

Title	Offshore Technology Report 543: Human and organisational factors in offshore safety
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Executive Summary	<p>This report (OTH 97 543) presents the results from Project P3366 which has investigated human and organisational factors in offshore safety. The project was jointly sponsored by British Gas, British Petroleum, Coflexip Stena Offshore, Conoco UK Ltd., Elf Enterprise Caledonia, Texaco, Total Oil Marine, the Offshore Contractors Association and the HSE Offshore Safety Division. The study comprised three phases of work with the following objectives:</p> <ol style="list-style-type: none"> <li>1. To measure human and organisational factors identified as most important for offshore safety in the 1994 Risk Perception study using the Offshore Safety Questionnaire (OSQ)</li> <li>2. To examine the role of the supervisor in determining safe working practices in their team or crews</li> <li>3. To investigate human factors coding systems and training practices in high hazard, high reliability industries and to see whether these codes correspond with the human factors causes of accidents as measured by the OSQ.</li> </ol> <p>A representative sample of 722 employees working on 11 offshore installations (33% response rate) and 103 employees from 2 onshore installations (40% response rate) were surveyed using a modified version of the 1994 'Offshore Risk Perception Questionnaire'. The new 'Offshore Safety Questionnaire' (OSQ) and 'Gas Terminal Safety Questionnaire' (GTSQ) included scales measuring 'Work clarity', 'Work pressure', 'Job communication', 'Safety behaviour', 'Risk perception - hazards and work tasks', 'Satisfaction with safety measures' and 'Safety attitudes'. The questionnaire also included a section on self-reported accidents and near misses and the causes which victims ascribed to their accident.</p> <p>The results of the questionnaire survey showed that a majority of both the onshore and offshore samples felt 'safe' with regard to a range of potential hazards on oil and gas installations and felt 'satisfied' with safety measures designed for the detection, prevention and control of incidents. The majority of respondents also experienced good 'Work clarity' and 'Job communication' and reported that they 'never' committed violations or unsafe acts, although about a third of each sample admitted to carrying out some violations 'seldom/sometimes'. The 'Safety attitudes' scale revealed a diversity of opinions about safety and accident prevention at work. Personnel seemed generally positive about 'Supervisor commitment to safety' and 'OIM (Offshore Installation Manager)/ TM (Terminal Manager) commitment to safety'. In addition, the majority did not feel that it was necessary to violate procedures and take risks in order to get the job done. They were more ambivalent about 'Speaking up about safety' and in their 'Attitude to rules and regulations'. Finally, contractor staff generally expressed a diversity of attitudes about 'Management commitment to safety'; 'Contractor company commitment to safety' and 'Confidence in the operating company', depending on which company they were working for.</p> <p>Multivariate analysis of the questionnaire data revealed a variety of 'safety subcultures' operating in the offshore environment, characterised by differences in the opinions and attitudes of employees from different companies; supervisory status and occupation. A number of different 'safety climates' were also apparent as evidenced by differences in perceptions of the state of safety on the various installations surveyed in the study. Accident victims had more negative opinions about factors affecting safety than those who had not had an accident, Irrespective of whether these opinions are a cause or an effect of the accident, accident victims hold these opinions now and steps should be taken to improve their perspective on</p>

safety. These steps should include further emphasis by both peers and management that violations will not be tolerated and also improving accident prevention measures onboard installations.

In more general terms, improvements in safety could be brought about by reviewing the causes of violations, i.e. inadequate rules and procedures (as experienced by about a third of respondents) and work pressure. Personnel, in general, should also be encouraged to 'Speak up about safety' more, without fear of reprimand or sanctions being taken against them.

The results of the supervisors' study indicate that 'more effective' supervisors in terms of safety performance, value their subordinates and the work that they perform to a greater extent than 'less effective' supervisors. They appear to have a supportive style of management and be concerned for their subordinates welfare. They visit the work-site frequently to see how their subordinates are getting on, out of interest and not to try and catch people out. When visiting the work-site they monitor the safety of the operation and raise any safety concerns they may have with their subordinates. 'More effective' supervisors tended not to talk about productivity and costs to the same extent as the 'less effective' supervisors. When they did speak about production they felt that it was their role to try and remove subordinates' perception that there was a need to compromise their own safety to get a job done.

The third phase of the project has provided a description of the human factors accident causation codes which are currently used by the UK offshore oil industry. These are compared against codes used in accident reporting forms by other high reliability industries. There appears to be a large degree of variance between companies in the UK offshore oil industry with regard to content, clarity and structure in their accident reporting forms, investigation procedures, guidance manuals and accident investigation training courses. It has proved difficult to obtain complete and accurate accident statistics with regard to their human factors causes, and companies tend not to use this data in their accident prevention strategies because of lack of expertise in this area. In addition, trained accident investigators do not code the same accident scenario consistently with regard to the human factors causes of the accident.

Recommendations arising from these three phases of work include the following;

- Personnel working on oil and gas installations appear unsure about speaking up about safety issues and are not entirely convinced of the utility and efficacy of rules and regulations. A proportion also feel it is necessary to violate rules and regulations in order to achieve production targets, and furthermore admit to 'occasionally' carrying out violations to get the job done. It is necessary for management to cultivate an atmosphere in which personnel are willing to share information about safety issues and feel uninhibited about expressing their views on such matters. In addition, it is necessary to reinforce the belief that violations will not be tolerated, unless the rules and regulations which are in place to control risk and safety are proved to be totally inadequate or would benefit from modification.
- How supervisors manage the production versus safety issue and their acceptance or non-acceptance of violations on the job determines their 'effectiveness' in terms of safety performance. Furthermore, 'less effective' supervisors appear to abdicate responsibility for safety and actually perceive that they are under more pressure from management to get the job done. Supervisors thus need to be trained in key man-management skills related to leadership, communication, understanding and respect for others' opinions. This can be done through 'Crew Resource Management' (CRM) which was developed in the aviation industry to improve team skills on flight decks.

Modified versions of CRM have already been developed for aircraft maintenance crews and control room operators in the nuclear industry and this approach has been proposed in a new project on the management of safety in the oil industry (see Flin and Mearns, 1997).

- Analysis of oil industry accident reporting forms suggests that some companies would benefit from including more detailed human factors codes, such as those used in the marine and aviation industries. In addition, companies should agree on a common set of codes which would facilitate accident analysis on a larger scale in oil industry accident databases. This would help identify some of the more common trends in human factors causes of accidents. It is also suggested that accident investigation procedures are standardised throughout the industry so that the accident investigation process is consistent both between and within companies. The lack of consistency, even among relatively experienced personnel, in their coding of human factors causes of accidents, indicates a need for more training and a better understanding of those factors which influence human behaviour at the workplace.

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