



Health & Safety
Executive

**OFFSHORE TECHNOLOGY
REPORT - OTO 98 160**

**National Inspection Project
on
Shift Handover**

National Inspection Project on Shift Handover

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1. EXECUTIVE SUMMARY

The process of shift handover was examined in a National Inspection Project involving sixteen offshore installations operating on the UK Continental Shelf. Five mobile drilling rigs and eleven fixed installations were included.

A wide range of practice was found, with no major differences between drilling rigs and fixed installations. There were a number of areas of good practice. These included an IADC initiative on improving shift handover, and some extremely comprehensive company standards and procedures on some fixed installations. However, in other cases management controls were absent, and there was a reliance on informal learning. Key findings were:

- a significant proportion of companies had no minimum standard, and half did not provide written guidance on how to conduct a handover
- less than 50% referred to shift handover in their safety case
- good practice on effective handover at crew change was not uniformly implemented
- in three organisations, the information needs of the key operational personnel had not been identified
- front line operational personnel appeared to be less aware of high risk or problematic handovers than senior managers
- few companies provided training, instead relying on informal, on-the-job learning
- only six companies regularly monitored or audited handovers
- fourteen accidents were identified involving miscommunication at shift handover, the majority of which concerned information about ongoing maintenance or plant status

The main conclusion of the project is that scope exists to improve current practice across the offshore industry by sharing best practice. Specific requests for additional information and guidance were noted, namely examples of good practice and case studies, possibly in video format.

2. INTRODUCTION

2.1. AIMS AND OBJECTIVES

The project aim was to influence duty-holders to improve the process of shift handover.

Specific objectives were to:

- determine the operator's philosophy on shift handovers
- examine specific tools and techniques
- observe the handover process, and comment on its effectiveness
- examine how duty-holders assess the effectiveness of this process
- encourage workforce involvement

2.2. BACKGROUND

This inspection project was compiled by Ronny Lardner, a Chartered Occupational Psychologist at The Keil Centre, Edinburgh, in conjunction with the SMS Team. Previous research carried out for OSD by Ronny Lardner involved a literature survey, and had highlighted the importance of handovers by reference to incidents and accidents, onshore and offshore. There are three published incidents affecting the offshore industry. All involved maintenance work which continued over a shift change.

A report of the research was published by OSD¹ and provides important background reading. This report is available to industry on request. The work was also published in The Chemical Engineer, 28 November 1996.

The literature review, and OSD's proposal to follow up the research with an inspection project, were discussed at a consultative seminar involving approximately 60 delegates from the offshore industry, in Lord Cullen House on 20 September 1996. About half the delegates admitted to having experienced problems in this area.

Shift handover arrangements should be based on critical analysis and identification of information needs. Special consideration should be given to certain "high risk" handovers, such as those at crew change. The most important information should be given high priority, while information of lesser importance should be appropriately filtered out. There are also key elements in how to give an effective handover.

Identification of information needs for shift handover ideally comes from a participative approach involving management and the workforce.

2.3. METHOD

A comprehensive inspection manual was developed, which used a mix of structured questions, observations and collection of documentary evidence to gather objective information. The first part of the inspection involved visiting the onshore base of each company, to gather information on policies, procedures and standards. Subsequently offshore operations were inspected during visits to offshore installations. The project involved interviewing personnel at three levels in each organisation to allow comparison of policy and practice, namely:

- Senior Onshore Manager - policy, procedure and standards
- OIM - operational overview
- Operational Supervisor - day-to-day operations

Following a pilot exercise in October 1996, the project was carried out between April 1997 and March 1998.

Sixteen installations were inspected. These included five drilling rigs and eleven fixed production installations, one of which was normally unattended.

3. ORGANISATIONAL POLICIES AND PROCEDURES

3.1. SAFETY CASE

Less than half of the companies inspected had described or referenced shift handover arrangements in their safety case. Two were intending to include this topic in the next safety case revision.

3.2. MINIMUM STANDARD

Nine of the sixteen companies inspected had defined a minimum standard for shift handover. The standards typically defined who must conduct a shift handover, the responsibilities of both participants in the handover, and emphasised the need for accuracy and a mix of written and verbal communication. Key categories of mandatory/optional information to be communicated at handover were defined.

3.3. WRITTEN GUIDANCE

Only half of the companies inspected had provided written guidance to operational personnel on how to conduct an effective shift handover. In some cases this was incorporated within the text of the organisation's minimum standard. Some examples were extremely comprehensive.

3.4. RECOGNITION OF HIGH RISK OR PROBLEMATIC HANDOVERS

Senior managers were questioned about their awareness of five known high-risk or problematic types of handover. The percentage of senior managers who identified each type of handover as high-risk is shown below, and is contrasted with the views of operations managers and supervisors. The trend shown is of less awareness of risk by those directly involved in operational handovers. This suggests operational staff, particularly supervisors and front-line personnel, should be made aware of the risks involved.

Table 1 - Awareness of High Risk or Problematic Handovers

| Problematic or high risk type of handover | % Identifying Handover as Problematic or High Risk | | |
|--|--|--|-------------------------------------|
| | Senior Onshore Managers (n = 16) | Offshore Operational Managers (OIMs) (n = 16) | Operational Supervisors (n = 14) |
| During maintenance which continues over a shift change | 44 | 44 | 14 |
| At crew change | 56 | 25 | 14 |
| During abnormal operations | 31 | 31 | 21 |
| After a lengthy absence from work | 13 | 31 | 7 |
| Between experienced and inexperienced staff | 13 | 25 | 14 |

Other problematic or high-risk types of handover mentioned included, during well operations; when critical operations cannot be suspended during handover; during complex operations and shutdowns; from OIM to OIM; during a process intervention; when conducting operations with a third party; during novel operations; handovers involving normally unattended platforms; handovers concerning the rig ballast system; overrides/inhibits; when new production demands coincided with handover; during hazardous well work; heavy lifts; new production wells; chemical handling; when the supply vessel was alongside; and during refuelling of helicopters.

3.5. SELECTION AND DEVELOPMENT OF STAFF

The inspection project asked each organisation whether communication skills were amongst the selection criteria for key post holders, e.g. the operation supervisors/superintendent. All but one organisation confirmed that communication skills were included in selection criteria. Assessment of communication skills invariably involved an interview, supplemented by references and a verbal presentation or written exercise. Other assessment methods which were less commonly used included an occupational personality questionnaire, a role play or group task and ability test. Internal candidates' previous performance measured via the appraisal system was also used extensively.

Only four of the sixteen organisations provided training for new or existing staff in how to conduct a shift handover. Those who provided training did this at induction or "on the job" against existing company standards. A number of those organisations who did not provide training reported that their staff learned informally by observing others.

Thirteen of the sixteen organisations reported that a variety of generic training courses were available enabling new or existing personnel to develop their communication skills if required.

3.6. ADDITIONAL INFORMATION/GUIDANCE

Organisations were asked what form of additional information, guidance or other materials they would find helpful concerning the topic of shift handover. The responses of people at different levels in the organisation are shown below.

Table 2 - Requests for Additional Information/Guidance

| Type of information/guidance | Number of requests | | | Total |
|------------------------------|-----------------------------|----------------------------------|-------------------------------------|-------|
| | Senior Managers (n = 16) | Operational Managers (n = 16) | Operational Supervisors (n = 14) | |
| Examples of good practice | 6 | 7 | 7 | 20 |
| Case studies | 4 | 8 | 7 | 19 |
| Analyses of incidents | 4 | 4 | 3 | 11 |
| Video | 8 | 4 | 4 | 16 |
| Training manuals | 2 | 2 | 3 | 7 |
| Guidance | 4 | 5 | 5 | 14 |

Other requests were for an audit system and information on the use of electronic handover of information.

4. OFFSHORE ARRANGEMENTS

4.1. SHIFT SYSTEMS

The most common crew change arrangement was two weeks offshore, two weeks onshore which was worked by thirteen of the sixteen companies. Two others worked three weeks on, three weeks off and the remaining company a week on, week off.

All operations worked 12-hour shift systems, typically changing over between 0600 and 0700 hours and again between 1800 and 1900 hours. The exception was one drilling rig where 12-hour shifts ran from 1130 to 2330 hours and 2330 to 1130 hours.

4.2. CREW CHANGE ARRANGEMENTS

Offshore operators report that little or no time is available for a face-to-face briefing at crew change due to the cost of helicopter time. Consequently all companies were asked to identify the strategies they adopted to optimise crew change. Examples of good practice are listed below, and may prove useful when considering how to improve current arrangements:

- incoming personnel phone their back-to-back the day before crew change for a verbal update
- visit company offices to see rig manager for update on morning of departure offshore
- crew report to company offices and use video link for handover before flight offshore, and also phone back-to-back the night before
- comprehensive summary of key events during absence prepared for incoming personnel to read on arrival offshore
- comprehensive notes faxed or e-mailed to incoming personnel to read before and during telephone conversation prior to journey offshore
- incoming staff get handover from day crew, and are not dependent on outgoing crew for handover
- with two week on, two week off pattern, crew changes are staggered by one week to maintain continuity (i.e. 50% of crew changes weekly)
- incoming crew arrive mid-day, and have seven hours to get up to speed before commencing night shift at 1900 hours
- all crew have 5-15 minutes face-to-face handover in heli-deck or heli-lounge
- OIMs have e-mail communication between rig and home
- outgoing OIM usually available in first 24 hours after crew change for consultation, if required

All of these arrangements should help to ensure correct communication at crew change.

4.3. STRUCTURE OF SHIFT HANDOVERS

In all but three of the sixteen installations visited, the information needs of key post holders with responsibilities for day to day offshore operations (often the OIM) had been incorporated into a common structured method of shift handover. Many organisations had developed highly structured paper or computer-based handover logs based on pre-determined categories of information and checklists. In others the content of shift handover had not been formalised and depended on individual judgement and what were perceived as the requirements of the day.

4.4. SAFETY CRITICAL MAINTENANCE

It is particularly important to identify how maintenance work is communicated across shift changes, as lack of such communication has been a causal factor in several serious incidents offshore and onshore. Inspectors were asked to identify a recent example of safety critical maintenance work which had continued over a shift change. Fourteen of the sixteen installations were able to identify such examples. These examples were then examined in detail.

In those organisations which had effectively communicated such work, communication and co-ordination across shift change was maintained by a range of methods which included handover logs, co-ordination meetings, and toolbox talks.

4.5. AWARENESS OF COMPANY MINIMUM STANDARD

Where organisations had a minimum standard for shift handover, senior operational personnel were aware of this, and were also aware of the written guidance on how to conduct an effective shift handover.

4.6. HANDOVERS IN PRACTICE (OBSERVATION)

A total of fourteen handovers were observed by inspectors. Twelve handovers were conducted face-to-face; the remaining two being conducted with a back-to-back colleague or shore personnel by telephone. In one case this telephone communication would normally have been conducted by a video link, however the link had broken down on the day. These handovers were conducted free from distractions and interruptions, with the logbook present, and involved both parties actively participating in a two-way communication. In most cases the inspectors described the handovers as professional and thorough, and were satisfied with what they observed.

5. PERFORMANCE MEASUREMENT

5.1. MONITORING/AUDITING

Only six of the sixteen companies had a written requirement for periodic monitoring or auditing of shift handover. At least one company was considering introducing such a requirement as a result of this inspection project.

In one company a copy of an internal shift and crew change handover audit was obtained. This had been carried out over a year before the inspection project. The main finding of this internal audit was that although a comprehensive company standard existed, few operational personnel were aware of its existence or requirements.

There was a wide range of frequencies of audit. In some cases this was monitored daily whereas in other organisations auditing of shift handover would be included in the corporate audit every three years.

5.2. INCIDENTS/NEAR MISSES

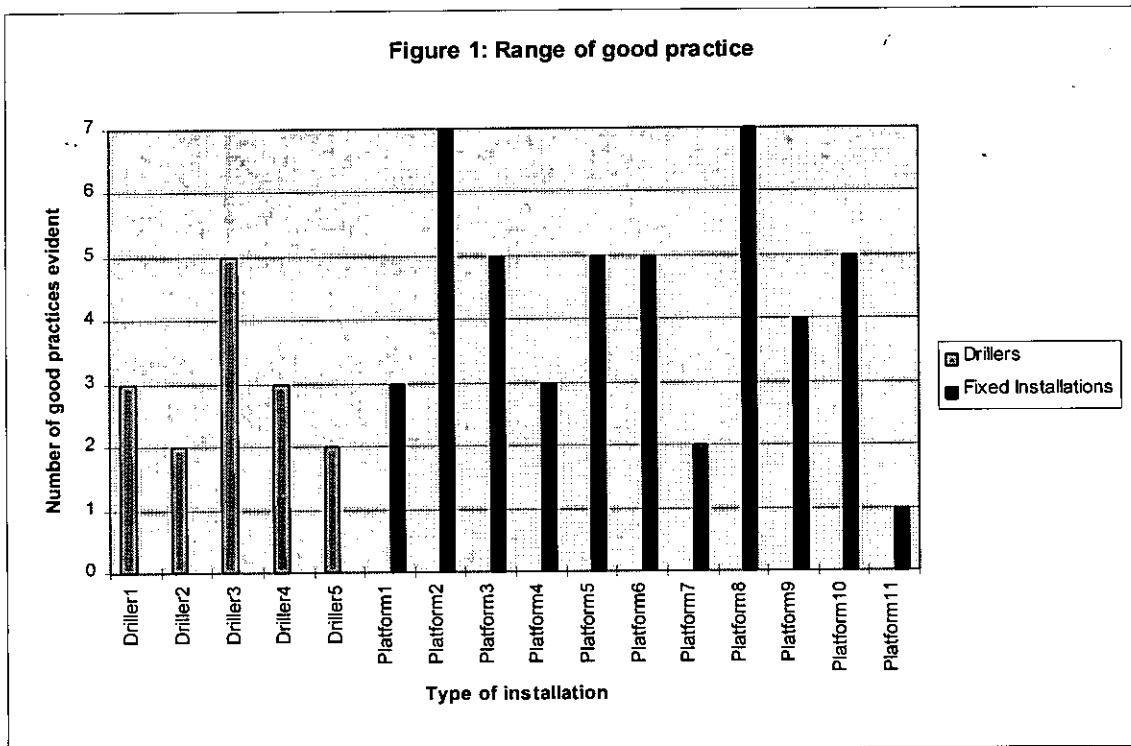
Each operating company was asked for details of any incidents they were aware of where failure of communication at shift handover had led to problems or near misses. A total of fourteen incidents were identified, which are summarised in Appendix 1. The majority of these incidents concerned failure to accurately communicate information about ongoing maintenance work or plant status at shift change. Consequences of these incidents included an injury, loss of hydrocarbons, damaged equipment, loss of production or power and wasted time. When combined with the previous HSE publication on shift handover this information should assist in identifying key categories of information which need to be handed over at shift change.

6. COMPARISON BETWEEN INSTALLATIONS

To permit comparison between individual and group data for drilling rigs and fixed installations, seven key inspection questions were identified for which complete data was available. Each question is reproduced in full in Appendix 2, and demanded an unambiguous yes/no response. The topics covered by these questions were:

- safety case
- minimum standard
- written guidance
- monitoring/auditing
- selection criteria
- training
- structured logs

Each of the sixteen installations inspected was allocated a score indicating the number of good practices which were evident. The possible scores ranged from zero (answered no to every question) to seven (answered yes to every question). Figure 1 below displays the range of scores obtained by each of the drilling rigs and offshore installations. Perhaps the most surprising finding is the range of good practice identified. Two platforms scored the maximum of seven. One platform was able to identify only one area of good practice they adhered to.



The average score of the five drilling rigs was 3.0 and the platform average was 4.3. Due to the small number of drillers inspected, this difference should not be interpreted as indicative of a wider trend. Closer analysis revealed the main differences between drillers and platforms was more emphasis on monitoring/auditing and selection criteria amongst platform operators.

It appears that potential exists for industry to share best practice to improve overall standards.

7. CONCLUSIONS

A number of areas of good practice were identified during the inspections. These included an International Association of Drilling Contractors' initiative on improving shift handover, and some extremely comprehensive standards and procedures for shift handover.

However, a wide range of practice was found. In some instances management controls were absent, and a reliance on informal learning existed. Specifically:

- a significant proportion have no minimum standard
- half of the companies do not provide written guidance on how to conduct a handover
- over 50% of companies do not include shift handover arrangements in their safety case
- good practice on effective handover at crew change was not uniformly implemented
- in three organisations, the information needs of the key operational personnel had not been identified
- operational personnel appear less aware of high-risk or problematic handovers, however are responsible for their conduct
- few companies provided training, instead relying on informal, on-the-job learning
- only six companies regularly monitored or audited handovers
- Fourteen incidents were identified involving miscommunication at shift handover, the majority of which concerned information about ongoing maintenance or plant status

Despite these mixed findings, the individual handovers observed by inspectors were professional and thorough.

These findings have to be set in the context of numerous published and unpublished incidents, where miscommunication at shift handover has been a contributory or causal factor. One conclusion which must be drawn is that some organisations regard shift handover as an activity which does not require careful management, instead relying on informal learning and a less systematic approach. The lessons from incidents suggest this is unwise.

Requests were made for examples of good practice and case studies, possibly in video format, to help improve policy and procedures and demonstrate effective communication at shift handover.

The results of this inspection project provide an informed basis upon which a cross-industry initiative could seek to further improve shift handover arrangements across the offshore oil and gas industry.

¹ Lardner, R (1996) Effective Shift Handover - A Literature Review Health and Safety Executive, Reference OTO 96 003

APPENDIX 1

Incidents where failures of communication at shift handover led to problems or near-misses

| Company identification number | What happened | Consequences | What was learned |
|-------------------------------|--|---|---|
| 4 | Drill pipe pup joint prepared for testing. Operation suspended overnight. Operation recommenced by different person next day, who was unaware that pup joint was under load. Whilst crane was being attached, pup joint dropped. | Injured hand. | Need to thoroughly communicate status of work when others take over job. |
| 8 | One shift put isolation on level sensor bridle. Not included in handover. Next shift found out when investigating system upsets. | Could have led to carry-over of condensate into flare system. | Need to put in place effective shift handover. |
| 11 | Supervisor carried out an incorrect start-up operation and did not communicate this at shift handover. | Loss of 300 tons of crude oil overboard. | Need to apply procedures correctly and communicate state of plant accurately. |
| 12 | Major hydrocarbon release when plant brought back onto line as over-ride was not communicated at shift change. | Major hydrocarbon release - no injuries. | Need to communicate over-rides at shift change. |
| 13 | Seal oil accumulators were overpressurised on one shift, resulting in blow-out of mechanical seals. Learning was not communicated across shift change, and next shift repeated same incident. | Two sets of blown mechanical seals. Could have resulted in pump case failing. | Need to hand over learning experiences. |
| 14 | A number of incidents regarding mechanical isolations, due to incorrect information | Hydrocarbon leaks, overpressure of equipment and cracks in | Need to communicate correct plant status at shift change. |

| | | | |
|----|--|---|--|
| | about plant status being communicated. | pipes. | |
| 1 | Lack of formal structure to handover notes contributed to miscommunication of product routings. | Pit of oil inadvertently dumped. | Need for structured approach to handover notes. |
| 3 | Crane boom wire being changed. Work spanned shift change. No shift handover completed. | Crane wire damaged, and rework required. | Comprehensive shift-to-shift handovers required between crane operators. |
| 9 | Low level diesel fuel alarm just before handover. Overlooked at handover. Fuel ran dry, and power was lost. | Loss of power. | Need for vigilance at shift handover regarding alarm cancellations. |
| 10 | No specific incident, but a belief that operator-induced shutdowns occur disproportionately on day of crew change. | Loss of production. | Plan main shutdowns to avoid crew changes. |
| 14 | Incomplete modification of 6" water pipe not communicated during deisolation and start-up of washdown pump. | Significant amount of water poured over people working in columns. | Need for thorough communication between supervisors during long-term work. |
| 15 | New well handed over from drilling/well services to operations. Status of isolation miscommunicated. | Valve left closed with hydraulic pressure locked in, which meant DSV would not have been able to close. | Need for procedure to cover inclusion of valve status. |
| 10 | Solenoid stored in new location, but this was not communicated to oncoming shift. | Lost time. | Importance of attention to relevant detail in handover. |
| 14 | Mechanical isolations on condensate system not signed off as completed at handover. | No incident, but job stopped to reassess status. | Importance of completed documentation to indicate job status. |

APPENDIX 2

SEVEN KEY INSPECTION QUESTIONS

1. Are shift handover arrangements described or referenced in the safety case? YES/NO
2. Does this organisation define a minimum standard for shift handovers? YES/NO
3. Is written guidance available to operational personnel on how to conduct an effective shift handover? YES/NO
4. Is there a written requirement for periodic monitoring or auditing of shift handovers? YES/NO
5. Are communication skills amongst the selection criteria for key post holders e.g. operations supervisor/superintendent? YES/NO
6. Is training provided for new or existing staff in how to conduct a shift handover? YES/NO
7. Have the information needs of the key post been incorporated into a common structured method of shift handover? YES/NO