from a health and safety standpoint, they will be required to have the same effect.Of course, as a project passes through its various stages, the line of command and accountability for health and safety and commercial activities might change to reflect the changing circumstances. This is perfectly acceptable but steps should be planned and taken to ensure that those affected are made aware of the change.

8. Line managers and supervisors should be made aware of their health and safety remits and responsibilities and should formally accept them. Periodically their health and safety performance should be reviewed in the same way and the same vigour as is done for their commercial and business areas of responsibility. The links between successful business performance and successful health and safety performance are so strong that there should be little difference between the two aspects of performance accountability. Effective control of work place activities equates to quality outputs and low accident levels.

9. Whatever organisation is in overall control of an offshore operation, which will be the operator for a producing platform, will have to decide how much control over health and safety standards is to be reserved to itself and how much is the reponsibility of the contractors it uses. The respective limits of responsibility need to be well defined and be clear to all parties concerned. However, it must be stressed that contractors will have duties as employers or as self employed persons under the Health and Safety at Work Act and it is not possible for these to be transferred from one party to another to another by means of a contract.

10. Health and safety controls over design and construction standards may take a different form to those over operations and maintenance. Companies placing orders for the specification, design or construction of installations or their constituent parts should have in place a command and accountability line for ensuring that, within the bounds of what is reasonably practicable, all hazards are considered and controlled and that their contractors are organised and equipped so as to allow this aim to be achieved.

11. It should be admissible for companies submitting safety cases to demonstrate the fitness for purpose of their hardware design and construction standards by reference to the certifying authority's acceptance documents for the installation concerned. However, companies would be free to choose alternative ways of demonstrating the worth of their designs and construction standards but this might involve some duplication of effort. Again the division of responsibility between contractors, whether they be consultants, designers, manufacturers or installers should be clear to all concerned and again the dividing line will, to some extent, depend upon how much control over the activities resides with each party.

Competency and Training of Personnel

12. The safety management system should set out the arrangements for ensuring that all persons have the required skills and support necessary to ensure they possess the competence and temperaments appropriate to the tasks they are employed to perform and the situations that they might encounter during normal and abnormal occurrences.

13. Where training needs are identified arrangements should be made for this to be provided and for assessing the quality of the training given.

Control Over the Selection and Activities of Contractors

14. With the employment of a large number of contractors in the offshore industry it is essential that owners of installations accept that the selection, competency and behaviour of contractors has a major impact on offshore safety. Arrangements with contractors for dealing with the combined responsibilities for health and safety, including the competence and training of contractor employees, should be addressed in a way that safeguards the integrated workforce.Contractor activities should be an integral feature in line departmental health and safety programmes and their performance included in installation statistics. For the non-major accident hazards more reliance can be placed upon the generic management controls and procedures contained in the elements of the safety management system.

15. In the case where regular contractors are employed on an installation the contractor staff should identify with line supervision and the line organisation of the installation on which they are working.They should be fully aware of the installation rules and emergency procedures and of the hazards of offshore operations, so that they realise the fundamental importance of restricted entry areas, even if their job is such that they are unlikely to be involved in process areas. Commendation and correction and recognition should apply to both owner and contractor staff.

16. Where contractors are employed in short term activities on or around an installation they should be made fully aware of the Owner's corporate safety policy and objectives and the standards which are to be maintained. The contractor should submit to the Owner for discussion and approval a safety plan to ensure compliance with appropriate elements of the policy and objectives and the contractor shall conduct his activities in accordance with the approved plan.

17. Irrespective of the conditions under which a contractor is contracted and the activities he is engaged in, the contractor's duties under the Health and Safety at Work Act remain.

Identification of the Major Accident Hazards

18. The safety management systems should identify those hazards which could give rise to multiple fatalities. This is to enable the principle of proportionality to be applied so as to ensure that the more critical safety issues receive the attention they deserve. One or more of the risk analysis tools should be used in this process in order to minimise the possibility of a particular set of events being missed.

Management Control Over All Risks

19. Having identified the major accident hazards, the various elements of the safety management system should give specific attention to the management competencies and procedures to minimise the possibility of any of these events, and if any were to occur, to limit their potential for causing harm.

20.For the non-major accident hazards more reliance can be placed upon the generic management controls and procedures contained in the elements of the safety management system. However, judgements on the division between the issues requiring particular control and those that can be left to generic control is no easy matter.

Procedures for Safe Systems of Work

21. Safety management systems should specify activities over which effective control needs to be exercised in order to safeguard the health and safety of persons. The degree and detail of the control would depend upon the risks involved. For a production installation the activities would include but would not be limited to such activities as the commissioning, start up, operation, maintenance, and shutdown of the processing plant both under normal and abnormal conditions, isolation procedures etc. For Mobile Offshore Drilling Units (MODUs), the issues addressed should extend to marine matters, control over exploration, appraisal and production drilling, well maintenance etc. Construction and other work support vessels would require specific consideration depending upon the work being undertaken and the proximity to other activities.

Permit to Work Schemes

22. A permit to work scheme is a formalised and documented management procedure for exercising control over work activities. Such schemes should be applied to all situations which have important safety implications or where misunderstandings could give rise to danger. Deciding upon what should be included is no easy matter since if too many low key activities are captured then the procedures become extremely cumbersome and the more important cases can get subsumed in a mountain of control documents for very low risk activities. Companies should set down their criteria for deciding whether or not a particular task should be included or otherwise.

23. Permit to work schemes, to varying degrees, impinge on the activities of offshore contractor. Companies in control of installations should, as part of their safety management systems, make clear how contractors are to be briefed and trained on the workings of their schemes and should have an established plan for bringing their schemes into line with developing industry standards.

24. Where secure isolation and immobilisation of plant, is a pre-requisite to the issuing of permits, the safety management system should set out the arrangements for securely locking off sources of energy and, thereafter, for effective control over the keys to these locks. All this means that electrical and mechanical isolators should be equipped so that locks can be readily applied when in the isolated position.

25. Permit to work schemes should lay down the status of the persons authorised to issue and receive permits and the arrangements for ensuring that others who need to know about the work being undertaken are informed. Also, it should be specified how the persons involved are to be informed about the details of the plant on which they are to work.

Professional Health and Safety Advice

26. Arrangements should be set out for providing professional occupational health and safety advice to line managers and the role of such advisers should be made clear. Although health and safety is a line management responsibility and safety engineers, safety officers etc should not be used in a way that dilutes this responsibility, they should have available to them communication conduits to the most senior levels of management.

Selection Criteria for Offshore Installation Managers

27. Companies should set out their criteria for assessing the command ability of Offshore Installation Manager (OIMs) and other key personnel having special duties in relation to emergencies and for the on going training of personnel in these posts.

Emergency Command Organisation

28. Those in control of installations should consider the events that could give rise to emergencies on their installation and any supporting vessels or aircraft. These should not only embrace situations requiring major evacuations of parts or complete installations but should extend to all circumstances in which emergency rescue might be necessary.

29. Having identified all emergency events, plans and procedures should be prepared for dealing with these including worst case scenarios. A central part of these plans and procedures will be the management command structure for assessing and reaching decisions on the situation; the communication links with personnel around the installation, neighbouring installations and on associate vessels; and the methods of alerting the rescue services. The safety management system should set out the arrangements for ensuring that all personnel are familiar with the facilities for making them aware of emergencies and with the way they are expected to behave. The safety management system should also set out the type and frequency of drills to be carried out to both test and enhance the familiarity of personnel with the plans and procedures.

Involvement of the Workforce in Health and Safety

30. Safety management systems should lay down the arrangements for involving the workforce in health and safety and for consulting them about the safety case for their particular installations.

Accident and Incident Investigation

31. Those in control of offshore operations should ensure that they are made aware of all accidents and incidents which could give rise to accidents. The more seriousness of these will be statutorily reportable to the Regulatory Authority. However, whether or not they are reportable, the safety management system should make arrangements for them to be competently investigated and for their circumstances to be brought to the attention of senior management so that action can be taken to prevent recurrences and any lessons can be given wide promulgation. The investigations should be thorough and aimed at discovering the wider causes of accidents rather than being limited to the immediate failures or shortcomings. It is worth remembering that in the ultimate analysis, all accidents are preventable and all are the responsibility of management.

Arrangements for Regular Monitoring and Periodic Auditing of Health and Safety Performance

32. It is not sufficient to establish safety policies, safety procedures and a line of command and accountability for applying the policy and procedures. The loops have to be closed by

suitable monitoring systems that detect levels of health and safety performance and compares them with the expectations of the safety policies and to take any necessary actions. Senior and junior managers need to know whether or not their safety policies are being implemented.

33. Direct monitoring of health and safety performance is difficult since disasters, accidents, dangerous occurrences and other near miss incidents are too low in number to give a true measure of achievement, although the numbers and rates might well be much above what is deemed to be acceptable. Therefore management has to support its limited direct measures with indirect techniques. These take the form of systematic evaluations of the extent to which safety programmes are being followed by monitoring against pre-determined performance standards. The results should be used not only to determine whether or not the laid down system is functioning but also to progressively establish higher attainment goals.

34. Safety management systems should specify the arrangements and schedules for regular monitoring health and standards. The form of the monitoring will depend upon the operations under focus. For a straightforward workplace it might start with a look at the general standards of husbandry and expand to include simple checks on such matters as the application of procedures, the competence limitations of the people involved in relation to the tasks they are expected to undertake. At the design stage the monitoring would take a different form, perhaps including checks to see that the correct written standards are being applied and that error checking procedures are being used.

35. The monitoring should be carried to at prescribed intervals by the personnel, both supervisory and otherwise, directly involved in the operations under scrutiny with some organisational and inspection inputs coming from the appropriate safety professionals. The results should be recorded and, together with any remedial actions taken, passed to senior management.

36. Periodic auditing is a more strategic in-depth exercise which is not only aimed at testing out that the laid down health and safety measures are working but also looks and questions the worth and relevance of the measures themselves. Auditing should be conducted by a team of people having some independence from the activities or workplaces being examined at intervals laid down in the safety management system. Generally, complete independence would not be achievable since the team would have to have some background knowledge of the layout and workings of whatever is being considered and collectively would need to have the full range of competencies relating to the audit being undertaken.

37. Whatever approach is adopted towards regular monitoring and periodic auditing the resulting scheme should achieve four objectives. First, monitoring and auditing, with differing degrees of independence, should provide information on health and safety performance to local supervisors and to the highest level of management within an organisation.

38. Second, the process of monitoring and auditing health and safety performance helps create a safety culture within companies. This can be defined as the willingness in individuals and companies to act correctly no matter what the pressures might be to do otherwise.

39. Third, monitoring and auditing generate a climate in which progressive improvements can be made to both the health and safety objectives and the actual achievement levels of an organisation.

40. Fourth, monitoring and auditing enables local management to recognise and act to remove potential causes of disasters, accidents, dangerous occurrences and property damage. There is an empirical relationship between the number of accidents and the situations that are likely to give rise to accidents.There are a number of propriety audit schemes available,some which have more relevance to the offshore industry than others. In broad terms these schemes are aimed at measuring management commitment and the effectiveness of management control over matters connected with health and safety. However, there is no reason why companies cannot generate their own audit schemes using similar principles to those laid down in BS 5750 or adapt one or more of the commercially available schemes to suit their particular circumstances.

HEINRICH TRIANGLE

41. The empirical relationship between accidents and near misses mentioned above is often referred as the Heinrich Triangle. But there are different triangles for different end events. In other words, although there may be some overlap, the near-miss incidents that have to be avoided to reduce the probability of having a stumbling, falling and slipping accident are different to those for some other categories of accidents such as those resulting from falling objects, unguarded machinery, electric shock, structural failures, ship collisions, and gas explosions. The latter groups all have disaster potential and it follows that the near-miss events forming the basis of these triangles should be given very particular attention by the Safety Management System.

RELATIONSHIP BETWEEN THE QUALITY OF SAFETY MANAGEMENT AND QUANTIFIED RISK ASSESSMENT

42. Once designed and constructed, the safety of an engineering system depends upon a complex interaction between the reliability of the hardware and the ability of human operators to either take the hardware outside of its design characteristics or to recognise impending hardware failures and to take appropriate corrective action.

43. Notwithstanding the difficulties of assessing the hardware reliability of the systems made up from components designed and constructed on an almost bespoke basis, and of using systems with active redundancy, the question arises of how much numerical credence it is realistic to attribute to either the human foul-up or the human corrective factor. The fact that these forces can act in either a beneficial or detrimental way illustrates the difficulty of attempting to assign a numerical figure to the human element in risk assessment. In simple terms, humans have a tremendous capability to intervene positively and sensibly when things start to go wrong but natural frailties and temptations can themselves cause difficulties.

44. Although it is doubtful whether it will ever be possible to assign a figure to human reliability, current research work in this area is likely to improve understanding about the influencing factors.

CONCLUSIONS

45. Satisfactory health and safety standards can only be achieved by effective management control. The difficulties do not lie in establishing control procedures but in making them work. Health and Safety performance standards, and the monitoring of their achievement are essential for success. Shortcomings in some areas have much greater consequences than in others and it is vital that these areas are identified and given the treatment that they deserve.