

Investigation report

Report

Report title Report of the investigation into an incident on <i>Transocean Barents</i> on 4 March 2015 when a person was injured	Activity number 402009004
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Security grading

<input checked="" type="checkbox"/> Public	<input type="checkbox"/> Restricted	<input type="checkbox"/> Strictly confidential
<input type="checkbox"/> Not publicly available	<input type="checkbox"/> Confidential	

Summary

The Petroleum Safety Authority Norway has investigated an incident which occurred on *Transocean Barents* on 4 March 2015. One person was injured by being squeezed between a railing and the yoke for the top drive in the main derrick (main Ram). The incident had the potential to cause serious injury or death.

The investigation identified inadequate design of the work area, conflicting procedure requirements for accessing and working in the derrick, ambiguities related to zones with entry restrictions in the drilling area, and inadequate management, risk understanding and risk assessment related to simultaneous activities on the drill floor.

Involved

Main group T-F	Approved by/date Leif J Dalsgaard / 2 July 2015
Members of the investigation team Eigil Sørensen, Mette Vintermyr, Kristen Kjeldstad	Investigation team Sigvart Zachariassen

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1 Summary

The incident occurred on mobile drilling unit *Transocean Barents (TO Barents)* in connection with a fishing operation in well 6305/7-5H D North on Ormen Lange. Transocean Offshore Ltd NUF (Transocean) holds an acknowledgement of compliance (AoC) and operates *TO Barents*. Norske Shell AS (Shell) is operator for Ormen Lange and holds a consent to conduct drilling operations with *TO Barents*.

A roughneck was injured on 4 March 2015 during an inspection in the derrick. He was on a work platform about 12m above the drill floor, and was probably bending forward a little over the railing when the yoke for the top drive descended and snagged him. The roustabout was squeezed/struck between the yoke and the work platform railing, but managed to twist free. The incident had the potential to cause serious injury or death.

The investigation team from the Petroleum Safety Authority Norway (PSA) started work on the unit on the day the incident occurred. In addition to conducting its own investigation, the PSA supported the police inquiry. Transocean also investigated the incident and had participants from Shell in its team.

Four nonconformities have been identified by the PSA's investigation:

- inadequate safety configuration of the work platform and failure to complete protection measures which had been initiated
- inadequate operational routines for accessing and working in the derrick
- unclear zoning of drill floor and derrick
- inadequate management, risk understanding and risk assessment related to simultaneous activities on the drill floor.

2 Introduction

The PSA arrived on *TO Barents* on 4 March 2015 together with the police and completed its work on board on 5 March 2015. The injury site was cordoned off and the operation halted immediately after the incident. This report is based on interviews, document reviews, verification in the drilling area on *TO Barents*, and Transocean's investigation report.

The PSA investigation team comprised:

Sigvard Zachariassen Working environment, investigation leader

Eigil Sørensen	Drilling and well
Mette E Vintermyr	Drilling and well
Kristen Kjeldstad	Drilling and well

The PSA's investigation team arrived on *TO Barents* together with the police at 20.30 on 4 March 2015. The police chaired the kick-off meeting with support from the PSA. An inspection of the incident site was then conducted with Transocean.

An overview of documents reviewed during the investigation is provided in chapter 7.

A list of personnel who participated in interviews or meetings is provided in appendix A.

The mandate for the PSA's investigation is established in accordance with the PSA's investigation procedures.

- a. *Clarify the incident's scope and course of events (normally with the aid of a human, technology and organisation – HTO – diagram), with an emphasis on safety, working environment and emergency preparedness aspects.*
- b. *Assess the actual and potential consequences*
 1. *Harm caused to people, material assets and the environment.*
 2. *The potential of the incident to harm people, material assets and the environment.*
- c. *Assess direct and underlying causes, with an emphasis on HTO aspects, from a barrier perspective.*
- d. *Discuss and describe possible uncertainties/unclear aspects.*
- e. *Identify nonconformities and improvement points related to the regulations (and internal requirements).*
- f. *Assess the player's own investigation report. Prepare a report and a covering letter (possibly with proposals for the use of reactions) in accordance with the template.*
- g. *Discuss barriers which have functioned (in other words, those which have helped to prevent a hazard from developing into an accident, or which have reduced the consequences of an accident).*
- h. *Recommend – and normally contribute to – further follow-up.*

3 Course of events

The operation under way when the incident occurred at 07.37 on 4 March 2015 was running a drillstring into the well to fish for a lost slips component.

An incident occurred on 28 February 2015 where a drillstring came under tension and hit an air regulator in the main derrick. The regulator, which was installed on a work platform about 12m above the drill floor, was smashed into several pieces and fell down.

At the shift handover meeting on 4 March 2015 between the operator representative, the senior toolpusher, the assistant toolpusher and the driller, it was agreed that the day shift would search for missing parts from the destroyed air generator. The aim was to avoid such components falling into the well.

A roustabout (the injured person) was assigned by the assistant toolpusher to search for parts from the destroyed generator. He first ascended the auxiliary derrick (auxiliary Ram) to look at the regulator corresponding to the one destroyed in the main derrick (main Ram), then descended and ascended the main derrick. The driller was not notified that the roustabout had

entered the derrick, and the latter did not sign in on entry. The operation under way was running drillstring into the well at a relatively low speed of 0.3 m/s.

The roustabout checked the area around the work platform in the main derrick where the destroyed generator had stood. He probably leant a little over the railing to check the air supply pipe to the regulator. The descending yoke for the top drive hit his head, which was partially squeezed between yoke and railing. The roustabout withdrew his head and his safety goggles fell to the drill floor. He suffered a broken jaw and a cut by his left ear.

At the same time, a roustabout who was operating the pipehandling machine in the driller's cabin noticed the injured person on the work platform and asked the driller to stop the operation. This was done immediately, and the top drive stopped after about 0.4 metres.

The injured person descended unaided from the work platform to the drill floor, where he was taken care of by colleagues and, after a few minutes, by a nurse as well.

Further operation was immediately halted and the accident site secured.

A SAR helicopter was requisitioned at 07.50, reached *TO Barents* at 9.09 and brought the injured person to hospital in Ålesund at 10.10.

4 Potential of the incident

Actual consequences

The injured person suffered a break to his right-hand jawbone and a cut by his ear, as well as crushing/bruising to his head, neck and back. He was flown by helicopter to hospital in Ålesund. Subsequent examination shows that he has probably not suffered permanent injury. No damage was caused to material assets and the natural environment.

Potential consequences

The incident had the potential to cause serious injury or death. It had no potential for material losses or possible damage to the natural environment.

5 Observations

The PSA's observations fall generally into two categories.

- Nonconformities: observations where the PSA believes that regulations have been breached.
- Improvement points: observations where deficiencies are found, but insufficient information is available to establish a breach of the regulations.

5.1 Nonconformities

5.1.1 Inadequate safety configuration of the work platform and failure to complete protection measures which had been initiated

Description

The distance from the work platform railing to the top-drive yoke is about 9cm and thereby poses a danger of crushing injuries. Work had begun on *TO Barents* to install a grating similar to one on *Transocean Spitsbergen*, but had come to a halt.

Grounds

- The configuration of the work platform and railing could allow personnel to be hit by the top-drive yoke.
- No traceable documentation exists to indicate that this condition has been identified and assessed.
- Protection has been installed on sister rig *TO Spitsbergen* to prevent crushing injuries, and warning signs have been posted (illustration 1). When this was done is unclear.
- Fixing brackets for a grating similar to the one on *TO Spitsbergen* had been installed on *TO Barents*, but the work was not completed. No written information on this was available in Transocean's organisation.
- What information transfer has taken place between drilling units with a RamRig concerning this condition is unclear.
- Whether information about the inadequate configuration was transferred with the change of ownership from Aker to Transocean is unclear.
- Aker Solutions/MHWirth, supplier of the RamRig, had not identified this hazardous condition and had no information which could cast light on the issue.

Requirements

Section 5, paragraph 1, letters c, f, g and h of the facilities regulations on design of facilities
Section 4, paragraph 1 of the management regulations on risk reduction

5.1.2 Inadequate operational routines for accessing and working in the derrick

Description

Operational procedures for entering the derrick were not in agreement with each other. Personnel had different views on how to comply with procedural requirements for accessing the derrick.

Grounds

- Conflicting requirements are specified in the procedures for accessing the derrick:
 - drops procedure, page 58 of 109: "You must have the driller's permission to access the derrick and fill out the Derrick Log Book" – see chapter 7, document 6
 - dropped objects prevention, section 2 sub-section 17, chapter 4.6.3, only requires an entry in the log book when tools are to be used in the derrick – see chapter 7, document 5.
- It emerged from interviews that personnel had different views on the procedural requirements for accessing the derrick. Some thought the requirement to sign the log book and get the driller's permission only applied when tools were being taken into the area. Others believed that entering the derrick always had to be logged with the driller.

Requirements

Section 24 of the activities regulations on procedures
Section 24 of the activities regulations on safety-clearance of activities

5.1.3 Unclear zoning of drill floor and derrick

Description

Section 2, sub-section 16, point 4.3.1 of Transocean's procedure on restricted access zones specifies that physical barriers must prevent unauthorised personnel from entering the area. See chapter 7, document 4. The ladder up to the work platform had no physical barriers.

Grounds

- The diagram showing zones (red/yellow/green) on the drill floor did not clearly define which zoning code applied to the work platform in the derrick. See chapter 7, document 14. The work platform was not coloured in on the zoning diagram
- Transocean's procedures define red, yellow and green zones. See chapter 7, document 4. This was not practised on *TO Barents*, where only the red zone was defined on the drill floor.
- It emerged from interviews that only the red zone was practised on the drill floor.
- The application of the green and yellow zones was unclear.
- It was unclear whether the red zone applied to the derrick over the drill floor.

Requirements

Section 24 of the activities regulations on procedures

Section 89, second paragraph of the activities regulations on remote operation of pipes and work strings

5.1.4 Inadequate management, risk understanding and risk assessment related to simultaneous activities on the drill floor

Grounds

- The management conducted no risk assessment and review with personnel before the inspection in the derrick began.
- Personnel involved in the main operation were aware that the injured person was in the derrick.
- It emerged during interviews that the driller had not been informed about the inspection being conducted in the derrick.
- No preliminary meeting was held before the inspection job began.

Requirement

Section 28 of the activities regulations on simultaneous activities

Section 30 of the activities regulations on safety-clearance of activities



Illustration 1, from *TO Spitsbergen*.

A grating has been installed on *Transocean Spitsbergen* as illustrated in photograph 1.

Bracket for a grating installed
on *TO Barents*.

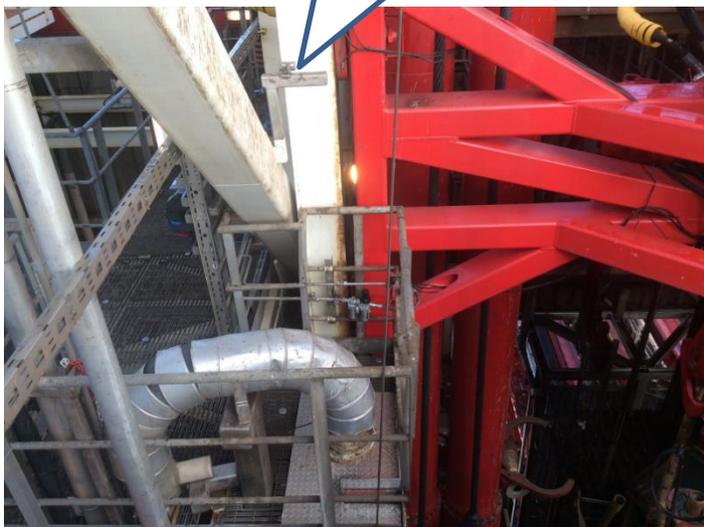


Illustration 2, from *TO Barents*.

Work had started on *TO Barents* to install a grating similar to one on *TO Spitsbergen*. The grating had not been installed, only the bracket.

6 Discussion of uncertainties

No witnesses observed the incident, and some uncertainty exists about details in the course of events. It is not entirely clear where the injured person was first struck and what happened before he was able to escape from the yoke. Nor is it clear whether he was shoved away from the yoke or managed to free himself by his own efforts. He was wearing a hard hat, but it is unclear whether this had any significance for the course of events or the injuries.

The incident occurred early on the first day after a shift change from night to day. People are known to be more tired and less attentive after such a changeover, and a higher incident frequency has also been documented in such conditions. The injured person regarded everything as normal, and did not believe he was particularly affected by the shift change. Subjective experience of tiredness often differs from the actual condition. Tiredness is related to increased lack of attention and reduced reaction time. It cannot be excluded that tiredness could have contributed to the incident in this case.

The incident occurred at a time when great uncertainty prevailed about a further contract for this unit in particular and a weak rig market in general. Many employees had been issued with redundancy notices, and more expected to receive them in the near future. Such circumstances can reduce concentration and attention in day-to-day work. The unanimous response in interviews was that such considerations were set aside when working. In the PSA's view, there is no reason to assign great weight to this factor.

We noted that attention was paid to dropped objects. The operator company had great expectations that prevention of such incidents would be at a high level. This is basically positive. During interviews, it was suggested that the concentration on dropped objects could be at the expense of the overall risk picture – such as the risk of being struck by moving objects in the red zone. It is difficult to assess the significance of this factor, but the operator is known to be a strong agenda-setter for the way a unit is operated by the drilling contractor. Strong, one-sided concentration on one area can shift attention from others.

Uncertainty prevails about the improvement measure which had been initiated. It is not clear why a grating was installed on *TO Spitsbergen* and how this was communicated to *TO Barents*. Nor, according to Transocean, is it possible to establish why installation of a grating was started but not completed on *TO Barents*. The unit has changed hands, but whether the grating history occurred before the transfer of ownership has not been clarified.

Transocean's investigation report by and large identifies the same causes as the PSA report. It also proposes various technical and operational measures to prevent a similar incident recurring. The Transocean report does not provide further details about the history of the measure implemented on *TO Spitsbergen*, nor does it identify why the measure initiated on *TO Barents* was not completed. Greater in-depth investigation would probably have increased the learning potential.

The medical response appears to have functioned satisfactorily, but it was noted in interviews that adequate first-aid equipment was not available as quickly as it should have been. Requisitioning a helicopter and transport to hospital took place in accordance with plans for the operation and within specified criteria for response times.

7 Documents

The following documents have been utilised in the investigation.

- 1 Notification of undesirable incident on *TO Barents* on 28 February 2015
- 2 Notification of incident on *TO Barents* on 4 March 2015
- 3 Morning report *Transocean Barents* from 28 February 2015 to 5 March 2015 (five issues)
- 4 Procedure: Restricted access zones, section 2, sub-section 16
- 5 Procedure: Dropped objects prevention, section 2, sub-section 17
- 6 Procedure: Drops, rev 00, HSE handbook, rev date: 1 July, 2011
- 7 Procedure: Tripping in drill pipe, section 2 sub-section 4.2
- 8 Mandatory rig specific procedure – tripping in drill pipe
- 9 Written risk assessment – handling of BHA
- 10 Written risk assessment – tripping in drill pipe
- 11 Log printout – GeoNext – incident on drillfloor *Transocean Barents* 07.40
- 12 Printout from Synergi
- 13 Photograph from *Transocean Spitsbergen* where a grating has been installed vertically to prevent crushing incidents after safety report (bulletin)
- 14 General information on safety – NOR-HSE-001, FM411-04n Issue 04 Rev 00
- 15 *Tranocean's* investigation report – stamped as received by the PSA on 22 May 2015

Appendix

A – Overview of participants from *Transocean* and *Shell*