PETROLEUMSTILSYNET

Investigation report

Report	
Report title Investigation of a serious lifting incident with personal injury on Oseberg B on 16 April 2020	Activity number 001053062

Security grading

☑ Public	☐ Restricted	☐ Strictly confidential
☐ Not publicly available	☐ Confidential	

Involved	
Team T-1	Approved by/date Kjell Marius Auflem/5 November 2020
Members of the Investigation team Torbjørn Gjerde, Eivind Hovland, Reidar Sune	Investigation leader Reidar Sune

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1 Summary

In connection with preparations for a new well operation, the derrick was due to be skidded to a new position. An incident occurred during this work with a catwalk extender, which tipped over during preparations for a lifting operation. One person fell to the pipe deck and was injured.

The extender which overturned was installed at one end of the permanent catwalk. It was due to be uninstalled and lifted an offshore crane to dedicated storage, since it would not be needed after the derrick was skidded.

Preparations for the lift primarily comprised removing 16 bolts which connected the extender to the permanent catwalk, moving a set of railings from the end of the extender to the end of the permanent section, connecting four wire rope lifting slings with shackles to the pad eyes on the extender, and attaching the slings to the hooks on the crane pennant.

The incident occurred after the slings had been attached to the pennant hooks and the crane operator began to tighten them as part of the preparations before the actual lifting operation to move the extender could begin. At that point, the injured person combined the roles of both slinger and banksman, and was on top of the extender. When the crane operator tightened the slings, one of the four snagged on a structural component on the underside of the extender and the whole structure was almost immediately tipped over onto its side. The slinger/banksman who was injured – also referred to in the following as the injured person – fell about 3.6 metres and landed on the pipe deck. The railings on the extender ended up about 30 centimetres from the injured person's head.

Immediate first aid was given on the spot to the injured person, and the emergency response organisation was alerted and mustered. The injured person, who was conscious throughout, was treated by the medic, transported to the hospital on Oseberg A and sent to Haukeland Hospital by SAR helicopter from Oseberg at 15.39. Work on Oseberg B was halted, and the area secured and cordoned off.

The investigation by the Petroleum Safety Authority Norway (PSA) has established that the direct cause of the incident was that a sling became snagged on the catwalk structure.

Underlying causes are multiple and complex. These are described in more detail below, but relate primarily to unfamiliarity with the equipment and lack of risk understanding of the uninstallation and the preparations which formed part of the lifting operation. The latter related particularly to removing the bolts securing the

extender to the permanent catwalk before the section was secured with tightened slings to the crane. Nor was the management system for safe use of lifting equipment complied with. Raising the crane hook began before the area had been readied.

The injured person suffered a fractured wrist, a cracked spine, a cut on the head and concussion. Under slightly different circumstances, the incident had the potential to cause further serious injuries to or kill the injured person.

The investigation has identified the following nonconformities.

Nonconformities:
- Equinor's exercise of its see-to-it duty
- the management system
- planning and risk assessment
- execution.

2 Background information

2.1 Description of facility and organisation

Oseberg is an oil and gas field located about 130 kilometres west of Bergen in a water depth of 100-160 metres. Its field centre comprises three platform – A, B and D – which stand on the seabed and are tied together by bridges. Oseberg A is a process and quarters facility on a concrete gravity base, Oseberg B is a jacket-supported drilling and well platform, and Oseberg D also rests on a steel jacket and carries gas processing and export equipment. It was tied to the field centre in 1999.

The field centre came on stream in 1988. Crude oil and condensate are transported in a 115-kilometre pipeline to the Sture terminal near Bergen.

Drilling is currently under way on Oseberg B, and KCAD is responsible for this work under a contract from Equinor's development and production Norway (DPN) west unit. It also has its own personnel with responsibility for materials handling, cranes and lifting operations on the facility.

Figure 1 – The Oseberg field centre, with Oseberg B to the right.

2.2 Position before the incident

The incident occurred during a work operation which formed part of the preparations for skidding the derrick from well B-29 to well B-13. An extender was fitted to one end of the permanent catwalk in order to operate with well B-29. This not required for work on B-13, and it was therefore to be uninstalled and moved to dedicated storage. The extender weighs 5.5 tonnes.

During this work, the incident occurred at about 14.00 on 16 April 2020. At the time of the incident, conditions on Oseberg B were good for lifting operations: daylight, dry weather, good visibility and little wind.

The investigation has also established that sufficient personnel had been allocated to the operation, and it emerged from interviews with people involved that there was no pressure of time or other factors which meant that the operation could not be executed in a safe manner.

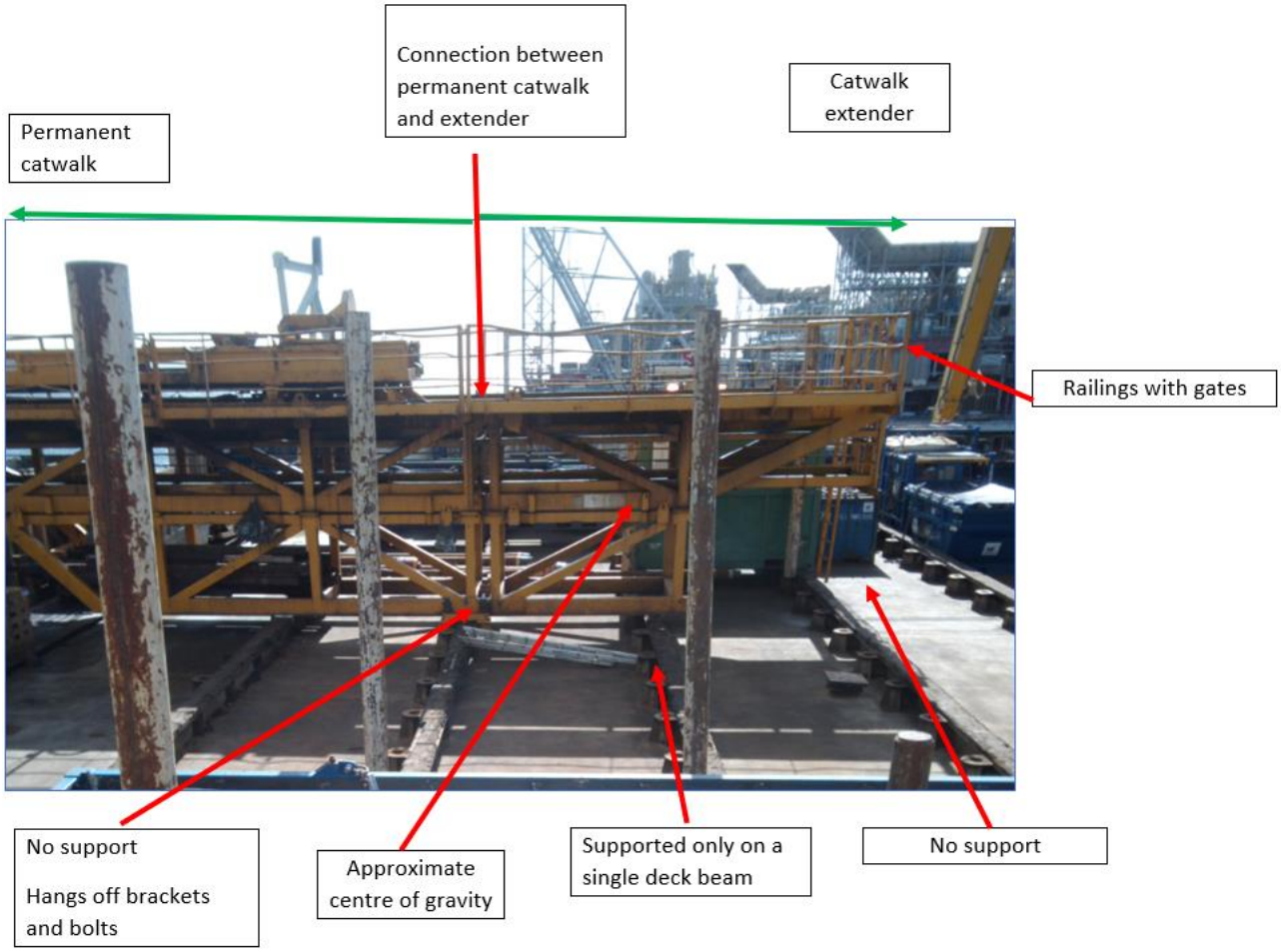

Figure 2 - Position before the incident. (From Equinor's presentation of the incident. The photo was taken on the day of the incident, but immediately before it occurred).
Annotations by the PSA.

The daily morning meeting was conducted before the incident and the job of moving the extender was reviewed with those who would be involved in the work and lifting operations. The work operation was treated as a routine job. During the preceding day, a toolbox talk risk identification card (Tric) was prepared as part of the planning process in order to identify possible hazards and other relevant conditions related to the forthcoming job. The investigation has shown that preliminary planning did not cover preparing detailed plans and allocating assignments to the individuals involved in the operation. Three people were involved on deck and one on the offshore crane.

When those involved came out to the work site to start the job, the crane operator went to their cabin while the other roustabouts undertook an inspection of the equipment before work on uninstalling the extender and preparing the actual lift.

The PSA team was informed during interviews that the extender section was connected to the permanent catwalk by a total of 16 bolts.

2.3 Equipment involved in the incident

The extender was uninstalled from the permanent catwalk and prepared for moving by the platform's offshore crane with associated lifting equipment. The latter comprised four wire rope slings and four shackles which were installed in pad eyes on the extender. The offshore crane was a fully electric type with very precise operation.

2.4 Abbreviations

DPN – Development and production Norway
KCAD - KCADeutag
Tric – Toolbox talk risk identification card

3 The PSA investigation

Composition of the investigation team:

Reidar Sune – logistics and emergency preparedness discipline (leader)
Torbjørn Gjerde – logistics and emergency preparedness discipline
Eivind Hovland – drilling and well discipline

The incident occurred at 14.02 on 16 April 2020, and the PSA's duty officer was notified of it at 14.46. Before receiving written notification, the PSA immediately contacted Equinor and requested all available information. On the following day, 17 April, a video meeting was held where Equinor presented the incident and its assessment of this. The company had then already established an investigation team which flew out to Oseberg that same day.

PSA personnel were forbidden to travel because of Covid-19. On 20 April, however, it was decided to conduct the investigation without travelling offshore but working from home with the use of digital aids. At that point, the investigation team had already requested and received relevant technical and operational documentation for the relevant operation.

Since the team did not get first-hand access to the site by having its own personnel offshore, it started on 22 April by interviewing the leader of Equinor's investigation. The latter provided a good and detailed description of observations made at the incident site, along with photographs and other relevant information. On that basis, together with the information presented by Equinor on 17 April, the team conducted 14 interviews between 22 April and 4 June 2020 with personnel involved and with people who had management responsibility and responsibility for operations on Oseberg B.

4 Course of events

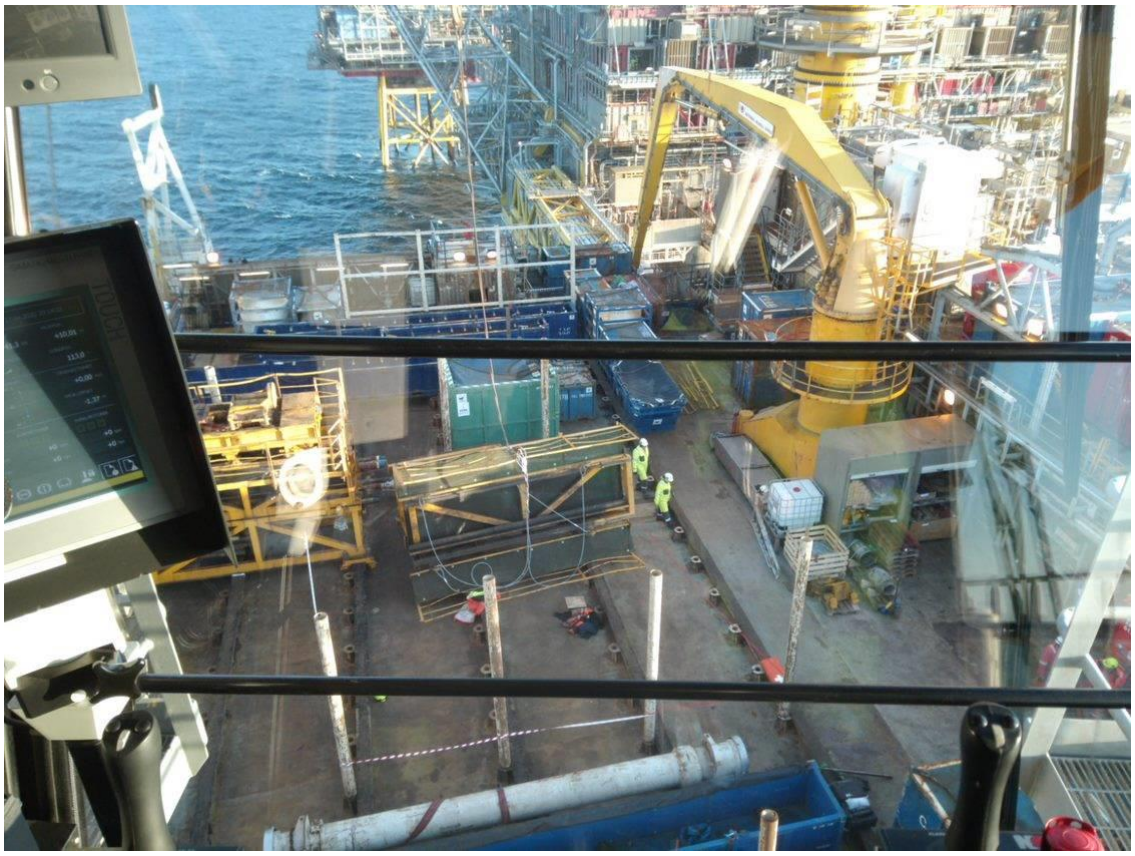

Figure 3 - The catwalk and the tipped-over extended, viewed from the operator position in the crane cabin.

It emerged from interviews that no documentation or work descriptions were available during planning on how to perform the work operation for uninstalling and preparing the extender to be lifted. Nor was any information provided on the sequence in which the work should be done. However, interviewees explained that an understanding prevailed that this was a simple job and that everyone had an opinion about how and what each person should do during the operation.

As part of the preparations for lifting the extender, four wire rope lifting slings with shackles were to be attached to pad eyes on the extender. Furthermore, a set of railings at the end of the extender were to be moved to the permanent catwalk so that the end of the latter was secured when the extender was lifted away. All the bolts between extender and catwalk – 16 in all – were to be loosened and removed, with the exception of two which were to remain until lifting could begin.

The four wire rope slings were fitted with shackles while lying on the deck before being attached to the hooks, two and two, on a double crane pennant and then lifted up and shackled to the pad eyes on the extender. The next step was to detach the slings from the pennant hooks and lay them on top of the extender because the

crane had to be used to move the end railings from the extender to the catwalk. While this was being done, the slings lay loose, shackled to the pad eyes on the extender and ready to be reattached to the pennant hooks.

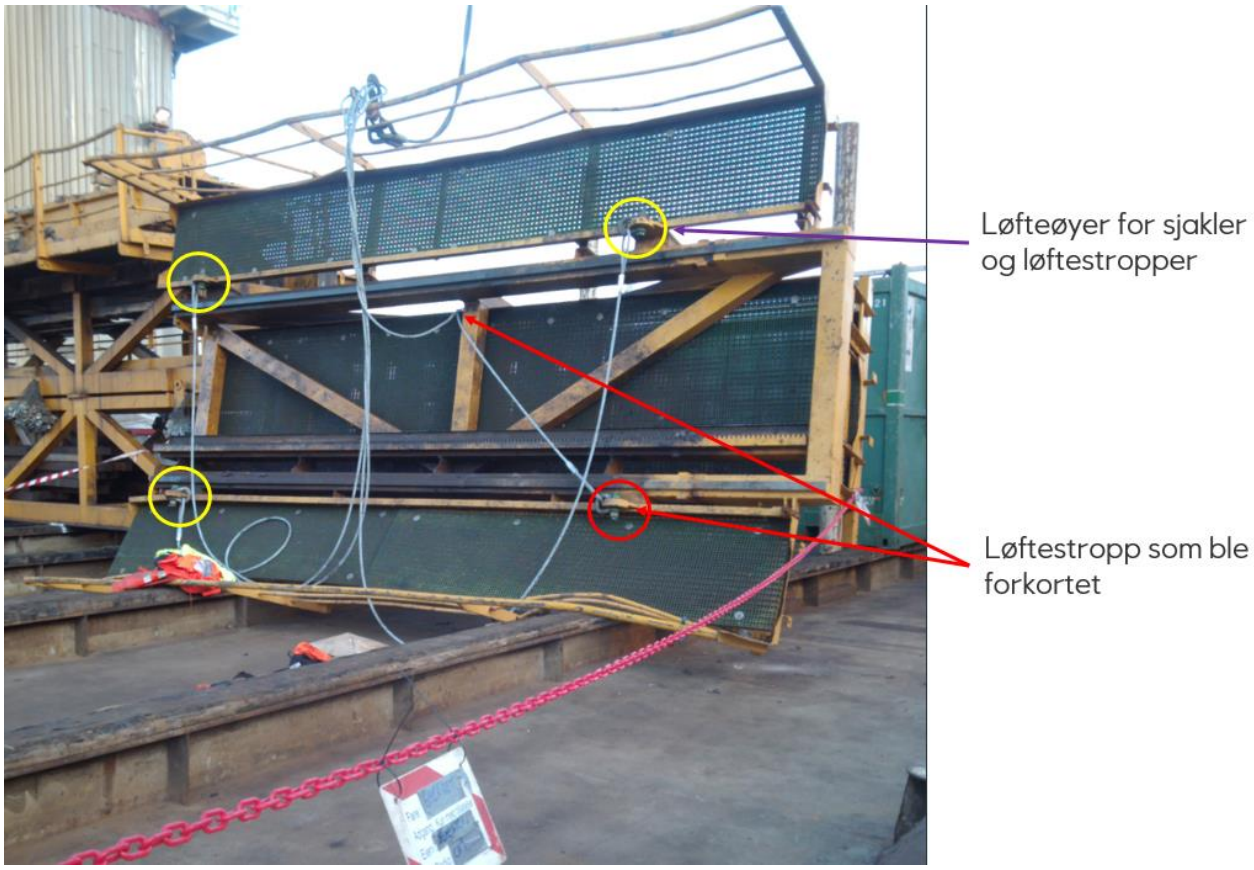

Figure 4 - The catwalk and the tipped-over extender seen from the operator position in the crane cabin. From Equinor's presentation of the incident.
Key: Pad eyes for shackles and slings; Sling which became shortened.

After the railings had been moved, the slings were reattached to the pennant hooks. To check that the slings were free and had not become snagged, the crane hook was raised in order to tighten the slings so that everything was ready to start the lift for moving the extender. While hooking-on and tightening were under way, the injured person was on top of the extender and then exercised the roles of both banksman and slinger. The two other roustabouts involved in the job were on the deck without roles, and explained that they paid no attention to the tightening of the slings. It was not planned to lift the extender during this part of the operation, but only to prepare for the actual lift. Plans included cordoning off the lift route before lifting could begin. Since no lift was planned at that point, this part of the job was not regarded as a lifting operation. Nor were the preparations before the tightening, and they were not planned and executed as a lifting operation.

When the slinger had attached the slings to the crane, the operator raised the hook in order to tighten the slings. It is uncertain when the last two bolts securing the

extender to the catwalk were removed – whether before or during hooking up the slings – but they had already been taken out when the tightening began. One of the slings had become snagged on a protruding structure on the extender. See figure 5. It therefore became tight before the three others, one side of the extender was lifted and it tipped over onto its side. The slinger, who was still on top of the extender, was thrown off and fell about 3.6 metres onto the deck. The railings on the extender ended up about 30 centimetres from the injured person's head.

Figure 5 - The structure where the wire rope sling became snagged. From Equinor's presentation of the incident.

What preceded the crane operator raising the hook while the slinger was still standing on top of the extender, and how quickly and how high the hook was raised, are a source of uncertainty in the investigation. It has been impossible to verify these aspects from the printout of the crane's log data. The crane's data logger was partly non-functioning during the incident.

Interviews have yielded two different descriptions of the course of events. These are respectively:

- Crane operator's version.
  Was told by the slinger/banksman to "raise slowly", and followed this instruction while the slinger/banksman was still on top of the extender – in other words, the crane's load.
- Slinger/banksman/injured person's version.
  The operator on his own initiative began to raise hook quickly without having received a go-ahead, and the slinger/banksman then signalled "raise slowly".

It has also emerged from interviews that uncertainty prevailed over how stable the extender would be once the bolts were removed from the permanent catwalk. This was possibly discussed when the personnel arrived at the site and work started on preparing the lift, but nobody took account of the possibility that the extender might tip over. Both the tipping and the speed that this happened came as a surprise.

In retrospect, when assessing the pre-incident photograph (figure 2), it emerges that the extender was supported solely on a single deck beam and probably rested against the permanent catwalk in the brackets when the bolts were removed. See figure 2 which provides an indication of the centre of gravity on the left-hand side of the deck beam. The PSA's assessment is that the extender could become unstable in its longitudinal direction with small weight changes on top, or with a minor shift in its position on the single deck beam. Furthermore, the team also considers that a possibility existed for the snagged sling, on being tightened, to move the section so that its centre of gravity changed. Assessing figures 2 and 6, and looking at how the extender lies in relation to the permanent catwalk, the possibility exists that it moved longitudinally away from the catwalk, was held in place by the snagged sling and twisted over onto its side. That is because photographs show that the extender is both displaced and twisted somewhat in the longitudinal direction.

Figure 6 - The structure displaced in the longitudinal direction away from the permanent catwalk and twisted somewhat in the same direction. From Equinor's presentation of the incident.

5 Potential of the incident

5.1 Actual consequences

The person who was on top of the extender and who fell to the deck when it tipped over suffered a fractured wrist, a cracked spine, a cut on their head and concussion. First aid was initiated immediately after the accident, and the injured person was soon afterwards flown to land in a SAR helicopter. They were conscious after the incident. The PSA has subsequently been told that the injured person will not suffer permanent disability.

The actual consequence of the incident was minor structural damage to the extender and disruption to the work of preparing to skid the derrick. Work resumed once the site was adequately documented and inspected by Equinor's investigation team.

5.2 Potential consequences

The investigation team's assessment is that the potential of the incident, under slightly different circumstances, could have been even more serious injury to or death for the roustabout – particularly if they had been directly struck by the extender's railings and/or structural components.

6 Direct and underlying causes

6.1 Direct cause

The direct cause of the incident was that one lifting sling became snagged on the extender's structure as the crane hook which the sling had been attached to was raised.

6.2 Underlying causes

The underlying causes of the incident are multiple and complex. They are addressed in the investigation report, but relate primarily to the following.

- Lack of an available materials handling plan, user manuals or work instructions for installing and uninstalling the extender.
- Inadequate knowledge of the equipment.
- Failure to plan the operation in such a way that risks were adequately identified:
  - inadequate understanding of risk related to uninstalling and readying for the lifting operation
  - the bolts securing the extender to the permanent catwalk were removed before the extender had been secured by tightening the slings with the crane
  - the extender was unstable when the bolts were removed – an assessment of photographs from the incident site suggests that the design of the extender,

  - its assumed centre of gravity and its positioning – supported primarily on a single deck beam – made it unstable
  - the injured person was on top of the extender (load).
- Inadequate compliance with the management system for safe use of lifting equipment because:
  - preparing for the lifting operation was not assessed as part of a lifting operation
  - the crane operator began a lifting operation by tightening the slings while personnel were on top of the extender (load) and without the latter being secured
  - the crane operator raised the hook attached to the load while the slinger/ banksman was positioned on the load
  - the tightening was not planned in such a way that risks had been sufficiently identified, since the assignment was not regarded as part of the lifting operation.
- Safety culture in the work team:
  - registered incidents in Synergi show several serious incidents in recent years
  - apparently inadequate collaboration and understanding of roles
  - risk understanding related to organising lifting operations and use of lifting equipment
  - work done with inadequate or non-existent governing documentation, and without complying with governing documentation.
- Inadequate follow-up by leading KCAD personnel to ensure implementation of and compliance with the management system for safe use of lifting equipment.
- Inadequate exercise of Equinor's see-to-it duty to follow up KCAD's implementation of and compliance with the management system for safe use of lifting equipment.

7 Emergency response

Because of the scope of the investigation, as described in the mandate, the PSA has not assessed emergency response on this occasion.

Equinor's investigation team has conducted a detailed review of the response, and this is included in its report.

8 Observations

Equinor has opted to base its Aris management system for crane operations on the Norsok R-003N standard for safe use of lifting equipment recommended in the regulations.

KCAD has its own management system with procedures, but this Wellman system is also based on Norsok R-003N.

A WR9621 safety standard based on applicable regulations/standards has also been drawn up, and includes guidelines for lifting operations. This takes the form of a handbook carried by the individual for use in their day-to-day work.

The PSA's observations fall generally into two categories.

- Nonconformities: this category embraces observations which the PSA believes to be a breach of the regulations.
- Improvement points: these relate to observations where deficiencies are seen, but insufficient information is available to establish a breach of the regulations.

8.1 Nonconformities

8.1.1 Equinor's exercise of its see-to-it duty

Nonconformity
Equinor had failed to see to it that KCAD complied with requirements for lifting operations specified in the health, safety and environmental legislation.

Grounds
It emerged from interviews and is the team's understanding of working practice on Oseberg B, where KCAD is responsible for logistics, that the role of the responsible party for operations has low priority. This relates to ensuring that the party concerned has adequate expertise and experience to be able to exercise their role in the intended manner. Furthermore, it emerged that the land organisation has no position or function exercising the role of and responsibility for operations support which was available to the responsible party for operations offshore. It emerged from interviews that KCAD's responsible party also lacked support from or organisational affiliation with Equinor's onshore team for cranes and lifting. Such contact was only possible via KCAD's rig follow-up manager, which is an onshore position. It also emerged that Equinor and KCAD had separate lifting fora. KCAD wanted to hold these fora together with Equinor to ensure shared understanding and practice. The two companies had joint lifting fora earlier, but began holding them separately two-three years ago.

Equinor has not followed up KCAD's lifting operations on board and ensured that these complied with the regulatory requirements for their safety. Equinor has no function with lifting expertise which follows up and sees to it that KCAD complies with the management system for safe use of lifting equipment. The PSA team asked in several interviews whether Equinor had followed up KCAD in the materials handling discipline, but no documentation or other information has been presented to show that Equinor has exercised its see-to-it duty in this area.

Requirement
Section 7, paragraph 2 of the framework regulations on responsibilities pursuant to these regulations
Section 92, paragraph 1 of the activities regulations on lifting operations, see the guidelines, see Norsok R-003N chapter 4, appendix A on roles and responsibilities

8.1.2 The management system

Nonconformity
Governing documents, including technical operating documents for safe lifting operations, at KCAD and Equinor were inadequate and not known to operating personnel.

Grounds
No documented method was available for installing and uninstalling the extender. The investigation team asked whether KCAD's management system included procedures, documentation or work descriptions for the way this operation should be done. No documentation or other information has been presented which shows that such material was available or existed.

Furthermore, the investigation has revealed deficiencies in document SO06860-Opr, 4, Equinor's local supplement for Oseberg B. This document stated that KCAD's senior tool pusher was the responsible party for operations, while practice on Oseberg B was that this role rested with KCAD's assistant tool pusher. Furthermore, it states that KCAD is only responsible for lifting operations which include drilling and well. However, it emerged from the investigation that KCAD was responsible for all lifting operations on Oseberg B – not only those directly related to drilling and well, but also all other work. Oseberg B is also a wellhead platform where Equinor conducts work which requires materials handling and lifting operations.

Requirement
Section 20, litera b of the activities regulations on start-up and operation of facilities
Section 92, paragraph 1 of the activities regulations on lifting operations, see the guidelines, see Norsok R-003N chapter 4, appendix C on local procedures and appendix E on documentation and labelling, section E1, respectively

8.1.3 Planning and risk assessment

Nonconformity
The lifting operation was not prepared and led in a prudent manner.

Grounds
It emerged from several interviews that the work operation of preparing to move and lift the extender had not been considered a lifting operation but only preparatory to

the actual lift, which would happen later. The consequences of not regarding this as a lifting operation included a failure to clarify roles and responsibilities for the individuals involved, and to hold a toolbox talk before the relevant lift. During the lift which triggered the incident, only the crane operator and the injured roustabout were directly involved. The injured person filled the roles of both slinger and banksman.

It also emerged that the planned lifting operation to move the extender was regarded as a recurring job, and was considered by several interviewees to be a routine lift. However, no early planning of the lifting operation was carried out in order to identify risks and hazards in advance. In addition, it emerged that the crane operator had not been involved in moving the extender before. With reference to information from Equinor's investigation report, the extender has only been uninstalled nine times in the 2014-20 period. This indicates that it was not a regular and well-practised work operation.

Requirement
Section 92, paragraph 1 of the activities regulations on lifting operations, see the guidelines, see Norsok R-003N chapter 4

8.1.4 Execution

Nonconformity
The actual lifting operation which led to the incident was not managed and executed in a safe manner.

Grounds
The incident occurred because the crane operator lifted the extender while the banksman/slinger was still on top of it. It emerged from interviews that several people perceived the movement as very fast, given that the intention was to tighten the slings. An uncertainty in the investigation is whether the lift was cleared via radio by the banksman/slinger while the latter was still on top of the extender (load), or whether the crane operator lifted without a go-ahead from the banksman. According to interviews, it was perfectly possible for the slinger/banksman to direct the lifting operation from a safe position. Interviews also revealed that the crane's control levers were not deactivated while the slinger/banksman was standing on the load, so that the crane could have moved if the operator inadvertently came into contact with them.

Personnel involved in the lift did not ensure that they had an unhindered escape route during the operation.

Requirement
Section 92, paragraph 1 of the activities regulations on lifting operations, see the guidelines, see Norsok R-003N chapters 4, 6 and 7

9 Barriers which have functioned

No barriers were established for the work operation, and no measures had therefore been implemented to prevent the extender tipping over or to reduce the consequences of such tipping.

10 Discussion of uncertainties

Several uncertainties have been found in the investigation which could not be determined with certainty. These include the following.

- Whether the last two bolts were loosened and removed immediately before or simultaneously with the attachment of the slings of the crane pennant hooks. However, the bolts had been removed when the tightening began.
- Whether the lift was cleared via radio by the slinger/banksman while the latter was on top of the load (extender), or whether the crane operator lifted without a go-ahead from the banksman. Two versions emerged from the interviews, and the PSA team has decided not to draw a conclusion about the exact sequence of events because this cannot be established. The team has also requested data from the crane's log unit about the crane's movements in the period before the incident. This review shows that the log unit has not functioned as intended, and only certain movements were recorded. Available registered log data therefore fail to provide adequate information and the basis for making a good assessment and acquiring a good grasp of crane and hook movements leading to the incident. That information could have provided a better understanding of such issues as:
  - possible technical faults with the crane
  - failures in communication systems
  - operator errors/misunderstanding
  - observed errors – in other words, whether the lifting speed was abnormal when seeking to check that the slings could move freely.

Several of the uncertainties are not necessarily significant for the causes of the incident or the identified nonconformities.

11 Assessment of the player's investigation report

Equinor's investigation report is good, thorough and detailed, and identifies both direct and underlying causes. These coincide with the PSA's conclusions.

The Equinor investigation is confined to KCAD's role in the incident and its responsibility in relation to contractual requirements, and has identified nonconformities related to preparing, implementing and complying with governing documents. It does not cover to a corresponding extent Equinor's own role and

responsibility to see to it that KCAD's materials management and lifting operations are conducted in compliance with applicable regulatory requirements and Equinor's own standards.

12 Appendices

A: The following documents have been used in the investigation

- Notice of undesirable work accident B – Person fell from catwalk to pipe deck, 16. April 2020
- Minutes and presentation, meeting, FX-00528 – 17 April 2020
- Equinor's investigation mandate, FX-00528 – 20 April 2020
- Safety flash – personal injury incident Oseberg B – person fell to the pipe deck, FX-00528 - 20 April 2020
- PSA e-mail on the decision to investigate the personal injury incident on Oseberg, 21 April 2020
- Summary of fieldwork 20 April – presentation by Equinor's investigation leader
- R-102649 – Define responsibility for operational responsible – Upstream offshore
- Operational instructions catwalk machine P30-45-LS, doc KCAD-WM-OSB-13301
- Installation procedure catwalk machine, doc KCAD-WM-OSB-13302 (2)
- Handling, preservation and storage procedure, catwalk machine P30-45-LS
- Photographs taken from the crane on OSB, 17 April 2020
- Exemption 194041: Postponement of refresher course for crane operator on Oseberg B
- Safety standard for drilling and well, WR9621, revision 3.01-2020 (manual)
- Roles interviewed by the Equinor investigation team
- Local supplement, Oseberg field centre, Norsok R-003
- KCAD Tric
- Assignment for the responsible party for operations offshore-I-104093
- Status expertise OSB A02
- Work permit AT1 9509376445
- AT1 9509376445 Work order with description of derrick skidding
- AT1 9509376445 Changes and signatures for work order
- AT1 9509376445 Preparations
- AT1 9509376445 Approval
- AT1-2 on OSB 16 April 2020
- Overview of crane incidents OSB – timeline
- Defined responsibilities of the responsible party for operations-R-102649
- Overview of expertise of personnel involved – Status expertise OSB A02 (1)
- Equinor investigation report following incident on OSB

B: Overview of personnel interviewed

See separate appendix.