

HSE Health & Safety
Executive

Bird guano accumulations and their effect on offshore helicopter operations

Prepared by
BOMEL Ltd/John Burt Associates Ltd
on behalf of BOMEL Consortium
for the Health and Safety Executive

OFFSHORE TECHNOLOGY REPORT 2000/131

Routine and frequent reporting of helideck condition is fundamental to efficiently managing the guano accumulation and obscured marking and lighting problems. Industry co-operation should include development of a routine UKCS NUI helideck condition reporting, assessment, recording and publishing system in conjunction with procedures fully owned, sponsored and managed by UKOOA / BHAB.

To assist with helideck condition reporting frequency all pilots could be requested to look at helidecks other than the ones they are flying to. This management approach if used as an 'early warning system', offers a good way for helicopter operators and installation duty holders to jointly discharge their 'duties of care' toward ensuring that NUI helidecks remain compliant in respect of the ANO and offshore legislation.

The procedures could be incorporated into the UKOOA Guidelines for Helicopter Operations to Normally Unattended Installations. No individual exclusion device has been able to provide the whole solution. It requires a combination of systems to sustain a reasonable degree of freedom from the birds in the medium term. This is currently being demonstrated with the Gull Scat / water spray combination on Total Oil Marine's MCP-01.

Cleaning and disposal of guano and bird debris from a fouled helideck remains a major task for most NUI duty holders, when they have helidecks that are heavily fouled. It is very unpleasant for the personnel involved, exposes them to potential health hazards, it is time consuming and disruptive to routine maintenance operations and is costly. There is much merit in focusing more attention on finding practical and cost effective solutions to these problems. Solutions that also reduce the frequency of repairing helideck surfaces and markings and replacing helideck nets would be an added bonus.

A starting point toward finding a practical solution to disposal and cleaning problems may be found in the 'tarpaulin' system currently used, with some success, by ARCO. Arco currently employ a system that achieves bulk guano removal and reduces helideck cleaning effort to quite an extent. It is recommended that industry consider this system as an option that deserves further development.

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1. INTRODUCTION

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

Offshore Technology Report - OTO 98 088, titled "HSE / CAA Inspection Project Offshore Helidecks 1991-1995" issued in March 1998 (Reference 1), highlighted concerns over the long-standing problems of sea birds roosting on Normally Unattended Installations (NUI's). The main problem with these sea birds is their habit of leaving guano accumulations, which build up to a point where helideck markings become obscured. This can contribute towards a pilot making a wrong deck landing (Reference 3) and in extreme cases aborting a landing. Equally important is the other debris they leave behind (potential FOD, see Section 6 for abbreviations), along with the general health risks for personnel exposed to guano and increased bird strike potential for helicopters operating in the local area.

Figures given in the OTO Report suggest that about 30% of helidecks on NUI's have a consistent problem with guano accumulation. This figure was given as 'recent' in the report and followed the formation in March 1997 of a Joint Industry Working Group (convened by HSE) to look at the size of the problem posed by colonising seabirds, the range of attendant problems they create and to look for possible solutions. This report continues HSE's aim to facilitate the search for solutions.

The guano problem on NUI helidecks is well illustrated in the photographs reproduced from the OTO Report, in Appendix 2.

1.1 PURPOSE

HSE's primary objective is to obtain a better appreciation of **current** bird guano accumulation problems that are encountered on UKCS installations (manned and unmanned) and their effects on the safety and health aspects of offshore helicopter operations.

From the findings of this study, a secondary objective is to identify those areas where further productive work could be done to find ways to improve the current situation through minimising the effects of guano accumulations.

3. PART 2 - THE EFFECTS AND CONSEQUENCES FOR OFFSHORE OPERATIONS

3.1 LEGAL RESPONSIBILITY - THE OFFSHORE AND AVIATION REGULATORY POSITION

3.1.1 APPLICABLE OFFSHORE SAFETY REGULATIONS AND INDUSTRY GUIDANCE

3.1.1.1 Regulations

Under the Health and Safety at Work, etc. Act 1974, there are several pieces of primary legislation that should concern Duty Holder's when discharging their 'Duty of Care', with respect to bird / guano problems arising on their installations. They are:

The Management of Health and Safety at Work Regulations 1992, Regulation 3 which requires employers to make a suitable and sufficient assessment of the risks (e.g. from the effects of guano accumulations on helidecks, etc.) to health and safety of his employees, and of persons not in his employment, to which they are exposed whilst they are at work and to record the findings of the assessment.

Regulation 5 requires employers to ensure that employees are provided with appropriate health surveillance with regard to the risks to their health and safety which are identified by the assessment.

The Offshore Installations (Safety Case) Regulations 1992 (SI 1992/2885), Regulation 8 (1) b which requires duty holders to ensure that a Safety Management System is in place and that it demonstrates that adequate control measures are being employed to mitigate attendant risks.

The Personal Protective Equipment at Work Regulations 1992 (SI 1992/2932) which require employers to ensure that suitable personal protective equipment is provided to employees who may be exposed to a risk to their health and safety (e.g. from the effects of guano accumulations) whilst at work.

The Control of Substances Hazardous to Health Regulations 1994 which require duty holders to identify, assess, employ appropriate mitigating measures and to keep records, where personnel may be exposed to substances harmful to their health (e.g. guano and associated bird debris).

The Offshore Installations and Pipeline Works (Management and Administration) Regulations 1995 (SI 1995/738), Regulation 13 which requires duty holders to establish procedures and provide plant (i.e. equipment) to secure, so far as is

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reasonably practicable, that helicopter operations, including the landing and taking-off of helicopters, are without risks to health and safety.

Also, **Regulation 19** which requires duty holders to clearly display the installation identification in such a manner as to make the installation readily identifiable from the air.

The Offshore Installations (Design and Construction, etc.) Regulations 1996 (SI 1996/913), Regulation 11 which requires the duty holder to ensure that every landing area forming part of an installation has sufficient clear approach / departure paths to

enable any helicopter intended to use the landing area safely, to land and take off in any wind and weather conditions permitting helicopter operations and is of a design and construction adequate for its purpose.

3.1.1.2 GUIDANCE

The above listed Regulations each have their own published (by HSE / HMSO) Codes of Practice or Guidance on Regulations which provide details on practical interpretation and application of the Regulations.

Additionally, the subject of managing bird / guano problems on offshore installations is addressed in the Joint Industry Guidelines for **The Management of Offshore Helideck Operations**, Issue No: 3 (Section 4.6 - Management of Bird Control), issued by UKOOA in August 1997.

3.1.2 APPLICABLE AVIATION REGULATIONS

3.1.2.1 Regulations

CAA regulate the use of unlicensed aerodromes (includes offshore helidecks) under the provisions of **The Air Navigation Order 1995 (as amended)**. This regulatory interest is not merely confined to aircraft in flight, but maintenance procedures on the ground, etc. Under the ANO, the CAA have powers to provide guidance (usually in the form of CAP's) where it is considered necessary or appropriate.

3.1.2.2 GUIDANCE

CAP 393 - Guidance on the Air Navigation Order, defines among other things a Public Transport Operator's (Air Operator's Certificate (AOC) Holder) responsibilities. Generally stated, this responsibility includes not permitting an aircraft to fly for the purpose of public transport (offshore flights are classed as public transport - non scheduled) without first satisfying themselves by every reasonable means that every place (whether or not an aerodrome) at which it is intended to take-off or land are made suitable for the purpose to ensure so far as practicable the safety of the aircraft and its passengers.

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CAP 437 Offshore Helicopter Landing Areas - Guidance on Standards (Third Edition - October 1998) sets out the criteria required by the CAA in the assessment of offshore landings areas for use by helicopters registered in the UK. It is these criteria that AOC Holder's are expected to comply with.

CAP 437 (page 3/17) paragraphs 3.13.2 and 3 specifically address the guano issue on NUI's.

In addition to other things, it requires helicopter operators to monitor the state of NUI helidecks and to advise the owner / operator before markings and lighting degradation becomes a safety concern. It also states that NUI's should be continuously monitored for signs of degradation of visual clues and flights should not be undertaken to helidecks where essential visual clues for landing are insufficient.

3.1.3 ENFORCEMENT ACTION

CAA actions arising from the four MOR's (see Appendix C) were not specific in their demands for enforcement action. One MOR recommended rig operators regularly assess the helideck condition. Another, which was mainly about poor helideck lighting, mentioned guano obscuring the lights and among other things, the actions included a request for a Safety Notice.

During the CAA helideck inspection project, enforcement action was taken by HSE OSD following CAA recommendations. One deferred Prohibition Notice and three Improvement Notices were served on Duty Holders.

It is not clear from the report whether any of these enforcement actions involved helidecks with guano accumulation problems.

3.1.4 BHAB OHIR REPORTING AND ACTIONS

The BHAB Offshore Helideck Inspection, reporting and approval scheme covers all UKCS helidecks. At present, the inspection and approval (3 yearly frequency) focus

appears to be more on manned installations. However, a BHAB Helideck Inspector has recently completed four OHIR's in Liverpool Bay and has recommended actions to clean off the guano and repair faded helideck markings.

There is no information with respect to any operating restrictions being applied pending completion of the remedial work arising from these inspection findings. Nor is there any information with respect to a change to the currency of the Helideck Approval Certificate.

3.2 THE POTENTIAL HAZARDS TO HELICOPTER FLIGHT OPERATIONS

3.2.1 THE POTENTIAL FOR WRONG DECK LANDINGS

In a recent report (Reference 3), reviewing wrong helideck landings, etc. prepared and issued (in June 1999) by BOMEL Consortium for HSE OD5.5, the obliteration of helideck markings, in particular the installation name, was found to be a contributor to flight crews executing wrong deck landings on NUI's.

Although such events were not found to be frequent, high risk occurrences, it is essential to recognise that the build up of guano can and does cause difficulties for positive installation identification.

3.2.2 THE BIRD STRIKE POTENTIAL

CAA Safety Analysis Department issued a Data Plus fact sheet on BIRD STRIKES (Ref: 99/DP1) in June 1999 (Reference 4). Analysis focused on bird strikes recorded on the UK CAA MOR Reporting Scheme database. The database encompasses all events involving UK registered aircraft world-wide or any aircraft in UK airspace.

Only 17 bird strikes to helicopters were recorded between 1981 and 1998, one a year. However, 11 of these were to the fuselage, with 8 involving collisions with or penetration of the windscreen or a cabin window. For example, in 1993 a Eurocopter Super Puma (AS 332) was struck by a large bird (species not identified in data sheet) on take off damaging the centre windscreen and sending pieces of glazing into the cockpit. And, in 1998 a large gull penetrated the right hand upper canopy of a Bolkow 105.

It was also noted in the analysis that even attempts to avoid bird strikes can lead to damage as in 1995 when a Hiller UH12 struck power cables whilst manoeuvring to avoid birds.

Important to note in the CAA's report is that none of the recorded bird strike incidents is reported to involve helicopters on or close to offshore installations.

Notwithstanding the limited offshore helicopter bird strike MOR's recorded by CAA, it is quite obvious that where there are colonies of birds (in particular the larger species like gulls) on or around installations and close to helicopter flight paths. The potential for a serious incident involving a bird strike is always present and should not be ignored.

For this reason further data was acquired from the CAA in the form of a Bird Strike (Offshore) Statistics Record for the period March 1984 to March 1995. Also, the helicopter operators were asked to comment on their experiences.

3.4 THE POTENTIAL HAZARDS FOR HELIDECK OPERATIONS

3.4.1 RISKS TO INTERVENTION HELIDECK CREWS ON UNMANNED INSTALLATIONS

The main risks to intervention helideck crews posed by guano accumulations on helidecks and surrounding structures are slips, falls and health hazards.

The increased potential for slips and falls is more likely to arise during the initial phases of helideck operations, on arrival at the NUI.

Movements to and from a 'rotors turning' helicopter and whilst using the associated

stairs and walkways can be much more precarious if the guano is excessive and wet. Immediately on arrival the appointed OIM / HLO will be required to make installation and helideck safety checks prior to disembarking other personnel. At this time he is probably at greatest risk.

During helicopter unloading the potential for slips and falls becomes a problem when the intervention helideck crews are carrying equipment. This is also the case during cleaning operations.

Health hazards are dealt with in 3.4.1

3.4.2 THE DISCOVERY OF DEFECTIVE HELIDECK EQUIPMENT

On arrival at a NUI the discovery of defective or unusable helideck equipment caused by the effects of guano is always a possibility. However, operator reports suggest that finding unusable helideck equipment is not a commonplace occurrence.

This suggests that routine precautions taken to protect the more vulnerable items of helideck equipment are generally proving adequate.

3.5 EFFECTS ON PERSONNEL HEALTH AND SAFETY

3.5.1 POTENTIAL HEALTH EFFECTS FROM GUANO

ACCUMULATIONS

There are consistent reports from operator personnel and flight crews about the unpleasant odours encountered on helidecks / installations with significant guano accumulations. This is not unexpected. However, it is not the odour that is a risk, it is the source of the odour.

Large and concentrated areas of guano may harbour micro-organisms which can lead to human diseases. This makes exposure to guano potentially hazardous for the personnel involved when they come into contact with it.

In some cases, diseases that may result from prolonged exposure to guano (without appropriate protection) can prove fatal, so the potential hazard on helidecks must not be underestimated. In particular, clearing accumulations of guano off helidecks is not just unpleasant, time consuming work, it can be harmful to health.

Thus, birds can be a threat to human health. This may be as a source of pathogens and allergens.

3.5.1.1 Allergens

Problems can include **Allergic Alveolitis**, which can lead to lung damage (so called "Bird fancier's Lung") as a result of allergic response to bird proteins, or as a source of disease organisms, including:

_ **Chlamydia psittaci** - Ornithosis a condition passed directly from bird to man causing pneumonia.

_ **Histoplasma capsulatum** - Histoplasmosis, from fungi which develop in droppings, and can produce pneumonia

_ **Cryptococcus neoformans** also from fungi which develop in droppings, and can produce meningitis.

Whether the above disease organisms are common in the bird species to be found on UKCS offshore platforms is unknown.

However, many of these diseases produce flu-like symptoms, and it is important for everyone concerned to be aware of the risks and to treat such symptoms with caution. If symptoms persist or are severe, individuals should see their GP and advise him or her of their contact with sea birds and their guano. The same caution should be exercised for family members as well, notwithstanding the low chances of infection for them.

3.5.1.2 Pathogens

Food poisoning organisms may also be present, which can be picked up by birds and then scattered around, contaminating water supplies and human foods directly. These

include:

- _ **Campylobacter spp**
- _ **Eschericia coli 0157**
- _ **Listeria spp**
- _ **Salmonella spp**
- _ **Vibrio cholerae**
- _ **Botulina**

Apart from Campylobacter, it is understood that the other organisms normally require large quantities of contaminated food and water to be ingested to cause infection. On the other hand, with Campylobacter, a small dose can cause infection and this can be transmitted by contact with droppings.

The above outline of potential health effects from guano exposure should be considered sufficient reason for Duty Holders to undertake detailed COSHH Assessments for their NUI operations, in conjunction with professional medical advice. (Note: There have been several papers published by medical and veterinary specialists concerning the transmission of diseases by sea birds).

Clearly, there are risks and they are likely to be present as a result of:

- _ Airborne contaminants (generated by dry guano particles circulated by the helicopter rotor down wash, during helideck clearing operations and by local winds).
- _ Contact with contaminants when handling guano covered equipment and during the disposal of guano overboard during clearing operations.
- _ The vulnerability to contamination of water supplies and food containers brought on board by helicopter for the use of intervention crews.
- _ Difficulties posed for ensuring personal hygiene on NUI's (limited facilities).

The following are summary reports received from installation and helicopter operators about their current experience with respect to health issues.

3.5.1.3 Helicopter Operators

Generally, there are no reported health issues that arise for the flight crews. However, the main complaint is the smell caused by the guano and, at times when the helicopter stays on the helideck for more than 5 minutes, crews start to feel nauseous.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

Throughout the various sections of this report there are many individual topics that have been addressed in order to give a complete picture to meet the report objectives. As a result many conclusions concerning the detail can be drawn. However, it is intended to only focus on the main conclusions that arise from the report. They are:

1. The subject of birds and their effects on offshore helicopter operations proved to have many facets. Each has been identified and addressed to a level deemed appropriate to meet the study objectives.
2. The bird / guano problem on UKCS offshore installations has existed for many years, in particular on NUI's. The associated problems are well documented and understood by industry and regulators alike. However, long lasting solutions have been very difficult, if not impossible, to find.
3. There are already a large number of NUI's on the UKCS and there are likely to be more in the future. Bird / guano problems are unlikely to reduce in scale!
4. Evidence suggests that helicopter bird strikes average about 10 per year offshore. These incidents are widely spread on the UKCS and statistics show that NUI's are no more affected than other installations or flights en-route.

5. Although there have been a number of bird strikes reported over the years they have not resulted in a serious accident, although on 2 occasions there has been significant damage to the aircraft.
6. Bird strikes on fixed wing aircraft have had catastrophic effects as a result of their engine design and operating environment. Helicopters appear to be less exposed to bird strikes by virtue of their engine intake designs and robust rotor systems. They also operate in a low speed environment.
7. The main and more persistent problem for offshore helicopter operations, caused by sea birds, is guano accumulations on NUI helidecks obscuring the helideck identification, other markings and lighting, thus reducing the visual clues required for making a safe and uneventful landing, particularly at night.

8. Guano accumulations on NUI helidecks are a persistent problem for the duty holders. They have to clean the helidecks, repair and replace damaged / faded surfaces and markings and replace helideck nets, etc. more frequently. These additional maintenance activities create scheduling problems and significantly increase manpower and other associated expenditures.
9. Permanently removing the birds (mainly gulls) from NUI's should be regarded as an unrealistic objective. Long established sea bird breeding, feeding and roosting habits are the overriding reason for their presence on NUI's. The installations also offer a relatively safe haven for the birds.
10. Most installations have abundant fish stocks around them or in the local area. This provides a ready source of food for the birds. The bird problem cannot be permanently solved unless that food chain is broken.
11. From the information gained for this report there does not appear to be a readily identifiable pattern to the bird problem on NUI's. Some NUI's are always affected, some are virtually unaffected and others occasionally get the problem badly one year then it goes away the next. Only a highly detailed bird study, across the UKCS, will provide the answers.
12. A proposal by MAFF in 1997 to conduct a 3 year study to formulate an integrated bird management system failed to gain industry support. Much of the research for the study was to be observing birds to establish species, habits and patterns. The value of such a detailed study into sea birds on NUI's is seriously questioned because if the birds are already present then the potential bird strike and guano problem is also there. It is very difficult to see how establishing the species and observing their habits will provide practical answers for reducing or removing guano accumulations or preventing bird strikes / interference. It is readily accepted that identifying the species of bird colonising platforms will provide the essential data required for setting up audio bird scaring devices (e.g. Gull Scat).
13. A more pragmatic approach for duty holder and regulator alike is to simply accept that the irresistible forces of nature are at work when an installation is selected and colonised by sea birds. Once this happens the problem has to be properly managed by the duty holder and helicopter operators alike to minimise the effects of the birds on both platform and helicopter operations.
14. Routine and frequent reporting of helideck condition is fundamental to efficiently managing the guano accumulation and obscured markings problem.

15. At present helideck condition reporting is done on an individual helicopter operator basis as a collective, rolling monthly report or by submitting individual 'voyage reports' for specific installations. These reports are then sent to the duty holders to act upon.

16. Helicopter operator responsibilities under the ANO are quite specific for ensuring that landing sites are suitable for purpose, etc. Also, CAP 437 requires the AOC holder to monitor and advise helideck owners before markings and lighting are degraded and become a safety concern. In addition, BHAB are now responsible for the issue and currency of Offshore Helideck Certificates and placement of restrictions where appropriate. Currently, BHAB do not appear to be 'in the loop' for NUI helideck condition reporting. The offshore Duty Holders also have responsibilities under the offshore installations regulations to provide facilities and establish procedures for landing and taking off helicopters, without risks to health and safety.

17. There is no common UKCS system for routinely observing, rating the condition, reporting and publishing the information about NUI helidecks. Operationally, there is considerable merit in having such a system which is consistent and easily accessible to duty holders, helicopter operators and the BHAB. Doing so would greatly assist all parties in meeting their legal 'duty of care' obligations.

18. There does not appear to be an industry agreed, operational protocol that provides a consistent approach toward dealing with helideck deterioration when guano accumulation has been reported. A simple and effective system should be employed that helicopter operators can embody into their Operations Manuals and duty holders into their intervention procedures / maintenance programmes and thus provide the required consistency.

19. Over the years much time, effort and money has been spent by offshore operators searching out solutions to the bird problem. Many of the 'pest control' options open to other industries are simply not suitable for application offshore. However, it appears that most devices that are available and suitable for offshore application have been tried by the various duty holders. The level of success with most of these devices has been low. However, audio bird scarers (e.g. Gull Scat) and water spray systems have met with some success.

20. No individual exclusion device has been able to provide the whole solution. It requires a combination of systems to sustain a reasonable degree of freedom from the birds in the medium term.

21. In the longer term, birds become habituated and largely ignore the exclusion systems employed offshore. This means the bird guano problem becomes a persistent and permanent feature for most NUI helideck operations.

22. Guano removal, disposal and cleaning operations are very unpleasant and expose personnel to potential health hazards. To date there have been no health problems reported by personnel that are related to guano exposures on NUI's. These potential health hazards are well documented in medical literature, etc. and should not be ignored or underestimated by duty holders.

23. Reports suggest that only about half of the NUI duty holders have done formal COSHH assessments to cover personnel exposure to guano.

24. Guano removal, disposal and cleaning operations are time consuming, disruptive to routine operations, manpower intensive and costly for duty holders. Jet washing is mainly used for the cleaning job. Depending on the levels of accumulation, low to moderate success rates are generally reported.