HSE
Health & Safety Executive

Review of wrong helideck landings, status lights and signalling lamps

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on behalf of **BOMEL Consortium**
for the Health and Safety Executive

OFFSHORE TECHNOLOGY REPORT
2000/067

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Review of wrong helideck landings, status lights and signalling lamps

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HSE BOOKS

First published 2001

ISBN 0 7176 2036 0

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HEALTH AND SAFETY EXECUTIVE
OFFSHORE DIVISION

A REVIEW OF WRONG HELIDECK LANDINGS, STATUS LIGHTS AND SIGNALLING LAMPS

EXECUTIVE SUMMARY

Wrong deck landings have occurred on the UKCS in recent years, but the officially reported, MOR (Mandatory Occurrence Report), frequency over the last decade is very low.

Not all wrong deck landings have been officially reported and no doubt there have been many 'near misses' that have gone unstated. If the number of actual wrong deck landing reports were increased tenfold, the frequency, as a function of the number of sectors flown each year, would still be low.

Realistically, it is unlikely that wrong deck landings can be entirely eliminated from offshore oil & gas activities because the vagaries of the human factor are ever present in the complex chain of operations.

Over the years, positive actions have been taken by industry towards reducing the opportunities for wrong deck landings. However, the continuing existence of this relatively low risk, low frequency event should not be ignored. This is because a wrong deck landing that suddenly encounters unexpected hazards, always has the potential to turn into a catastrophic situation.

There are always risks associated with a wrong deck landing. However, from experiences to date, the risks and consequences (perceived and real) are generally considered to be low for both the helicopter and personnel on board and an installation involved with an unscheduled helicopter landing. Various factors contribute to making a wrong deck landing, the most common being environmental awareness difficulties encountered by pilots flying in 'densely packed' areas of the UKCS.

Searching for a single solution to remove the potential for wrong deck landings is unrealistic. Continued effort is required by industry to maintain these occurrences at their current low frequency level. Some of this effort could also go toward seeking operationally efficient and cost effective ways to further reduce the problem.

It is recommended that each component of the current process (control procedures and basic signalling equipment, etc) is examined and tested to assess its effectiveness. If weaknesses are identified in the process consideration should be given to implementing

changes. It is specifically recommended that a practical, low cost approach be adopted for considering any improvements or modifications that are to be made to the process.

Discussions about the value and suitability of using signalling devices (e.g. Aldis Lamps) to help eliminate wrong helideck landings offshore have gone on within the industry for the last seven or eight years and a 'limited trial' has been carried out. To date the issue is still unresolved.

This issue should be resolved as soon as practicable. It is a prudent action to determine whether or not signalling lamps can effectively and efficiently contribute to reducing wrong deck landings. To overcome the apparent impasse there are a couple of possible ways forward:

1. Industry (UKOOA and BHAB jointly) should carry out, and report in detail, a further 'controlled trial' using the Aldis type signalling lamp (or similar device), and / or;

2. Duty holders, in conjunction with their helicopter operators, should evaluate the benefits of using signalling lamps to reduce the potential for wrong deck landings on their installations.

1. INTRODUCTION

This study report was commissioned by the Health & Safety Executive (HSE), Offshore Safety Division (OD 5.5).

1.1 PURPOSE

The HSE's primary objective is to obtain a better understanding of the causes and consequential hazards and risks associated with UKCS offshore helicopter wrong deck landing occurrences.

Secondly, to seek a way forward toward resolving the long standing issue within the Oil Industry Advisory Committee (OIAC) - Helicopter Liaison Group (HLG); namely, should Signalling Lamps be used for assisting pilots to positively identify the correct helideck prior to landing on offshore installations.

1.2 SCOPE

The study is broken down into three parts for ease of reference, that must be addressed in order to meet the primary and secondary objectives. The topics are:

- Wrong Deck Landings
- Helideck Status Signalling Systems
- The ALDIS Lamp

Expressed views on each of the above topics are diverse. Therefore, to bring together a balanced report, discussion with a wide range of people with differing opinions, knowledge and experience was necessary.

Contacts have included representatives of British Airline Pilot's Association (BALPA), British Helicopter Advisory Board (BHAB), Civil Aviation Authority (CAA), Health & Safety Executive (HSE) and United Kingdom Offshore Operators Association (UKOOA). Additionally, individual views and experiences have been sought from an Airfield Service Company, Helicopter Operators (managing and line pilot), Oil Companies, Signalling Equipment Suppliers and Trade Unions.

The time given over to discussions by all contributors has been much appreciated by the author and hopefully this approach has ensured a balanced outcome to the report.

2. Part 1 - WRONG DECK LANDINGS

2.1 BACKGROUND TO WRONG DECK LANDINGS

Potential for landing on the wrong helideck is an occurrence that has been present in the UKCS for several years. As the UK offshore industry has matured, the number of helidecks available for helicopter crews to land on has increased significantly. This numerical increase in helidecks results directly from the large number of oil and gas platforms that have been installed, the many mobile drilling rigs that move around the UKCS to various well sites and a myriad of other specialist vessels used for offshore support activities. Often, these platforms, rigs and vessels are clustered together in groups, rather than working in total isolation. This pattern of distribution is simply because UKCS offshore facilities nowadays tend only to operate where reserves are proven and prospects are very good.

For helicopter crews, the current pattern of offshore operations in UK waters has both advantages and disadvantages.

The advantage with a mature area of operation is there are a lot of installations and vessel activity. This in turn means that flight coverage and control is usually very good and there are many helidecks (available landing sites) and support vessels (to initiate a ditching recovery) in the event of an in-flight emergency.

The main disadvantage is the problem of environmental awareness. With high density offshore operations, one installation or vessel can look very similar to another from the air and at a distance, particularly in moderate to poor visibility conditions. This situation gives rise to helideck identification problems for a helicopter crew, unless they are very familiar with the operating area and the available landing sites.

It should also be noted that despite the availability in modern helicopters of sophisticated navigation and communications equipment to assist the crew for most of the flight, the final check that an aircraft is arriving at the correct landing site is currently achieved only by the flight crew positively identifying the helideck by NAME. Sometimes, this procedure is simply not enough to prevent a wrong deck landing.

The final helideck identification (NAME check) takes place when crew workload and activity on the flight deck is at it's highest intensity during the critical landing phase. It has been suggested informally (by BALPA) that nowadays, due to commercial pressures and the underlying 'name and shame' culture, flight crews go to disproportionate lengths to avoid landing on the wrong helideck. As much as

50% of their attention during the final approach is given over to correct helideck identification. This identification may not be seen until the aircraft has passed the landing decision point (i.e. as close as 200 metres and at a speed of less than 40 knots).

If this estimate of crew workload to identify helidecks is accurate (the figure of 50% was not substantiated by the author), then, this flight safety issue should be speedily addressed by CAA. An excessive cockpit workload of this order, which diverts crew attention during a critical stage of the landing procedure could cause a catastrophic event, as a result of pilot misjudgement caused by other distractions during landing manoeuvres.

Initially, in the early years of UKCS offshore operations when pilots made a wrong deck landing it mostly caused embarrassment for the 'offender', due mainly to 'loss of pride' in his airmanship. The 'event' itself and the pilot's discomfort was generally greeted with mirth by his peers. Also, at this time wrong deck landings were rarely, if ever, officially reported. In the last decade industry management attitudes toward wrong deck landings have hardened, probably due more to commercial pressures rather than for purely safety reasons. So, nowadays these indiscretions do not go overlooked and more are being officially reported.

When a wrong deck landing occurs, this invariably means a formal report between the oil company and helicopter operator and then, if considered appropriate by the helicopter operator, a report is submitted to the CAA in the form of a Mandatory Occurrence Report (MOR). In each case some form of personnel action will probably be taken because these reports cannot easily be ignored. Therefore, the prospect of making a wrong deck landing now is cause for real concern for line pilots. Their job may well be on the line if one day, they happen to make a simple navigation error and as a consequence, they inadvertently land on the wrong helideck. For any pilot who lands on the wrong helideck due to poor airmanship and inattention to his flight plan there should be little, if any, sympathy. His career prospects as a command helicopter pilot should immediately be closely examined.

This situation raises a number of questions and issues. The most important are:

"How often does this sort of event occur and, if a helicopter does land on the wrong helideck, inadvertently or otherwise, what are the flight and installation safety implications?"

"Have flight safety concerns about wrong deck landings been overtaken by greater concerns about helicopter company reputation, such that the potential sanctions against flight crews have now suppressed any inclination pilots may have to **freely** report their concerns and adverse experiences?"

2.2 THE EXTENT OF THE PROBLEM

Any failure 'to arrive at the intended destination' can mean that an aircraft has encountered a serious problem which may then turn out to have tragic consequences. However, on many occasions, it is simply a navigation error. Fortunately, on these occasions the problem can often be corrected without unduly compromising flight safety. To establish a basis for reviewing the extent of the problem of wrong deck landings on offshore UKCS helidecks, the CAA - Safety Data Department's Mandatory Occurrence Report (MOR) Database (Ref 1) has been interrogated to obtain relevant reports.

The period covered is from 1 January 1976 (coincident with the introduction of mandatory occurrence reporting in the UK) to present day. Voluntary reports are also included and no distinction is made between them. The MOR records are generally received as a very brief summary of an occurrence.

Report outputs obtained from CAA - SDD are included in **Appendix A**.

The MOR reports which were received, have been assessed to give qualitative assessment of failure category and causes. There have been 18 wrong deck landing MORs submitted between 24 April 1989 and 1 February 1999, a period of a little over 10 years. They are distributed over the reporting period as follows:

1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
2	4	4	1	1	1	1	1	3	0

So far, no wrong deck landings have been recorded in 1999.

It should also be noted there are no reports of wrong deck landings recorded prior to 1989. This seems to be a common feature of the MOR database for occurrences relating to offshore helicopter operations. The lack of reports prior to 1989 supports the widely held view that in the early years, helicopter operators were fairly frugal with their 'official' occurrence reporting. It is therefore most unlikely that MOR reports alone can provide an accurate picture of the extent of the wrong deck landing problem. It is accepted that, previous reviews of occurrence reports (Ref 2) along with other informal reports, have shown that MORs are normally just the 'tip of the iceberg'.

Taking into account unreported occurrences and near misses it is not unreasonable to suggest that the total of potential wrong deck landings over the ten year reporting period could be in the order of ten times greater, approximately 180. This assumption is based on modified Heinrich Pyramid values of 1:29:300 (Ref 2).

This figure fits well with one or two “occurrences” or “near misses” each month and also correlates with informal estimates given by BALPA (and others) about six or seven years ago, that estimated wrong deck landings were in the order of 10 or 12 per year. Near misses were not included. The statistical data obtained from MOR reports also gives an indication of under reporting during this same period. However, it is very important to note that more recently the rate of wrong deck landings has dropped to about three or four a year, according to an informal BALPA report.

2.3 THE PATTERN AND REASONS FOR WDLS

2.3.1 AREAS, LOCATION AND TYPES OF INSTALLATION FOR WDLS

18 wrong deck landing MOR’s were analysed for area / location and type of installation in an attempt to determine whether any significant patterns emerged.

Well over half of the reports excluded reference to both the occurrence area / location and type of facility, so this exercise has proved of little value (see tables below). However, it is probably true to say that wrong decks landings occur randomly in all operational areas on the UKCS and involve all types of offshore facilities, with the possible exception of specialist support vessels.

Southern NS	Central NS	Northern NS	Morecombe	Not Known
2	1	3	3	9

Table 2.1 Area / Location

Fixed	Mobile	Vessel	Not Identified
4	1	0	13

Table 2.2 Type of Installation

2.3.2 REASONS FOR WRONG DECK LANDINGS

In all cases the primary cause is cited as Pilot Error because the pilot had misidentified the installation. It is however, important to understand why the pilot misidentified the helideck by taking a look at secondary causes.

The 18 MORs have been further analysed and secondary causes extracted from the reports. For some of the occurrences there are a combination of factors involved. These included:

- Marginal / Poor Weather / Low Visibility.
- Rig move not properly reported by owner.
- Wrong navigation heading selected.
- Poor flight deck supervision by Commander.
- Flight deck distraction during approach / landing phase.
- Incorrect routings noted by pilot.
- Changed routings during task flying.
- Turbulence / handling difficulties during approach / landing phase.
- Unapproved data given and used in RNav.
- Identical or similar installations nearby.
- Deck markings obscured by Guano.
- Incorrect installation designations used during communications.
- Several platforms / rigs in close proximity.

Most of the secondary causes listed above are valid contributory factors toward making an inadvertent wrong helideck landing. Just three are clearly a matter of poor airmanship. In all 18 cases the flight crews subsequently repositioned safely to the correct helideck. On other than the unmanned platforms, the helicopter would have stayed on the wrong deck until permission to takeoff was obtained to safely continue the flying task.

The above list of contributory factors is not complete nor exhaustive. There are other mechanisms which can also increase the likelihood of a wrong deck landing. Typically, these are:

- The flight crew may see an installation where and when they expect to see their destination and so will make an approach.

- The flight crews may get it into their minds they are going to one installation when they should be going to one nearby.

- The flight crew may not be able to see the installation NAME until they are relatively close on final approach, by which time they will (and should) be concentrating on the vital tasks of controlling speed, height, rate of descent, power, rate of closure, approach direction, avoiding turbulence, etc. Consequently, if they have headed towards the wrong helideck before they can identify it, they will probably not identify it at this late stage of the approach. By then, they are about to land on the wrong deck.

- The flight crew's workload may be high due to the complexity of their task combined with other factors. Identification of the installation will probably instinctively become one of the lower priorities in this case.

- Shuttle flights are normally undertaken visually because it takes several minutes to create and put in way points into the navigation system. It is not advisable for one pilot to have his head down in the cockpit for long periods when he should be looking out and assisting the pilot flying.

- A variety of human factors (behavioural science) that may have an adverse effect on flight crews which in turn, may lead to an inadvertent wrong deck landing.

2.4 THE FREQUENCY AND POTENTIAL HAZARDS FOR WDLS

2.4.1 FREQUENCY OF WRONG DECK LANDINGS

Based on MORs submitted from 1989 to date, the frequency of wrong deck landings over the last decade is calculated as 7.13E-06 (**Ref: Appendix B**). This is a low rate.

The best year was 1998 with no wrong deck landings recorded on MORs. By way of comparison the worst year recorded was 1997 with a frequency of 1.43E-05. Still a low rate.

It could be argued that if the rate were one order of magnitude higher (e.g. x 10, to cover under-reporting and near misses), the frequency of wrong deck landings for the number of sectors flown on the UKCS over the last decade is still low, at 7.13E-05.

2.4.2 HAZARDS TO THE HELICOPTER AND PERSONNEL ON BOARD DURING WRONG DECK LANDINGS

Referring once again to the 18 MORs there is only one report that identifies a potential hazard to the helicopter and its occupants during approach to and landing on the wrong helideck. A crane was in operation at the time. However, there is no mention in the report that because the crane was working at the time, this had any adverse effect on either flight or personnel safety.

In the remaining 17 MORs no installation operating hazards were reported at the time of landing on the wrong deck. There are, however, implications on flight and personnel safety. Primarily, there was no fire / rescue crew available to intervene if something had gone seriously wrong at any time during the initial period the helicopter was on the helideck. If an alarm was raised, the installation crew should, at any time, be able to quickly mount an emergency response anywhere on the facility, including the helideck. But, in all these instances precious time would have been lost in controlling a fire hazard and therefore the personnel on board the helicopter were exposed to a greater risk than normal.

The degree of additional exposure to personnel is difficult to quantify and will vary depending on the type of facility involved and the way helideck crew duties are assigned. On a manned facility a permanently assigned helideck crew is more likely to respond quicker to a non scheduled helicopter arrival than a helideck crew that is also the installation / vessel deck crew. Such helideck crews normally include the crane driver.

On not normally manned installations the procedures for fire cover and helideck management are different to manned facilities. The intervention crews (first flight in) are also members of the helideck crew. In this particular case, the potential hazards have already been identified and procedures will be in place to keep the risks to an acceptable level. Also, the number of personnel potentially exposed is deliberately kept small.

Other operational hazards that may also exist for the helicopter, it's crew and passengers as a result of making a wrong deck landing (depending on the type of facility) are:

- A process upset condition or well operations that could rapidly release gas to vent / flare, just prior to and immediately after arrival.
- Deteriorating weather and excessive vessel motions which may affect helicopter stability whilst on the helideck.
- Crane operations.
- Maintenance operations that may affect the helideck and support systems serviceability (e.g. anything that temporarily prevents compliance with CAP 437).
- Various activities associated with combined operations.
- Ballasting or anchoring operations on non-fixed platforms or structures.
- Radio silence procedures in effect.

Considering the above list of potential hazards and accepting that a pilot about to land unannounced on the wrong installation or vessel will be totally unaware of the installation / vessel operating status, landing on the wrong helideck cannot be considered as safe, despite the pilot having physical indications to the contrary.

Therefore, these potential hazards are all very good reasons for a pilot to be vigilant and to avoid making a wrong deck landing.

An in-flight emergency requiring an immediate landing is something entirely different.

It is also naturally assumed that where ‘status lights’ are fitted and operating or a Landing Prohibited Marker is displayed, pilots would not execute a landing, under any circumstances.

2.4.3 HAZARDS TO THE INSTALLATION / VESSEL FROM WRONG DECK LANDINGS

Apart from the helicopter and personnel on board, potential hazards to the installation / vessel must also be considered in the event of a wrong deck landing.

There is a potential problem to the installation if a helicopter lands on a deck which is not rated to accept the type of helicopter involved in the incident. Or if the helicopter takes up air space in the approach which could put personnel or equipment at risk on the installation.

If the helicopter lands without further incident, the risks encountered by the installation are probably no more than for normal helideck operations. These risks are well documented (and quantified) and are generally controlled. This of course assumes that personnel were not inadvertently caught on or around the helideck during the unscheduled landing.

If personnel happen to be working on or around the helideck (e.g. doing routine maintenance) at the time of the landing, then they would be exposed to a significant hazard and unnecessary risk. This is unacceptable, but the probability of such an event is estimated as very low.

2.5 ACTIONS TAKEN TO PREVENT WRONG DECK LANDINGS

Over the last decade, various positions on the problem of wrong deck landings, have been adopted by industry bodies, duty holders and helicopter operators. Several positive actions have also been taken to reduce / control the risks, these are detailed below.

To a large extent the problem of wrong deck landings falls to the aviators. They manage and fly the helicopters. Therefore, actions in this regard are entirely the responsibility of the helicopter operators. The potential risks to personnel travelling offshore in helicopters and the offshore installations themselves is a matter for the oil and gas companies to reconcile. However, there is a shared responsibility between the aviation and offshore industries for ensuring that offshore landing sites meet and maintain the required standards and that management of offshore

helicopter operations is properly executed. This shared responsibility requires greater focus by all parties in order to consistently achieve both individual and joint objectives.

2.5.1 THE HEALTH AND SAFETY EXECUTIVE, OFFSHORE SAFETY DIVISION

The HSE have responded positively to the issue of wrong deck landings on several occasions.

Since December 1997 three Operations Notices have been issued by HSE that are relevant to the avoidance of wrong deck landings. They are still in effect.

- ON No: 6 (Ref 5), Outlines the procedures for the notification for rig movements which includes notifying the helicopter operators.

- ON No: 14 Ref 6), concerns the marking of offshore structures for the purposes of safe navigation at sea but has the additional value for identification from the air.

- ON No: 39 (Ref 7), specifically draws the attention of duty holders to the need to provide unambiguous signage and effective aeronautical communications to prevent wrong deck landings.

CAA have for several years advised HSE of failures by some duty holders to notify **all** helicopter operators of 'rig moves'. The immediate response to this failure, from HSE, has been to revise and reissue Operations Notice No: 6. This revision is intended to reinforce the requirements for more comprehensive notification of rig moves and the need to improve liaison between helicopter operators and duty holders when establishing rig communications at the 'new' location. The revision process is currently underway.

HSE have commissioned this report in order to investigate the extent of the wrong deck landing problem offshore. Also, in the absence of any firm industry conclusions to date, this report is required to address the issue of using signalling lamps as an aid to preventing wrong deck landings.

2.5.2 THE CIVIL AVIATION AUTHORITY

The CAA have been closely monitoring the wrong deck landing situation for several years.

CAA closures for the MORs included in this report are:

- No CAA action appropriate provided frequency of occurrence remains low.
- Hazard acceptable provided frequency of occurrence remains low.
- Hazard adequately controlled by operators / reporter's action.

In 1992 as a result of the number of WDL's CAA asked helicopter operators to include in the Pilot's checklist, a final check that the right helideck had been identified prior to a landing. Apart from this instruction and continuing to monitor the situation, CAA along with UKOOA and HSE have been proactive in their attempts to find practical solutions to the problem. This is manifested by various studies and trials that have been funded and carried out over several years to obtain a suitable helideck status light system. Also, there is the continuing CAA emphasis on obtaining improved markings for installation and helideck identification.

The above marking and status light requirements have been stated in CAP 437, Second Edition (Ref 3) since December 1993 and they have recently been heavily reinforced in the Third Edition, published in October 1998. CAA also take the view that generally, wrong deck landings should not happen because pilots have RNav, GPS, Aerad Plates, Pictures and Maps readily available to them, as well as physical recognition of the installation and positive identification of the landing site by name.

Additionally, CAA regard HSE Operations Notices No. 6 and 39 as being directly associated with preventing wrong deck landings. ON 6 is the mechanism used by the duty holders for notifying helicopter operators / pilots about mobile rig movements. ON 39 requires all duty holders to ensure that the means of identification of installations (side signage, helideck ident and call sign) does not have the potential to cause confusion or ambiguity to any approaching helicopter. it also strongly recommends the use of modern hi-tech side signage systems which offer enhanced visibility (day and night).

2.5.3 UKOOA

UKOOA have, in conjunction with CAA, also monitored the wrong deck landing issue over many years.

As noted above, UKOOA have supported several research projects and have provided funding and the facilities (collectively and through individual members) for carrying out offshore equipment trials.

The generally stated consensus from UKOOA on the issue of wrong deck landings is; they are not a hazard on safe decks but are a hazard on unsafe decks. As a result, the primary focus from UKOOA in recent years has been on finding ways to

clearly indicate to flight crews when a helideck / installation is in an unsafe condition for helicopters to land.

2.5.4 HELICOPTER OPERATORS

The Helicopter Operators have first hand knowledge of the wrong deck landing issue. It is their flight crews and aircraft that are directly involved and they have the full weight of responsibility to enforce appropriate procedures and to resolve any problems to prevent a recurrence. As Air Operator Certificate holders they ignore the wrong deck landing problem at their own risk.

The helicopter operators also submit the MORs to CAA. MOR closures by the helicopter operators for the occurrences listed in Appendix A, include:

- Appropriate actions taken by operator to remind crews of hazard.
- Existing flying staff instructions considered to provide adequate guidance.
- Operator initiated action to identify possible human factors causes.
- Crews re-briefed to monitor RNav indications on shuttle sectors.
- Crews re-briefed to double check helideck identity before landing.
- Appropriate company / personnel action taken.
- Pilot(s) advised re correct installation identity to be used.
- Flight Safety instruction issued and company procedures reviewed.

As a further example of the helicopter operator's / flight crew's increasing awareness and probably their ongoing concerns about wrong deck landings, two recent MORs are included at the end of Appendix A for information.

These recent MORs relate to:

- Difficulties experienced by flight crews when rig moves are not shown on the oil rig map. This matter has been brought to the attention of UKOOA and BHAB Helideck Subcommittee.

- Poor identification markings on an installation and it's helideck (e.g. NAME covered by the landing net).

In both cases, actions are apparently being taken by those who are responsible for correcting the deficiencies. Both deficiencies are good examples of positive contributors toward a flight crew inadvertently making a wrong deck landing. Ironically, if this were to happen in the present climate of concern, it is only the flight crew that potentially faces punitive disciplinary action.

Helicopter companies are compelled to balance the way they manage day to day operations with their obligations under Air Navigation law in a highly commercial

climate. At times this balance may be extremely difficult to obtain when sometimes, customers are demanding punitive action to be taken against flight crews when things go awry. It appears this may be the principal reason behind the sanctions that are now generally imposed upon pilots who have the misfortune or otherwise to make a wrong deck landing. The end result may appease the customer but it does little to eliminate the wrong deck landing problem.

2.5.5 BALPA

BALPA have stated their position as: "Wrong deck landings should be avoided. However, positive identification of the correct helideck is a difficult task which interferes with the already complex task of flying a helicopter during the approach and landing on an offshore facility. A procedure or system that makes this task easier is required".

They also say the experience of flight crews does not appear to have a bearing on the likelihood of a pilot making an inadvertent wrong deck landing. These occurrences have been experienced by senior North Sea Commanders as well as less experienced pilots.

2.5.6 OIL COMPANIES

Installation owners and duty holders, have sometimes been required to take appropriate actions as a result of the wrong deck landings reported in MORs. These actions have included:

- Renewing helideck markings.
- Cleaning guano off the helideck.
- Repositioning the landing net.
- Improving side identification signage
- Changing radio call signs

As reasonably expected, the companies that were consulted have generally adopted the UKOOA position. They (through the individuals contacted) have also emphasised, from the operator's viewpoint, that their primarily concern about wrong deck landings is they may occur on a helideck when conditions on the installation make it unsafe for a helicopter to land there.

Among those companies contacted, experience of wrong deck landings on their facilities seem to be fairly limited and considered not to be of major importance. Also, the feedback was more about events that had occurred some years ago, rather than recent experiences. It is interesting to note that where wrong deck landings have been experienced, certain companies (notably Shell) have been proactive in their approach to finding solutions to the problem. As a result of their own internal investigations they have adopted various remedies, such as:

- Putting installation identification signage on the rig ‘monkey boards’ to make them more visible from the air.

- Issuing instructions to HLO’s and Standby Boat Crews to notify flight crews, by radio, where they observe a helicopter potentially routing to an incorrect installation. This is only applicable to SBV’s when they are in a position to positively identify the helicopter and the receiving installation.

- HLO required to sight helicopter on final approach and confirm to the helicopter that he (the HLO) has visual contact and that the helideck remains clear. (Revised Shell S.N.S procedure).

- Adopting a ‘no blame’ culture to create a better climate for open reporting and investigation of these incidents.

These actions have been proven effective by Shell and should be considered, by industry, as good practice.

Some duty holders’ staff have expressed concern at the disciplinary actions taken by helicopter operators, in recent times, against their flight crews who have inadvertently made a wrong deck landing. The expression of concern comes mainly from professionals who themselves have followed an operational aviation career.

Such individual reactions are borne out of many years of operational flying so they have a good knowledge of how easy it is to discover a navigation error, at the least opportune time. The observation has also been made that disciplinary measures applied to a well known but low risk error have a very ‘short life’ value within an organisation. More so, they rarely make a positive contribution toward finding a lasting solution.

It has also been intimated that nowadays some elements of crew training that may help to resolve the problem, are not as intense as they used to be. Any training deficiencies that may be identified in this area are probably due to the high costs and commercial pressures generally associated with today’s flying operations.

3. Part 2 - HELIDECK SIGNALLING SYSTEMS

For the purposes of this report, ***signalling systems*** is used as the generic term for any visual or audio aid used to provide, under normal circumstances, appropriate information to a flight crew in order to assist with correctly identifying a safe offshore landing site (e.g. a helideck) for making a landing.

3.1 REGULATIONS AND GUIDANCE

A number of relevant guidance documents refer to the provision of suitable landing and communication aids for offshore helideck operations. These include:

1. **ICAO, Volume II, ICAO 14 (Aerodromes),** (Ref 10) Chapter 5. Visual Aids.

   Apart from setting out the basic requirements for visual aids this document, in section 5.3.2, recommends the provision of heliport beacons where:

   a) long range visual guidance is considered necessary and is not provided by other means; or

   b) identification of the heliport is difficult due to surrounding lights.

   IFALPA have proposed an amendment to the current text in the form of the following note.

   "Where several installations, fixed as well as mobile are operating within a relatively small area, it would be of great help to the pilot if the installation being his destination can turn on a visual identification during day and night".

2. **CAP 437** (Ref 3) - Chapter 4, Visual Aids.

   CAP 437 covers in detail various aspects of offshore helideck identification, marking and lighting as follows:

   General (4.1.1 Identification),
   Helideck Markings (4.2.6 Landing Prohibited Signal - marker flag),
   Lighting (4.3.6 Status Lights).

It is noted that very early editions of CAP 437 used to include a requirement for a signalling lamp as part of the helideck equipment but the requirement was removed several years ago. It is believed the reason for including the signalling lamp requirement in earlier editions may have something to do with the tendency, at the time, for CAP 437 to run in parallel with the MODU code and the existence of less stringent requirements for airband radio coverage offshore.

3. **JAA Administrative & Guidance Material**, Section 4: Operations, Part 3: Temporary Guidance Leaflets (JAR OPS) - **Leaflet No: 13 Authorisation of Offshore Helidecks** (Ref 11) (01.10.98) refers to all the conventional installation / helideck requirements for navigation, communications and visual aids, including the use of Aldis Lamps. **See Appendix C.** It should be noted the CAA have commented that the Temporary Guidance leaflet is 'guidance material' and is not yet part of JAR OPS 3. Also, the reference in 5c is incorrect because Aldis Lamps do not meet the specification for Status Lights.

4. **SOLAS (1974) Regulations** states that "all ships of over 150 tons gross tonnage, when engaged on international voyages, shall have on board an efficient daylight signalling lamp which shall not be solely dependent upon the ship's main source of electrical power."

5. **DETR Standard Marking Schedule for Offshore Installations** (Ref 8) Section 5. Identification Panels - which states:

   a) Identification panels shall be displayed showing the registered name or other designation of the structure (vessel) in black letters at least one metre high on a yellow background and shall be so arranged that at least one panel is visible from any direction.

   b) The panels must be illuminated, unless the letters / figures are on a retro-reflective background.

   c) Retro-reflective material used for identification panels shall be of an equivalent standard to British Standard 873 covering requirements for the manufacture of road signs.

3.2 OVERVIEW OF CURRENT HELIDECK IDENTIFICATION AIDS

In the context of helideck identification aids that help to prevent wrong deck landings, these aids cover a range of radio communications, navigation and visual aids (e.g. markings and lights). They can be identified as follows:

- GPS to assist with general and precise area navigation.
- NDB ident received from destination installation.
- VHF Radio conversation with destination HLO / Radio Operator.
- Area Charts showing the disposition of destination helideck and adjacent structures.
- Installation / helideck / structure recognition (from AERAD's, pictures and Route Guides).
- Installation / vessel identification boards.
- Helideck NAME displayed.
- Landing Prohibited Marker displayed if landings are banned.
- Status Lights to indicate helideck / installation is unsafe for landing.

The above aids are normally used in combination during the approach to an installation / vessel, and provide flight crews with a wide range of information to confirm their arrival at the correct landing site.

3.3 HELIDECK STATUS LIGHTS

Research into helideck 'Status Lights' was precipitated by increasing concerns about wrong deck landings. These studies looked at a variety of solutions and equipment.

Early on, the concept of a traffic light system that would show either an unsafe or safe helideck was dropped. Trials showed it to be impractical, for a number of reasons. Also, the use of a high intensity, flashing 'white' light was discarded because of the general background lighting problem. A red flashing light, the international aviation signal for **'do not land'** seemed to provide the answer but its visible range was still a problem to be resolved.

As a result of the early work (Ref 9) ‘red flashing beacons’ became the main focus for further development. The work by DERA reported in Reference 9 includes a detailed offshore helideck status light system specification.

The purpose of the helideck status light system (a red flashing beacon) is to give any approaching helicopter, helicopter on deck, or helicopter in the vicinity a general, very bright, warning that the installation or vessel is in an unsafe condition for helicopter operations due to a process upset condition or moving machinery in the vicinity of the helideck (eg. cranes). The warning given should be designed and installed (around the helideck perimeter) to be visible to the pilot of a helicopter approaching and landing on the helideck, from a range of at least 400 metres at all azimuths in visibility’s of 600 metres (day and night).

The light system should flash at a frequency of 2 Hz. and the signal should be visible at all azimuth angles. Effective intensity should be at least 3250 Cd between 5° and 10° above the horizontal and 1000 Cd up to 90° above the horizontal. The status light system should be integrated with the installation Central Control Panel so that it is automatically activated as a result of a process upset condition releasing gas to flare / vent or a confirmed fire or gas alarm, etc. It should also have an override and manual control which can be initiated when required by the HLO (Helicopter Landing Officer).

Status Lights are not intended to provide a positive identification for helideck landing clearance. They are solely intended to indicate whether conditions on the installation are unsafe for helicopter operations. It is also considered inappropriate for a Hand Held Signalling Lamp to be used as a substitute for an installation STATUS LIGHT system. Although, in extreme circumstances, a hand held signalling lamp could be used if the status light system has failed for some reason.

Interesting to note is the current research being funded by CAA which follows on from the status light work. This research is directed at finding ways to enhance the amber / yellow perimeter lighting, aiming circle and ‘H’ markings displayed on offshore installations, municipal heliports, etc. Trials have recently been undertaken on NAM K14 installation, in the Dutch Sector, using green perimeter lighting. CAA have said informally, that the trial results were very good. Apparently, the green perimeter lights provided a much better visual reference than the existing amber / yellow lights because they show up more against background light pollution. In the near future, DERA will commence trials to test the effectiveness of LED systems (green and yellow) for delineating the aiming circle and ‘H’. The LED’s that will be used are variable intensity, long life, low profile units. They are also low voltage and can be formed into strips.

3.4 THE CASE FOR IMPROVING HELIDECK IDENTIFICATION

Failure to correctly identify an installation / helideck is the reason for wrong deck landings. This suggests overall quality of the current means of installation / helideck identification may be inadequate on some facilities and for some offshore flight operating scenarios. These inadequacies should be corrected where reasonable and practicable. The low frequency and relatively small but 'reasonably foreseeable' risk of wrong deck landings cannot be totally ignored. However, there is a price to pay for introducing another 'safety system' offshore. Therefore, a cost / benefit analysis should be carried out prior to making a commitment to install new equipment and implementing new procedures.

Human factors and densely populated offshore areas will always be present on the UKCS for the foreseeable future so the opportunity for an inadvertent wrong deck landing will always exist for some years to come.

Disciplinary sanctions against errant flight crews making an inadvertent landing will not greatly assist with attempts to eliminate the problem. Although the Pilot is always ultimately responsible for the management and safety of a flight, there can be several other external factors that may exacerbate the problem of correct landing site identification. Some are valid mitigating circumstances and should always be taken fully into account prior to taking personnel action.

It is well known that 'good, solid experience' comes from making mistakes but being able to retrieve the situation in a controlled manner. Where others can genuinely learn from such experiences then positive progress is often made. Sanctions may smother disclosure of the real reasons why a particular mistake was made and with it the opportunity to pass on valuable experience, to avoid making the same mistake again.

Wrong deck landings continue to occur at a low frequency and there is little likelihood that the problem can be totally eliminated. The challenge is to maintain these occurrences at their current low level. There is no single known method to achieve this so a combination of options must be used.

To date, the practical solutions currently in use to avoid wrong deck landings all have a positive effect, for much of the time. Occasionally they fail. The results of some other actions that have been taken in direct response to a wrong deck landing have probably added little value, at times they may even have had a negative effect. The overall situation suggests there is still some room for refining the current processes and to seek other suitable methods that can be employed to assist with managing the problem.

4. Part 3 - THE ALDIS LAMP

4.1 HISTORY AND USE OF THE ALDIS LAMP

ALDIS is a generic term used for all Hand-Held Signalling Lamps. ALDIS is generally given to mean **A L**ight for **D**isrupting **I**ncoming **S**pyplanes and the first lamps were designed by the Aldis Brothers just prior to the Second World War. Ever since, they have been in continuous use and have been widely adopted by naval and merchant ships at sea and air traffic controllers on airfields. The Aldis company no longer exists today. It was taken over by the Rank Group in the 1970's. However, the lamps have been in continuous production for over 50 years. Another company, FRANCIS SEARCHLIGHTS, have been manufacturing Aldis Lamps since 1953 and these days are the main supplier. They have sold thousands and the average cost today is about £380. Cegelec also produce an Aldis type lamp but it is more expensive than a Francis unit.

SOLAS 1974 requirements for a stand alone, hand held signalling lamp on all vessels over 150 tons continues to provide the Aldis Lamp with a future. However, with the 'official' ending of the use of Morse Code from 1 February 1999, this may ultimately contribute to the demise of the Aldis Lamp at sea, sometime in the future. Apart from extensive marine use the Aldis Lamp is used on small airfields, in the UK and elsewhere, where the available communications are often limited. Also, at many military and civil airfields air traffic controllers keep them available for 'last ditch' signalling to an aircraft in an emergency. This choice of the signalling lamp for emergency use is because they are not subject to the vagaries of mains power loss, etc. When used at airfields the lamps are either fitted with RED or GREEN filters or used without (WHITE). The lamp provides either a FLASHING or STEADY signal depending on the required signals that are set out in CAA CAP 637 - The Visual Aid Handbook (page 6).

The history of Aldis Signalling Lamps and their continuing use in marine and aviation into the 21st Century, suggests they offer a simple solution for ensuring good visual communications. Their track record is certainly well proven in marine and some aeronautical applications.

4.2 ALDIS LAMP SPECIFICATION

An approved specification (by UK Department of Transport, Marine Directorate) for an Aldis Lamp (the FRANCIS FSP 127 (Mk V) signalling lantern [127mm (5")]) is as follows:

- Low voltage 12 or 24 volt lamps (available with 5.5. metres cable to power pack and contained in a wooden stowage box).
- Direct charging from 110 / 240 VAC supply.
- Manufactured in aluminium, fully weatherproof and light weight (2.2 kgs).
- Super purity aluminium parabolic reflector.
- Signals made by tubular shutter which interrupts the light from the reflector.
- Tubular and V sights fitted.
- Daylight and Night use.
- Different screens / filters can be fitted with no major reduction in light output.
- Capable of maximum daylight signalling range of 8 miles.
- Beam divergence of 5 degrees.
- Used as hand held lamp for ship to ship signalling using Morse Code or as a spotlight if the signalling trigger and lamp switch are both left on.
- Can transmit Morse at 12 words/minute. Up to 8 miles in good visibility.

4.3 USE OF ALDIS LAMPS FOR HELIDECK IDENTIFICATION

4.3.1 GENERAL

Given the history and sound track record of hand held signalling lamps in marine and aviation applications, it is not unreasonable to suggest that such lamps may offer a simple, effective and cheap solution toward assisting positive offshore helideck identification. If there is likely to be a problem that may render the signalling lamp less effective than expected, it is the high levels of light pollution from the sodium, fluorescent, etc. light units that are always present on an offshore installation.

The perennial problem when specifying other signalling systems such as perimeter lights and helideck status lights has always been light pollution. A ‘green’ aldis signal will no doubt encounter similar problems.

Extensive testing (See Ref: 9) has demonstrated that the levels of general light pollution (stray cultural lighting) experienced on installations at night, simply overrides the light output from signalling devices to the extent that the signal is partially lost in the visually cluttered environment (e.g. visual range is much reduced).

A series of 'Status Light' trials was undertaken and concluded that the problem of light pollution (at night) affected visual acquisition of a high intensity red flashing light system to such an extent that the requirement for acquisition range was reduced from 600 to 400 metres. During the trials it was similarly shown that a specification for a flashing green light signal could be produced for a 'helideck safe' light.

There is a possibility that using permanently displayed 'flashing' lights, green or otherwise, to indicate a 'safe' helideck or as a signal to confirm 'this helideck is cleared for a landing', could cause problems. During the landing phase at night, any high intensity lights flashing around the helideck perimeter could be a major distraction for the handling pilot to such an extent that they may affect visual references and night vision. Any signal used for this purpose would need to switched to be 'steady state' or 'off', once it had been positively acquired by the flight crew.

4.3.3 TESTS IN THE BRAE FIELD

The use of an Aldis Lamp for giving a green flashing signal to indicate to helicopter flight crews that they had acquired the correct installation / helideck, was tested in the Brae Field in 1997. The aim of the trial was to introduce a procedure that would back-up an aural landing clearance with a visual indication of clearance from the HLO on the installation expecting the helicopter to arrive. The trial extended over a period of 32 flights to the Brae platforms by day, and in a wide variety of weather conditions from bright sunlight to gloomy mist. The trial did not include night flights.

In his report on this limited trial, Capt. Adrian D. R. Thomas, Chief Pilot AS332L of Bristow Helicopters (and Chairman of BHAB Helideck Sub-Committee), drew the following conclusions.

- The addition of a positive green light hand held by the HLO, indicating a deck that is clear to land, would be a low cost extra facility to help reduce the incidence of wrong deck landings in the North Sea.

- For such a system to work it would be necessary for the procedure to be universally adopted. The suggestion here being adoption in specified sectors of the North Sea.

- Unserviceability of the signalling lamp would be notified with the routine weather report.

- Every installation would have to introduce a procedure and adopt a method of use to ensure the pilot can see the 'green' from whatever direction the approach is made.

- If Oil Companies and Helicopter Companies consider wrong deck landings a serious issue then this additional measure is worthy of further consideration.

The overall impression gained from speaking about the trial with Capt. Thomas and Fergus Mack of Marathon Oil (the Brae Field duty holder) is that people involved in the exercise generally thought the use of a signalling lamp to be good. However, the trial was not conclusive because of its limited duration and it was not done at night. Also, the Brae Field installations are very well known to flight crews, so during the trial they were extremely unlikely to experience an inadvertent wrong deck landing.

4.3.4 VIEWS AGAINST THE USE OF THE ALDIS LAMP

There are some bodies and individuals who have expressed strong feelings against the use of Aldis Lamps offshore. One reason for this is the potential for undermining the CAP 437 requirement for fitting 'Status Lights' to indicate an installation is safe or otherwise for helicopter operations. It should be noted that during the past few years a significant investment in time, money and effort has been, and continues to be, made by the CAA, Shell Exploration & Production and others (e.g. DERA) into investigating and developing workable solutions for clearly indicating installation safety status for helicopter operations. This work has succeeded in identifying and specifying a workable solution for identifying an 'unsafe' helideck from the air, despite encountering several difficulties along the way. It would be unacceptable to reduce the value of this warning system.

Adding yet another piece of equipment to the already large and costly inventory of an offshore installation also gives rise for concern. Introducing new equipment invariably increases operating costs for providing additional maintenance and spares, writing and implementing new procedures, personnel training, etc.

4.3.5 THE CAA POSITION ON ALDIS LAMP USE

CAA have expressed serious safety concerns about the use of Aldis Lamps offshore and do not recommend their use. Because Aldis Lamps used as a 'light signal' are a contentious issue within CAA they have specifically not been recommended by the JAA Work Group.

The following are the reasons for rejecting the use of Aldis Lamps given by CAA in their Work Group response to the JAA 'Temporary Guidance Leaflet'. Summaries in italics are sample opinions from the discussions with industry experts. CAA have not yet had the opportunity to respond to these opinions.

1. It can present a danger to the operator of the lamp (HLO) in inclement weather.

   Many years of use at sea have not given rise to similar concerns about hazards to the lamp operator. The power system is low voltage.

   If concerned that an HLO might be exposed to the elements (high winds, etc.) whilst using the lamp on the helideck to 'accept' an incoming flight, this would suggest the flight should be curtailed anyway because the winds probably exceed the limits for safe helideck operations.

2. It requires positive visual identification by the HLO of the specific helicopter seeking deck clearance.

   Agreed. The HLO is the responsible person in charge of the helideck so he would need to identify the incoming helicopter in order to signal helideck clearance. A positive identification is the primary objective when trying to avoid a wrong deck landing, particularly if there is more than one helicopter in the vicinity.

3. It places an onerous responsibility on the HLO which is outside his job description, responsibilities and accountabilities. This potentially places him in an invidious position under health and safety law: In any case it can be argued that only a qualified ATCO (Air Traffic Control Officer) can give internationally recognised light signals to aircraft.

   The HLO is the responsible person in charge of an offshore helideck and currently uses an aeronautical radio frequency (sometimes done via the Radio Operator) to give an incoming helicopter verbal clearance to land. Similarly, as the HLO is in charge of the helideck he should also be considered competent to make light signals to a helicopter, after appropriate training and qualification, if considered necessary.

4. Aldis lamps cannot be used on every helideck; e.g. Normally unmanned platforms.

   This is correct, however, the first flight onto a NUI would not have a light signal for positive helideck identification but in this case the flight is

'controlled / monitored' from a manned installation and the OIM and HLO are on board the helicopter as leaders of the initial intervention crew. Subsequent flights onto the NUI could be given a positive identification signal by the HLO, including the last incoming flight, prior to vacating the platform.

5. No common operational procedures exist which include the requirement for the use of Aldis Lamps in this industry. It could, for example, be implied that a go-around should be initiated if it is not seen; or that it becomes a no-go item if not available; or that a pilot could be disciplined by his company if he 'disobeyed' the signal, etc.

Agreed. However, if hand held signalling lamps were found to be an effective means for contributing toward positive installation identification then a simple set of procedures could easily be produced and promulgated. The signals used would need to follow CAP 637.

In the event of a flight crew being told over the VHF by the HLO (or Radio Operator) that a light signal is being made at him and the signal is not seen, this should suggest to the flight crew that they are probably approaching the wrong helideck. In that case the pilot should automatically go-around.

The pilot is solely in command of the helicopter and he should always go-around if unsure of the identity of his landing site, regardless of any signals or radio messages received from an HLO. If for any reason a signalling lamp were to be unserviceable or unavailable it could be construed as a NO-GO item. If so, this rule must also apply to Status Lights. However, from a flight safety perspective, the loss or unavailability of both types of system should not warrant flight curtailment because failures can be reported to flight crews in the 'Daily Report' and confirmed during initial VHF radio contact with incoming flights. Having done so, other control and verification systems can be used by the flight crew (Mk 1 eyeball) and HLO (extra vigilance) to maintain good safety standards.

6. An Aldis Lamp cannot be guaranteed to be visible to the pilot regardless of the direction of approach.

Agreed. This is a problem with visual aid systems (including Status Lights) on nearly all helidecks, and is simply because of the position of the helideck relative to other platform structures.

However, if the HLO can see the helicopter approaching the helideck and is shining a green light at it then it is inconceivable that a pilot will not see the green light. If the HLO cannot see the helicopter and cannot point the green light at it he would not say on the radio that he was making a green light and the pilot would not be expecting to see a green light.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

1. Statistically, according to CAA MOR reports, wrong deck landings occur at a very low frequency on the UKCS.

2. Current control measures appear to be containing the problem at a low frequency and the averaged trend (over the last five years) appears to be toward less frequent occurrences.

3. A helicopter landing on any installation unannounced is potentially hazardous to the helicopter, its occupants and the installation. However, the overall level of risk is deemed to be small.

4. Where wrong deck landings have occurred, the remedial actions taken on installations, the refining of flight procedures, re-briefing flight crews and disciplinary actions against pilots, etc. have not eliminated the problem.

5. It is most unlikely that the problem of wrong deck landings can be entirely eliminated. This is due to the ever present human factor on the flight deck and several external factors that have been identified as positive contributors to a pilot making an inadvertent wrong deck landing.

6. An inadvertent wrong deck landing can happen to very experienced senior pilots in the same way as those pilots with less experience.

7. Explaining and then correcting the human factors element of wrong deck landings is not covered within the scope of this report. A pragmatic view is that humans will always be prone to making a mistake at some time, no matter how well trained and well disciplined they might be. Suffice it to say that behavioural science has been under constant scrutiny within the CAA and many other institutions for many years.

8. Most of the wrong deck landings have occurred where there are several similar installations located and working in the same area. It is reported by BALPA that this is the scenario that gives flight crews most concern and there have been a number of ‘near misses’ as a result.

9. Many ways (within the whole process) currently exist to assist helicopter crews with confirming that they have identified the correct offshore landing site. These include a variety of navigation aids, communications, visual aids, charts, etc. Contact with the HLO prior to final approach and landing will assist in the identification process.

10. In the final phases of approach and landing on offshore installations crew workload is at its highest level in order to control the aircraft and land safely. This is not the time to further add to pilot workload to obtain positive confirmation that the helicopter is landing on the correct helideck.

11. Positive installation / helideck identification should always be made prior to committing to land on a helideck. If in any doubt the pilot should go-around. This action should be regarded (by everyone) as professional and safe flying behaviour and should therefore NOT incur any penalties.

12. Over the years much evidence exists to show that all sides of the Industry have positively sought ways with which to overcome the problem of wrong deck landings. This attention to the problem has not diminished.

13. No single solution for preventing wrong deck landings has been identified to date. Realistically, the problem can only be controlled by employing a number of measures in combination.

14. It is essential to maintain the frequency of these occurrences at their current level, better still, to reduce them further. To do this, existing arrangements should first be assessed, refined and reinforced. Any additional practical and cost effective solutions to reduce the problem should be identified and tested.

15. Status lights (red flashing beacons) have a specific purpose. That is, to indicate when an installation / helideck is in an unsafe condition for a helicopter to land and to remain on board. They do not provide a flight crew with information to correctly identify a landing site.

16. Significant amounts of time, money and effort have been expended to conclude the testing of ‘status lights’ and to develop a workable specification. Experience gained during this work to overcome the problems of light pollution on and around installations / helidecks and its effect on light signals, must not be ignored.

17. The use of a signalling lamp for providing flight crews with a positive ‘green’ visual confirmation of their intended landing site is a potential aid to further reducing wrong deck landings. The results of previous ‘limited scale’ testing, lends support to the viability of this ‘low cost’ option. Seeking a proper conclusion to this ‘trial’ should be considered seriously.

18. To maintain a balanced approach, oil industry and aviators should work together to refine existing arrangements and to find ‘new’ solutions. Only low cost options would currently appear to fit this requirement and great care should be taken not to introduce more complexity. Risk assessment and cost / benefit analysis should support the introduction of process changes and new solutions.

5.2 RECOMMENDATIONS

1. The problem of wrong deck landings offshore should be openly accepted by all sides of Industry as a low frequency, relatively low risk occurrence. The problem should not be ignored and practical ways to maintain the frequency and risks at their current low level should be continuously explored and employed.

2. Duty holders and helicopter operators should review all current control procedures and aids used to assist flight crews to correctly identify offshore landing sites and to avoid inadvertent wrong deck landings. Where processes are found deficient they should be refined and / or corrected. Ideally, the processes used within the industry should all have a common base. Therefore, the outcome of any reviews should be openly reported to assist all interested parties and to avoid duplicating work.

3. Signalling systems (e.g. Aldis Lamps, fixed beacon systems, etc.) that could be used for giving a ‘green’ flashing light signal to indicate to helicopter flight crews that they have acquired the correct installation / helideck should be properly evaluated. A report should be prepared covering the options available and where appropriate, comprehensive ‘field trial’ results, equipment specifications and proposed operating procedures included.

4. The UKOOA Guidelines for the Management of Offshore Helidecks should be updated to include a reference to the problem of wrong deck landings and the measures to be taken to comply with best practice. These should include:

- Renewing helideck markings that have deteriorated.

- Cleaning guano off the helideck prior to the markings becoming obscured.

- Repositioning the helideck net to ensure it does not obscure the helideck name.

- Improving installation side signage. Where practicable, this includes the use of hi-tech sign systems and elevated sign boards on drilling rigs (where appropriate).

- Changing radio call signs to match the installation / helideck signage.

- Issuing instructions to HLO's and Standby Boat Crews to be vigilant and to notify flight crews, by radio, where they observe a helicopter potentially routing to an incorrect installation.

- HLO required to sight helicopter on final approach and confirm to the helicopter that he (the HLO) has visual contact and that the helideck remains clear.

- Adopting a 'no blame' culture to create a better climate and greater cooperation for open reporting and investigation of these incidents.

6. REFERENCES

1. CAA - Safety Data Department Mandatory Occurrence Report Database.

2. BMT Fluid Mechanics Limited Project No: 43135 - Research on Offshore Helideck Environmental Issues for CAA. Final Report -Release 7, December 1998.

3. CAA CAP 437, Third Edition. Offshore Helicopter Landing Areas: A Guide to Criteria, Recommended Minimum Standards and Best Practice.

4. CAA CAP 637, The Visual Aid Handbook.

5. HSE (OSD) Operations Notice No:6 - Reporting of Offshore Installation Movements, Dated November 1998.

6. HSE (OSD) Operations Notice No: 14 - Guidance on the Coast Protection Act - Consent to Locate and the Marking of Offshore installations, Dated August 1998.

7. HSE (OSD) Operations Notice No: 39 - Guidance on Identification of Offshore Installations, Dated December 1997.

8. DETR - Standard Marking Schedule For Offshore Installations, Rev 12/94.

9. DERA - Specification for an Offshore Helideck Status Light System, DERA/AS/FMC/CR980235/1.0, July 1998.

10. ICAO Aerodromes Annex 14, Volume II Heliports, Second Edition - July 1995 (Amended 9 November 1995).

11. Joint Aviation Authority (JAA) Temporary Guidance Leaflet No: 13, Dated 01 October 1998.

APPENDIX A

UKCS WRONG DECK LANDING MORs

Report No: 159 **Year:** 1989 **Incident Type:** MOR

Aircraft Type: **Flight Phase:** Landing

Operating Area: UKCS **Region:** Southern North Sea

Helideck ID: Not Known **Incident Date:** 24 April 1989

Caused By: Landed on wrong platform. Crew misidentified platform in marginal weather for an identical configuration nearby. A mobile rig had moved alongside overnight giving same appearance as intended destination.

Failure Category: A/C Ops

Primary Cause: Pilot Error **Secondary Cause:** Other

Comments: Notification of rig move received 29 mins after incident. Error considered due to unexpected arrival of second rig and large number of platforms / rigs in close proximity. Companies are renewing deck markings.

Report ID: 8903044C

Report No: 160 **Year:** 1989 **Incident Type:** MOR

Aircraft Type: **Flight Phase:** Landing

Operating Area: UKCS **Region:** Not Known

Helideck ID: Not Known **Incident Date:** 05 December 1989

Caused By: Landed on wrong oil rig. Crew misidentified rig.

Failure Category: A/C Ops

Primary Cause: Pilot Error **Secondary Cause:** Unknown

Comments: Appropriate action taken by operator. See also 8903044C.

Report ID: 8904882B

Report No: 161 **Year:** 1990 **Incident Type:** MOR

Aircraft Type: **Flight Phase:** Landing

Operating Area: UKCS **Region:** Not Known

Helideck ID: Not Known **Incident Date:** 08 February 1990

Caused By: Landed on wrong oil rig. Supervisory pilot failed to notice co-pilot had selected incorrect heading.

Failure Category: A/C Ops

Primary Cause: Pilot Error **Secondary Cause:** N/A

Comments: Appropriate action taken by operator to remind pilots of hazard. Existing company flying staff instructions provide adequate guidance on this topic.

Report ID: 9000639J

Report No: 164 **Year:** 1990 **Incident Type:** MOR

Aircraft Type: Eurocopter AS 332 **Flight Phase:** Landing

Operating Area: UKCS **Region:** Northern North Sea

Helideck ID: Brent Alpha **Incident Date:** 15 December 1990

Caused By: A/C landed on wrong oil platform in error.

Failure Category: A/C Ops

Primary Cause: Pilot Error **Secondary Cause:** N/A

Comments: CAA Closure: Hazard acceptable provided frequency of occurrence remains low.

Report ID: 9005661B

Report No: 162 **Year:** 1990 **Incident Type:** MOR

Aircraft Type: **Flight Phase:** Landing

Operating Area: UKCS **Region:** Not Known

Helideck ID: Not Known **Incident Date:** 31 July 1990

Caused By: Landed on wrong oil rig while crane in operation. Pilot misidentified rig.

Failure Category: A/C Ops

Primary Cause: Pilot Error **Secondary Cause:** Unknown

Comments: Appropriate action taken by operator. Existing written instructions and operating procedures considered adequate.

Report ID: 9003412X

Report No: 163 **Year:** 1990 **Incident Type:** MOR

Aircraft Type: Sikorsky S 61 **Flight Phase:** Landing

Operating Area: UKCS **Region:** Not Known

Helideck ID: Not Known **Incident Date:** 31 October 1990

Caused By: A/C landed on wrong oil rig. Crew misidentified platform having been distracted by flight deck activities.

Failure Category: A/C Ops

Primary Cause: Pilot Error **Secondary Cause:** Other

Comments: Investigation showed that any change to operating procedures could not have prevented this particular incident. Operator has initiated action to identify possible human factor causes of such incidents.

Report ID: 9004848B

Report No: 166 **Year:** 1991 **Incident Type:** MOR

Aircraft Type: Eurocopter AS 365 **Flight Phase:** Landing

Operating Area: UKCS **Region:** Morecombe Bay

Helideck ID: Not Known **Incident Date:** 02 March 1991

Caused By: A/C landed on wrong oil rig.

Failure Category: A/C Ops

Primary Cause: Pilot Error **Secondary Cause:** Unknown

Comments: Crews rebriefed to monitor RNav indications on shuttle sectors and double check helideck identity before landing. CAA and UKOOA monitoring situation. See also 9100567.

Report ID: 9100625B

Report No: 165 **Year:** 1991 **Incident Type:** MOR

Aircraft Type: Eurocopter AS 365 **Flight Phase:** Landing

Operating Area: UKCS **Region:** Morecombe Bay

Helideck ID: Not Known **Incident Date:** 23 February 1991

Caused By: A/C landed on wrong oil rig. Crew misidentified platform.

Failure Category: A/C Ops

Primary Cause: Pilot Error **Secondary Cause:** Unknown

Comments: Crews rebriefed to monitor RNav indications on shuttle sectors and double check helideck identity before landing. CAA and UKOOA monitoring situation. See also 9100625.

Report ID: 9100567A

Report No: 168 **Year:** 1991 **Incident Type:** MOR

Aircraft Type: Eurocopter AS 365 **Flight Phase:** Approach

Operating Area: UKCS **Region:** Not Known

Helideck ID: Not Known **Incident Date:** 26 September 1991

Caused By: A/C landed on wrong oil rig. Pilot failed to copy full routing onto flight log until after take-off. He then mistakenly substituted AV for API as the first stop.

Failure Category: A/C Ops

Primary Cause: Pilot Error **Secondary Cause:** N/A

Comments: None.

Report ID: 9104280A

Report No: 167 **Year:** 1991 **Incident Type:** MOR

Aircraft Type: Eurocopter AS 365 **Flight Phase:** Landing

Operating Area: UKCS **Region:** Morecombe Bay

Helideck ID: Not Known **Incident Date:** 16 August 1991

Caused By: A/C landed on wrong offshore platform.

Failure Category: A/C Ops

Primary Cause: Pilot Error **Secondary Cause:** Unknown

Comments: See also occurrences 9100567 & 9100625. CAA closure: No CAA action appropriate provided frequency of occurrence remains low.

Report ID: 9103024B

Report No: 169 **Year:** 1992 **Incident Type:** MOR

Aircraft Type: Bell 212 **Flight Phase:** Approach

Operating Area: UKCS **Region:** Northern North Sea

Helideck ID: Eider **Incident Date:** 23 April 1992

Caused By: A/C landed on wrong oil platform in error.

Failure Category: A/C Ops

Primary Cause: Pilot Error **Secondary Cause:** N/A

Comments: CAA closure: hazard acceptable provided frequency remains low.

Report ID: 9201481X

Report No: 170 **Year:** 1993 **Incident Type:** MOR

Aircraft Type: Eurocopter AS 332 **Flight Phase:** Approach

Operating Area: UKCS **Region:** Not Known

Helideck ID: Not Known **Incident Date:** 15 May 1993

Caused By: A/C landed on wrong oil rig.

Failure Category: A/C Ops

Primary Cause: Pilot Error **Secondary Cause:** Unknown

Comments: Operating procedures reviewed by operator to ensure positive identification of rig is made before landing. CAA closure: Hazard adequately controlled by operator's action.

Report ID: 9301764B

Report No: 171 **Year:** 1994 **Incident Type:** MOR

Aircraft Type: Eurocopter AS 332 **Flight Phase:** Approach

Operating Area: UKCS **Region:** Not Known

Helideck ID: Sedco 714 **Incident Date:** 28 September 1994

Caused By: Landed on wrong rig after destination change. Whilst controlling A/C in 30 kt wind in turbulent sector rig not visually identified. Landed on Sedco 714 adjacent to platform not Sedco 704 approx 2 miles West.

Failure Category: A/C Ops

Primary Cause: Pilot Error **Secondary Cause:** Turbulence

Comments: 2nd flight of day during RTT, co-pilot got info on trip change. Pos'n of nearest fixed rig entered in RNav for landing on 1 of 2 adjacent rigs. Unapproved NAV data source used. Both rigs shown adjacent to platform.

Report ID: 9404358B

Report No: 172 **Year:** 1995 **Incident Type:** MOR

Aircraft Type: Eurocopter AS 332 **Flight Phase:** Landing

Operating Area: UKCS **Region:** Not Known

Helideck ID: Not Known **Incident Date:** 28 November 1995

Caused By: A/C landed on wrong oil rig.

Failure Category: A/C Ops

Primary Cause: Pilot Error **Secondary Cause:** Unknown

Comments: Appropriate company action taken.

Report ID: 9505165A

Report No: 175 **Year:** 1996 **Incident Type:** MOR

Aircraft Type: Sikorsky S 76 **Flight Phase:** Landing

Operating Area: UKCS **Region:** Southern North Sea

Helideck ID: Not Known **Incident Date:** 25 November 1996

Caused By: A/C landed on wrong rig. 2 shuttles req'd to ferry all personnel from manned platform to NNMI. On 2nd flight A/C entered heavy rain and inadvertently landed on a sister satellite 1.5 miles from destination.

Failure Category: A/C Ops

Primary Cause: Pilot Error **Secondary Cause:** Weather

Comments: Heavy rain reduced visibility and increased cockpit workload. After landing and rain ceased crew realised they were on wrong platform. Deck markings on both platforms partially obscured by guano. Action taken.

Report ID: 9605438G

Report No: 176 **Year:** 1997 **Incident Type:** MOR

Aircraft Type: Sikorsky S 76 **Flight Phase:** Landing

Operating Area: UKCS **Region:** Southern North Sea

Helideck ID: Barque PB **Incident Date:** 17 January 1997

Caused By: A/C landed on wrong rig following destination change. On shutdown at Clipper pilot given route change to Barque PL. Pilot assumed pick-up was PB not PL, routed accordingly and rec'd landing clearance.

Failure Category: A/C Ops

Primary Cause: Pilot Error **Secondary Cause:** Other

Comments: Barque PL known to pilots as Barque Extension or SPLI but new Radio Op unaware of this and used correct rig designations. Appropriate action taken by operator.

Report ID: 9700220H

Report No: 177 **Year:** 1997 **Incident Type:** MOR

Aircraft Type: Sikorsky S 76 **Flight Phase:** Landing

Operating Area: UKCS **Region:** Not Known

Helideck ID: Not Known **Incident Date:** 23 November 1997

Caused By: A/C landed on wrong offshore platform. Rig misidentified. A/C re-positioned to correct platform.

Failure Category: A/C Ops

Primary Cause: Pilot Error **Secondary Cause:** N/A

Comments: See also 9706751. Appropriate personnel action taken. Flight safety instruction issued and company procedures reviewed. CAA closure: Hazard adequately controlled by reporter's action.

Report ID: 9706137J

Report No: 178 **Year:** 1997 **Incident Type:** MOR

Aircraft Type: Sikorsky S 61 **Flight Phase:** Landing

Operating Area: UKCS **Region:** Northern North Sea

Helideck ID: Brent B **Incident Date:** 18 December 1997

Caused By: A/C landed on wrong offshore platform. Rig misidentified. A/C re-positioned to correct platform.

Failure Category: A/C Ops

Primary Cause: Pilot Error **Secondary Cause:** N/A

Comments: See also 9706137. Appropriate personnel action taken. Flight safety instruction issued and company procedures reviewed. CAA closure: Hazard adequately controlled by reporter's action.

Report ID: 9706751B

Report No: 181 **Year:** 1998 **Incident Type:** MOR

Aircraft Type: Eurocopter AS 332 **Flight Phase:** Cruise

Operating Area: UKCS **Region:** Central North Sea

Helideck ID: Northern Producer **Incident Date:** 01 October 1998

Caused By: Floating Production Platform omitted from oil rig map.

Failure Category: A/C Ops

Primary Cause: Other **Secondary Cause:** N/A

Comments: Subject FPSO (Northern Producer) had reportedly been on station for 9 - 12 months. See also 9705653. Oprs. procedure reviewed & topic brought to attention of BHAB Helideck Sub-Committee & UKOOA.

Report ID: 9806709E

Report No: 179 **Year:** 1998 **Incident Type:** MOR

Aircraft Type: Eurocopter AS 332 **Flight Phase:** Approach

Operating Area: UKCS **Region:** Central North Sea

Helideck ID: North Everest **Incident Date:** 02 January 1998

Caused By: Alleged inadequate identification markings on offshore platform. Cloud base 500-600 ft, visibility 2-4 nm. Crew reported being unable to positively identify platform until approx 70 metres short of helideck.

Failure Category: A/C Design

Primary Cause: Other **Secondary Cause:** HLO Failure

Comments: While name of oil company & block numbers are shown on side of platform, name of installation (North Everest) appears only on helideck, in this case beneath netting.

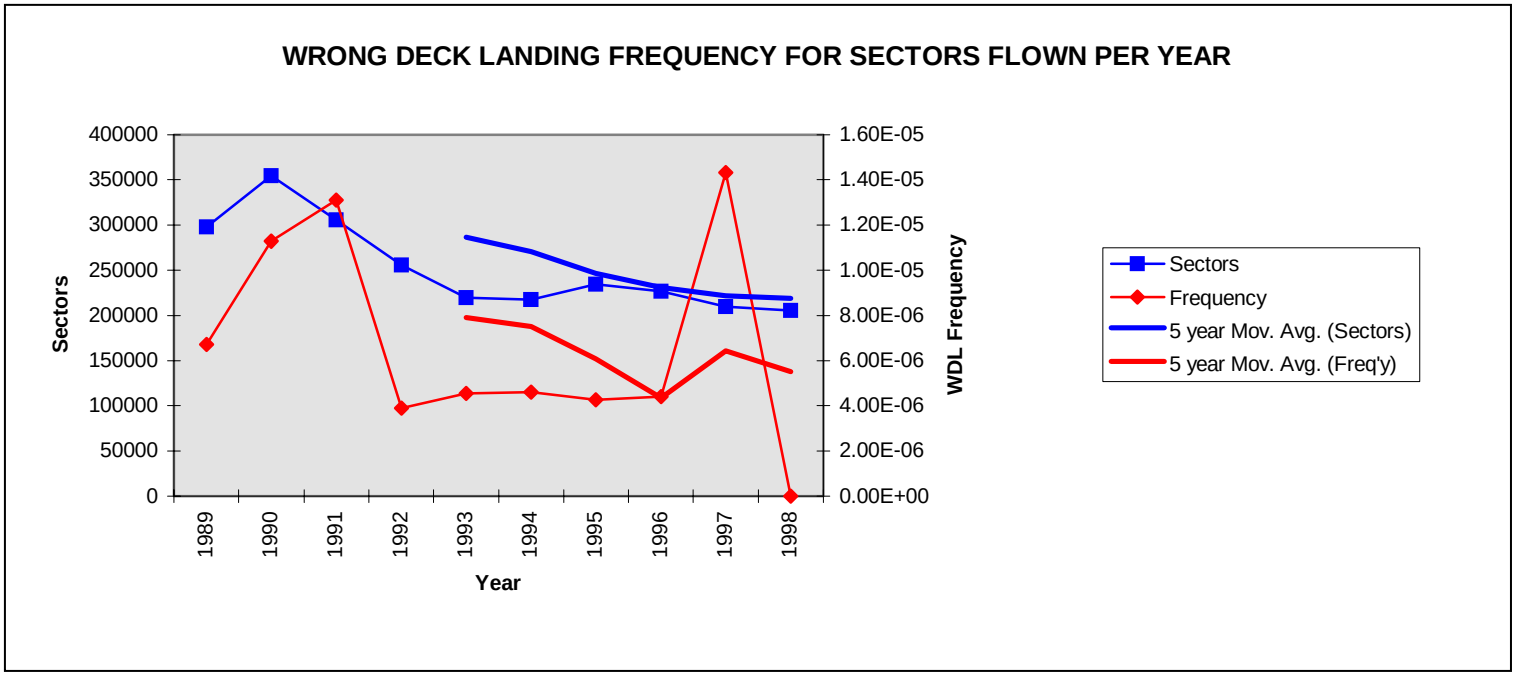
Report ID: 9800319D

APPENDIX B

WDL FREQUENCY FOR SECTORS FLOWN / YEAR

Appendix No: 2 - Wrong Deck Landing Frequency For Sectors Flown Per Year

Year	Bell 212	Bell 214	Bo105	AS332	AS365	S61	S76	BV234	Wx30	Total/Yr	WDL/Yr	WDL Freq/Sect.
1989	48231	5047	3689	54208	100319	51307	34370	65	402	297638	2	6.72E-06
1990	55772	9559	3624	68895	101541	66020	48701		407	354519	4	1.13E-05
1991	45478	1824	5370	57817	109513	51458	33174		914	305548	4	1.31E-05
1992	28426	1864	1197	56055	84607	51074	32312		496	256031	1	3.91E-06
1993	20223	2960	15879	49488	48082	53700	29162			219494	1	4.56E-06
1994	13094	2086	26677	42352	44201	51889	36753			217052	1	4.61E-06
1995	11308	1297	33338	44648	51864	41927	49891			234273	1	4.27E-06
1996	10976	2188	27219	49353	54893	31071	50895			226595	1	4.41E-06
1997	8847	1760	30624	51233	47116	21930	48147			209657	3	1.43E-05
1998		1998 figures not yet available (Total sectors for year estimated)								205000	0	0.00E+00
										2525807	18	7.13E-06



APPENDIX C

JAA TEMPORARY GUIDANCE LEAFLET NO: 13 **(EXTRACT)** (01.10.98)

AMC OPS 3.220 Authorisation of Heliports by the Operator - Helidecks. refers to all the conventional installation / helideck requirements for navigation, communications and visual aids. In particular it refers to:

5c Marking and Lighting, (iii) Status Lights (NB for night and day operations e.g. Aldis Lamp), and

5g Communications and Navigation, (iv) Light Signal (e.g. Aldis Lamp).

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C0.35 5/01

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OTO 2000/067

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ISBN 0-7176-2036-0