

Investigation report

Report

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Involved

Team T-3	Approved by/date Erik Hørnlund 16 January 2019
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1 Summary

An undesirable incident occurred on 28 July 2018 on Aker BP's Tambar facility. During the test landing of a motion-compensated walkway, damage was caused to railings and cable trays on the facility.

The Petroleum Safety Authority Norway (PSA) decided to investigate the incident on 5 September.

Under slightly different circumstances, the incident *could* have resulted in a major accident with the release of large quantities of hydrocarbons, substantial material damage and possible loss of life. This is because the incident could equally well have happened when using the landing platform at the south end of the facility, where hydrocarbon pipelines and equipment could have been hit.

The direct cause of the incident was that the walkway missed the landing platform and hit its edge of the latter before sliding off. It then attempted automatically, in line with its design, to find a fixed point to engage with on the receiving side.

The team's principal observations relate to deficiencies in the following areas:

- dimensioning accidental loads
- documentation of structural integrity
- decision base and planning
- organisation and coordination of roles, responsibilities and information exchange.

Further details are provided in chapter 8.

The activity on the Tambar facility was to be conducted in the summer season, but it is uncertain whether the limited time at Aker BP's disposal for planning and implementing measures could have contributed to the incident.

However, the investigation established that statistics are available which show that unsuccessful landings of motion-compensated walkways have occurred. Determining the dimensioning accidental loads must therefore be included when planning such walkway use.

Identification of risk, with the necessary understanding of possible accident scenarios and their consequences, is the basis for safety work. So a systematic identification of hazards (Hazid, for example) represents an important basis for continued efforts to understand and manage new or unfamiliar activities in a good way.

This was not taken sufficiently into account when assessing and implementing the walkway solution on Tambar.

2 Background information

2.1 Brief review of Aker BP, Tambar and the position before the incident

Aker BP is operator on the Norwegian continental shelf (NCS) for the Valhall field centre (with the Hod satellite), Ula (with the Tambar satellite), Ivar Aasen, Alvheim (with the Bøyla, Vilje and Volund satellites) and Skarv. The Tambar facility stands 16km south-east of Ula, in

68m of water. This is a normally unmanned wellhead installation controlled from Ula. The field came on stream in 2001. Power is supplied by electric cable from Ula.

In normal operation, the facility is manned once a week for maintenance work. Helicopter transfer from/to Ula is then used.

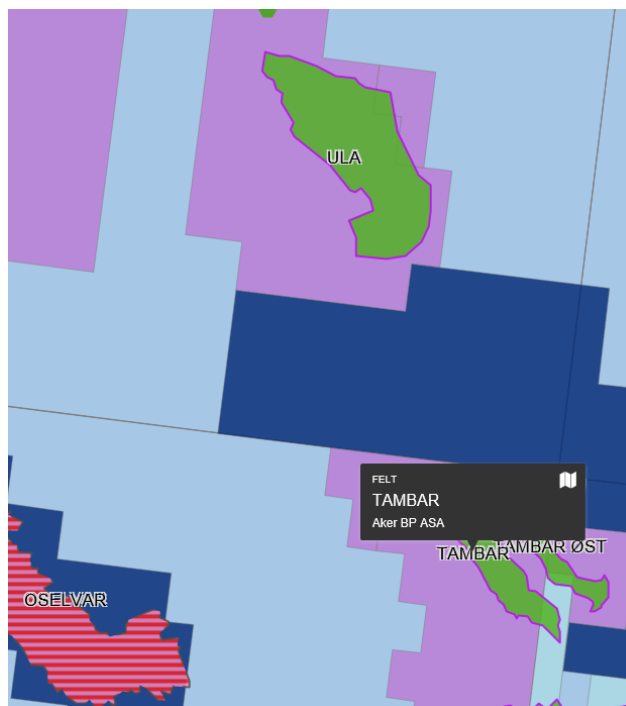


Figure 1 Overview of Tambar/Ula area. (Source: www.norskipetroleum.no)

Production is piped to Ula for processing and export. While the gas gets injected in the Ula reservoir, oil is exported via Ekofisk to Teesside in the UK.

Modifications to install gas lift on Tambar were expected to require some 6 200 work hours on board. The original plans called for this job to be done while *Mærsk Interceptor* was positioned at the Tambar facility in the first half of 2018, but this rig left the field before the modification work had been completed. Aker BP calculated that it would take about 200 days to finish the work using daily helicopter hops.

To speed up this work and make better use of the workers, the company considered using a vessel with a motion-compensated walkway – known as a walk-to-work (W2W) ship. This solution would allow the modification work to be completed in about two months while reducing the number of helicopter flights.

After a tendering process in June 2018, Aker BP opted to charter *Island Diligence* from Island Offshore. This vessel is fitted with a motion-compensated walkway from Uptime. The Tambar facility was modified to accept the walkway.



Figure 2 The Tambar facility. (Source: AkerBP.no)

Island Offshore operates about 25 ships and offers various services, including walk-to-work (W2W) vessels. *Island Diligence* is a platform support vessel (PSV) with dynamic positioning to DP2 class and carries a motion-compensated walkway from Uptime, one of the companies delivering such equipment.



Figure 3 Island Diligence. (Source: www.islandoffshore.com)

When *Island Diligence* arrived on Tambar on 26 July, a helicopter was used to man the facility. The vessel conducted DP tests outside the 500-metre zone and waited for preparation of the landing areas to be completed and the weather to improve.

Conditions when the walkway was to be test-landed were a significant wave height of about 1.8m and a wind strength of nine to 11m/s.

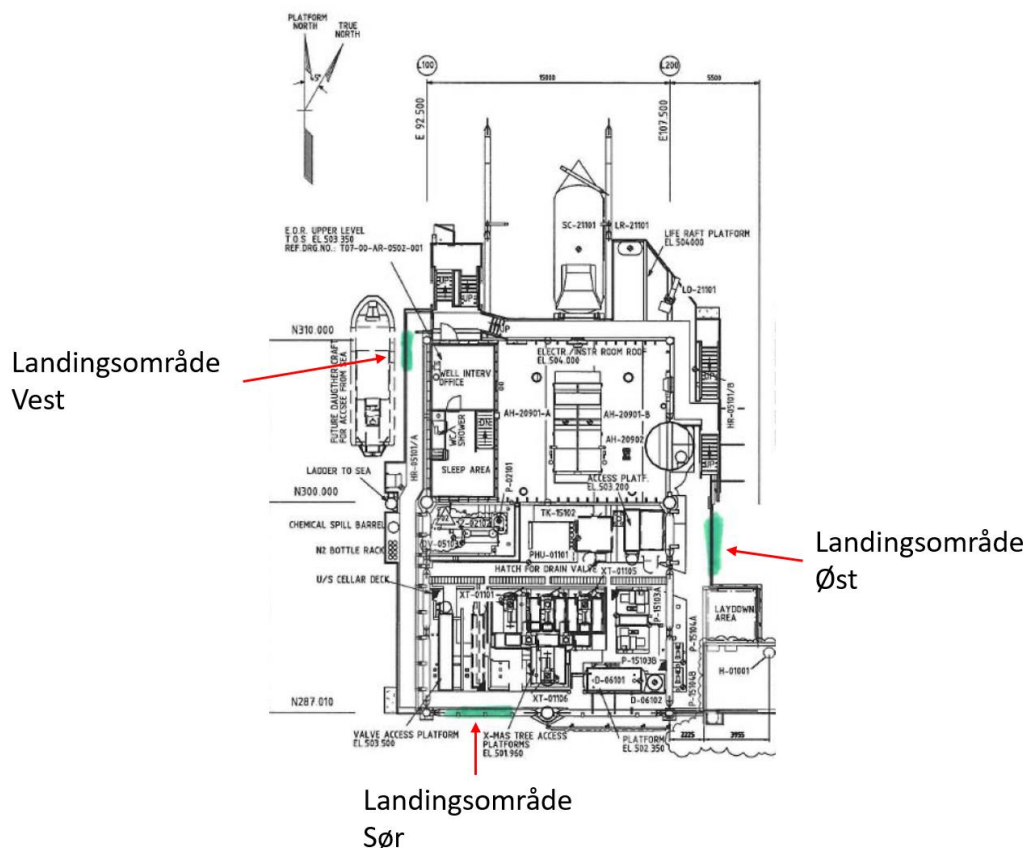


Figure 4 Overview of the three landing areas on the Tambar facility. (Source: Aker BP).

The landing area on the west (Vest) side was used during the test.

2.2 W2W vessel

The term W2W vessel refers to a ship with a motion-compensated walkway for transferring personnel from it to an offshore facility – usually a “simpler facility” in the petroleum sector. Motion compensation means that the walkway is kept more or less at rest even if the vessel moves as a result of wave action. This means that the walkway operator can guide it to a specific landing platform on the facility. That could be directly part of the structure, such as an H-beam, or a platform installed for the purpose. Three landing areas had been prepared on the Tambar facility. One was an H-beam, while the others had a landing platform attached as shown in the photograph below. The landing areas were position on the southern, eastern and western sides, as shown in figure 4.



Figure 5 Landing area on the east side with platform installed. (Source: Aker BP)

Two methods are normally available for landing a walkway. One involves pushing the walkway against the facility with a certain amount of thrust (typically 4-16kN) throughout the process. The walkway is then locked to the landing platform.

With the second approach, the walkway is landed on a cone installed on the facility. It then moves with the vessel motion without using thrust towards the facility. The thrust method was used on Tambar.

Walkways have been used internationally for a number of years to transfer personnel between a vessel and an offshore facility, such as a wind turbine. In the petroleum sector, such vessels are used for both manned and normally unmanned facilities. However, Norwegian owners of these ships have largely worked in the offshore wind power sector.

The PSA set up a work group in 2016 to gather international experience with W2W ships. Meetings were held with Danish, Dutch and British regulators, because the Netherlands and the UK have used them for a number of years. They have been utilised particularly with normally unmanned installations, called simpler facilities in the Norwegian regulations.

A W2W vessel (*Kroonborg*) built in the Netherlands in 2015 is employed full time on transferring personnel to/from petroleum facilities. The operator's experience of replacing helicopter transport with this ship was very good. It achieved an availability of 90 per cent using *Kroonborg*, which is better than with helicopters. Effective working time was also increased by 30 per cent.

In the UK, W2W vessels are used with normally manned facilities, in part to increase manning during turnarounds. Personnel are then quartered on the ship and transferred morning and evening. The FPSO *Enquest Producer* is an example.

The partner in the Tambar licence, Faroe Petroleum Norge AS (Faroe), has also had experience with W2W vessels on the UK continental shelf for transferring personnel to the unmanned Schooner and Ketch facilities. These are comparable with the Tambar facility.

Motion-compensated walkways have only been used once with oil and gas facilities on the Norwegian continental shelf (NCS). This was for Oseberg H (OSH), a simpler facility without helideck or emergency quarters. Unlike Tambar, OSH is designed on the assumption of continuous connection with a motion-compensated walkway when manned in normal operation. The plan for development and operation (PDO) for OSH was submitted in 2016, and production began in 2018. Motion-compensated walkways were deployed in connection with completing the facility in 2017, but have yet to be utilised in normal operation.

Tambar is the only producing facility on the NCS where the operator has tried to land a walkway from a vessel.

2.3 Regulations

Unlike facilities, the petroleum regulations have limited applicability to vessels. Where transport is concerned, section 17, paragraph 1 of the activities regulations states that the operator must ensure that people and supplies can be transported safely to, from and between facilities and vessels during placement, installation and use, and for the chosen disposal alternative. Otherwise, the relevant provisions of the regulations apply for petroleum functions exercised by the vessel, but not for maritime aspects.

Personnel accommodation on offshore facilities is fully covered by the petroleum regulations. Accommodation related to petroleum activities must be provided by facilities in accordance with the definitions in the Petroleum Act and the framework regulations. To meet requirements in periods with increased manning, typically turnarounds or a start-up phase, mobile units such as semi-submersibles or jack-ups are used. These are usually dedicated flotels, but can also be mobile drilling units. Today's regulations thereby permit vessels with motion-compensated walkways to be used for personnel transport but not for accommodation.

The PDO for Oseberg west flank 2 included accommodation on vessels with a motion-compensated walkway, and was approved with this solution. That applied to offshore personnel who would work on the normally unmanned OSH wellhead facility. The PSA has subsequently drawn up proposals for regulatory amendments which permit vessels with motion-compensated walkways to be used for accommodation of offshore personnel working on simpler facilities. These proposals were the subject of public consultation in 2018 with a view to implementation from 1 January 2019. For more details, see the consultation letter issued in connection with the proposed amendments to the regulations

Plans to use a vessel with a motion-compensated walkway on Tambar should accord with the proposed regulatory amendments. Aker BP had applied for consent to use such a ship on Tambar after the PSA gave it notice of an order to do so. Following the incident, which occurred during testing of the walkway solution, Aker BP decided to cancel the planned use of the vessel with a motion-compensated walkway on Tambar and withdrew its application for consent. The PSA therefore did not complete its consideration of the application.

While preparing its consent application, Aker BP appealed in a letter of 10 July 2018 against the PSA's decision that consent had to be sought for this vessel activity. In a decision of 21 November 2018, the Ministry of Labour and Social Affairs (ASD) accepted the PSA's interpretation and supported its decision. The ASD noted that groundwork and administrative practice provide solid legal support for the conclusion reached by the PSA on this issue, and that the vessel had to be regarded as a facility in this planned operation.

2.4 Technology qualification

Aker BP's requirements for technology qualification are largely governed by whether recognised industry standards exist in the area. The company therefore maintains that applying technology new to it but known in the industry does not require such qualification.

DNV GL has developed standards and guidance for this type of walkway. Aker BP utilised DNV GL's standard in designing the walkway's use on Tambar, and argued that technology qualification was not required.

The regulations state in part that, where petroleum operations require the use of new technology or methods, criteria must be established for developing, testing and utilisation so that health, safety and environmental requirements are met. This also covers the use of known products and methods in a new way.

2.5 Risk posed by using the walkway solution

The industry's arguments for utilising walkway solutions for this type of unmanned facility generally refer to greater cost-efficiency, increased flexibility and enhanced safety. It argues that this solution provides:

- greater cost-efficiency and flexibility with an increased level of manning, higher productivity and shorter execution time
- enhanced safety based on quantitative analyses where the risk of personnel transport by helicopter is compared with the risk with the walkway solution and collision risk.

Good risk management means that issues have been comprehensively and adequately identified before taking decisions, and that a good balance is struck between financial value creation and safety. This requires adequate risk information. The traditional way of treating risk in an analysis context – calculated as probability times consequences and measured against predefined acceptance criteria – could be appropriate for comparing risks and achieving a perspective on what constitutes a high or low risk with the activity. But this is too narrow and restrictive when defining risk related to understanding, administering and managing activities.

It emerges from the guidelines to section 11 of the framework regulations that consequences and uncertainties are important elements in the risk concept. The goal must be that decisions are based on adequate information on risk, associated uncertainty and consequences.

Identification of risk with associated understanding of possible accident scenarios and consequences is fundamental to safety work. Where new and unknown activities are concerned, systematic hazard identification (such as Hazid) is an important basis for further work on understanding and managing activities in a good way.

Adequate identification, understanding, assessment and handling of relevant hazards, including with regard to consequences, is very important for actual risk. Identifying of and dealing with location-specific conditions, for example, such as closeness to hydrocarbon equipment, play a major role for the consequences of an incident of the type covered in this report. The same applies to assumptions associated, for example, with the expertise of the walkway operator and agreed communication between vessel and facility.

2.6 Abbreviations

CTR – Cost–time–resources
 Hazid – Hazard identification
 Hazop – Hazard and operability analysis
 JIP – Joint industry project
 kN – kiloNewton
 NCS – Norwegian continental shelf
 Ovid – Offshore vessel inspection database
 PDO – Plan for development and operation
 PSV – Platform support vessel
 RFI – Request for information
 TAL – Tambar artificial lift project
 TC – Technical committee
 W2W – Walk to work

3 The investigation

3.1 Composition of the investigation team

Bjarte Rødne	Logistics and emergency response (investigation leader)
Lars G Bjørheim	Structural integrity
Ove Hundseid	Process integrity
Else Riis Rasmussen	Process integrity

The investigation has been conducted through meetings and interviews as well as a review and assessment of governing documents, documentation and Aker BP's investigation report.

3.2 Investigation team's mandate

- a) Clarify Aker BP's processes, with the emphasis on risk management and the see-to-it duty in relation to hiring, planning and using a motion-compensated walkway on Tambar, including
 1. reviewing Aker BP's assessment of the concept
 2. clarifying which verification activities were actually conducted by Aker BP.
- b) Assess direct and underlying causes, with particular emphasis on the planning process (barriers and/or processes which have not functioned).
- c) Identifying nonconformities and improvement points related to the regulations (and internal requirements).
- d) Discuss and describe possible uncertainties/unclear aspects
 1. obtain experience acquired from the use of motion-compensated walkways.
- e) Discuss barriers which have functioned (in other words, those which have helped to prevent a hazard from developing into an accident, or barriers which have reduced the consequences of an accident).
- f) Assess the player's own investigation report.
- g) Prepare a report and accompanying letter (possibly with proposed use of enforcement powers) in accordance with the template.
- h) Recommend – and normally contribute to – further follow-up.

Factors it could be relevant to highlight in the investigation report

- Factors which provide lessons about motion-compensated walkways in the industry.

- See-to-it duty – make the operator responsible.

3.3 Work of the investigation team

A kick-off meeting was held with Aker BP on 10 September, and interviews were conducted with key personnel in Aker BP's organisation on 17 and 18 September. Separate meetings were held with Island Offshore, Uptime and licence partner Faroe. DNV GL was also interviewed about its role ahead of the test landing on the Tambar facility.

Key documents and relevant documentation have also been reviewed, but no visit was paid to the vessel or facility. However, videos of the test walkway landing have been viewed.

An Aker BP observer was present at meetings and interviews with Aker BP personnel, but not at meetings with the other companies.

The investigation has concentrated particularly on planning *before* the test landing. Less attention has been paid to the detailed requirements in Aker BP's management system, since the team felt these were well covered in Aker BP's investigation of the incident. The team's emphasis has been more overarching, with a view to learning which activities should be included in the planning phase in order to avoid similar incidents.

4 Course of events

Aker BP failed to achieve the desired progress with the current Tambar artificial lift (TAL) modification projects on the facility. Daily transport of personnel to and from the facility by helicopter yielded poor efficiency and progress.

At the technical committee (TC) meeting of 23 November 2017, Faroe proposed using a W2W vessel during the modification work. It repeated this proposal at the TC meeting of 12 March 2018.

Aker BP conducted a feasibility study on 13 April to identify vessels and walkways available in the market. The market assessment was presented to the TC meeting of 27 April.

Updated collision analyses and supplier prequalification were initiated in the first half of May.

On 22 May, Aker BP assessed the risk of using a W2W vessel on Tambar. The company's risk register shows that the risk of an erroneous walkway landing was identified (Risk ID 2), which might mean the walkway would move inward from the landing area and damage process facilities. That in turn could cause a hydrocarbon leak. Installing protective scaffolding was identified as a risk-reducing measure.

Design of the landing areas was initiated in the second half of May.

On 26 May, the PSA gave Aker BP notice of an order that it had to obtain consent before accommodating personnel on the W2W vessel on Tambar.

Aker BP began assessing personnel risk and establishing marine operation procedures at the beginning of June.

A request for information (RFI) for a W2W vessel was issued on 5 June.

The decision by the production licence to charter the vessel was taken on 14 or 15 June (Aker BP and Faroe differ over the date).

The contract to charter *Island Diligence* was awarded to Island Offshore on 18 June.

A Hazop was carried out on 20 June, facilitated by DNV GL. Since Uptime was unable to attend the meeting, walkway expertise was provided by Ampelmann. No measures were initiated with regard to Risk ID 2.

Design of the landing areas was completed in the second half of June. Prefabrication, transport and installation followed.

The change required by the choice of a W2W vessel for Tambar was considered by the TAL project on 25 June.

Inspection of *Island Diligence* using the offshore vessel inspection database (Ovid) was conducted on 27-28 June.

Experience transfer from the production licence partner took place on 28 June.

Verification of health and the working environment on *Island Diligence* took place on 3 July and was followed up on 17 July.

A new Hazop was carried out on 4 July, facilitated by DNV GL as before. Uptime took part this time. No measures were initiated with regard to Risk ID 2.

The consent application to use a W2W vessel on Tambar was sent to the PSA on 11 July.

Tambar partner Faroe conducted a verification of Aker BP's preparations for using a W2W vessel on 19 July.

Installation of the landing areas was completed in the last part of July.

Ahead of the test landing of the walkway, Aker BP installed scaffolding boards as a physical barrier at the south landing area to protect the hydrocarbon piping. Verification of this barrier was a separate checkpoint.

The test landing of the walkway occurred on 28 July. The course of events as *reported* to the team (incident database) was as follows.

“In connection with the test connection to Tambar, an undesirable incident occurred. When implementing the test programme for the W2W vessel on Tambar, before final mobilisation, the walkway on *Island Diligence* failed to connect as intended with the landing platform on Tambar. This created problems in managing the walkway, and the walkway hit the platform railings and then a cable tray.”

5 Potential of the incident

5.1 Actual consequences

The actual consequences were damage to railings, light fittings, cable trays and cables in the landing area on the west side of the facility. This incident caused Aker BP to cancel the planned use of a W2W vessel on Tambar.

5.2 Potential consequences

Under slightly different circumstances, the incident *could* have resulted in a major accident with the release of large quantities of hydrocarbons, substantial material damage and possible loss of life. This is because the incident could equally well have happened when using the landing platform at the south end of the facility, where hydrocarbon pipelines and equipment could have been hit.

It must be added that Island Offshore would not have used the south landing area if it was aware that hydrocarbon piping ran behind it. The team was told this in the meeting with the company.

6 Direct and underlying causes

6.1 Direct cause

The direct cause of the incident was that the walkway missed the landing platform and hit its upper edge. The walkway nevertheless converted to landing mode, where it pushes against the facility in order to lock onto the landing platform. The motion compensator was then disconnected, and the vessel's motion caused the walkway to be pushed up and slide off the landing area.

The walkway continued, in line with its design, to seek a fixed point in order to maintain its thrust against the facility. It then damaged the railings. The walkway operator noticed this and raised the walkway in order to withdraw it. Combined with vessel motion, that caused the walkway to hit cable trays above the walkway before it was withdrawn.

6.2 Underlying causes

The incident had several underlying causes. While the picture is complex, the investigation has concentrated on what can be done to avoid similar incidents. This reflects its mandate, which gives emphasis to hiring, planning and using a motion-compensated walkway on Tambar. The points below reflect that.

6.2.1 Acquiring experience

Interviews and experience acquisition have revealed statistical material which shows that comparable incidents have occurred when using such walkways. The planned use of a walkway on Tambar failed to make adequate use of this information.

6.2.2 Identifying hazards

Aker BP failed to implement a full hazard identification programme (such as Hazid) when planning walkway use on Tambar. Two analysis meetings were held with DNV GL as

facilitator, but these were more in the nature of Hazop reviews of established operational procedures. The cost-time-resources (CTR) order of 25 May from Aker BP to DNV GL confirms this.

6.2.3 Time aspect

The motion-compensated walkway on Tambar could only be used under certain weather conditions because it has clear restrictions on use – if vessel motion is excessive, for example. These weather criteria could mainly be met in the summer season, so the time aspect might have played some part in hiring the W2W vessel and planning walkway use.

6.2.4 Roles and responsibilities

The two main players in the course of events, Aker BP and Island Offshore, did not exchange important information on the walkway ahead of the incident. That includes Aker BP's failure to share the design of the landing platforms and details about the surrounding areas to any extent with Island Offshore. Lack of clarity also existed about the interface with and communication between the walkway and TAL projects.

6.2.5 Technical, operational and organisational requirements

The various reviews and analyses carried out when planning walkway use concentrated one-sidedly on operational and organisational measures. Technical requirements were apparently assumed to be covered.

Comfort and employee satisfaction had a higher priority than risk reduction in the planning phase. This is exemplified by the decision to let personnel on the facility eat lunch on the vessel. That doubled the number of daily walkway landings.

7 Assessment of the planning process

Aker BP itself has concluded that the way the job would be managed with entrenchment in the management system was not defined, and that the organisation lacked clarity. Few resources were directly allocated, for example, with a reliance on many part-time contributors both internally and externally.

Since the management system is well covered in Aker BP's investigation of the incident, the team has concentrated on planning before the test landing of the walkway.

Aker BP has worked on walkway solutions since 2014, but lacked practical experience. Personnel who had conducted walkway studies therefore made use of external consultants who had such experience from the UK continental shelf.

Work on hazard identification (Hazid) as the basis for understanding, administering and managing the walkway activities first began after the decision to use the W2W vessel from August to October had been taken and the contract was awarded to Island Offshore. Aker BP used an existing frame agreement with DNV GL to facilitate this analysis. DNV GL had previous experience of such assignments.

The CTR order of 25 May to DNV GL included a Hazid for the Tambar walkway solution, with a description of goal, scope, data input and delivery. DNV GL describes the delivery as a Hazop of the operational procedure for using the walkway, while Aker BP calls it a Hazid.

A Hazid is meant to identify hazards so that necessary barriers can be established or other compensatory measures initiated. However, it emerges clearly from the CTR that Aker BP wants the review to use operational procedures and bridge documents as the input/basis. The order therefore has more the character of a Hazop, reviewing established operational procedures rather than identifying hazards.

The analysis meeting was held on 20 June. Uptime was unable to attend, so it was decided to hold a further meeting on 4 July.

In conversations with personnel who took part, the investigation team was told that these two meetings devoted considerable time to assessing what incidents might occur. Among other things, time was allowed for questioning the concept and expressing concern over various hazards. Nevertheless, it is uncertain whether the framework for conducting the analyses helped to give sufficient emphasis to identifying relevant hazards.

The main reason for the damage suffered on the Tambar facility was that the planning process failed to take account of the possibility that the walkway could miss the landing platform. The team has been told that this type of incident was discussed, but that the probability of it happening was found to be very small. No measures were therefore initiated.

Because the first analysis meeting on 20 June was held so soon after the contract had been awarded to Island Offshore, representatives from the shipowner and Uptime could not attend. Instead, representatives were present from walkway supplier Ampelmann, which uses a different walkway design from Uptime.

Both Island Offshore and an Uptime representative attended the second analysis meeting on 4 July. Views differ about what information was presented at this meeting. Island Offshore and Uptime claim to have provided details about unsuccessful walkway landings, but Aker BP says it received no such information in the meeting.

On request, Island Offshore sent the investigation team an overview of the incidents it has registered involving the use of walkways. Incidents similar to that on Tambar and other types of incident were recorded.

Aker BP placed scaffolding boards at the south landing area to protect process equipment from the walkway. See Risk ID 2 discussed in chapter 4. That shows this risk has been an issue in the process. However, it is uncertain when the need for protection was identified, the background for the requirement and the load the boards were intended to protect against.

DNV GL issued guidelines on walkways in 2015. These were the result of a joint industry project (JIP), which summed up experience of use and were intended to contribute to safe and efficient personnel transfer over such walkways. The guidelines accordingly cover conditions which should be assessed when using walkways, including protection of the facility with an eye to incidents like that on Tambar. Aker BP was aware of these guidelines, but made no active use of them in the walkway project.

During the interviews, the team learnt that adopting new technology was challenging for the company, in part because had no practical experience. Employees reported that it was difficult

to ask the right questions in areas where they lacked expertise. In such cases, they by and large emphasised familiar issues related to health and the working environment.

The operator must rely to a great extent on information from suppliers and external expertise. In this case, Aker BP was told that the type of incident experienced on Tambar was highly unlikely to occur. This was contradicted in practical application, since the walkway failed to connect with the landing platform as it should in every test.

Aker BP had decided that the walkway solution should be implemented in a short time, so the project was very sensitive to delays. If the project experienced hold-ups – in the conversion of the landing areas, for example – it could be pushed into the autumn with a higher probability of bad weather. Combined with a lack of in-house experience, this could have made it more difficult for those involved to raise questions about incidents which were considered to have a low frequency.

In circumstances with limited time and little practical experience, the company can find it very demanding to assess incidents which external expertise concludes are highly unlikely to occur.

First-time use of the walkway solutions combined with little time for planning and implementation *could* accordingly have produced a less robust solution.

8 Observations

The PSA operates with two main categories of observations.

- *Nonconformities*: observations where a breach/inadequate implementation of the regulations has been *proven*.
- *Improvement points*: observations where breaches/inadequate implementation of the regulations are *believed to exist*, but insufficient information is available to prove this.

8.1 Nonconformities

8.1.1 Failure to establish dimensioning accidental loads

Nonconformity

Dimensioning accidental loads from relevant accidents were not defined as design requirements for the walkway landing areas.

Grounds

Aker BP assessed the probability of an unsuccessful walkway landing as so small that it was not taken into account in the design. However, statistics made available by Island Offshore in this investigation show that unsuccessful landings occur. Dimensioning accidental loads from failed walkway landings must therefore be established in order to avoid unacceptable consequences.

Requirement

Section 11, paragraph 1 of the facilities regulations on loads/actions, load/action effects and resistance

8.1.2 Structural integrity in the landing areas

Nonconformity

Aker BP has not documented that the landing areas on Tambar are strong enough to withstand the loads they would be exposed to from a motion-compensated walkway in normal use.

Grounds

Loads arising from normal use of the walkway were identified by walkway supplier Uptime, but Aker BP could not produce documentation which showed that the landing areas were able to withstand these loads.

Requirement

Section 56, paragraph 1 of the facilities regulations on load-bearing structures and maritime systems

8.1.3 Deficiencies in the decision base and planning**Nonconformity**

Deficiencies in planning and the basis for coordinating decisions.

Grounds

- a) Aker BP has not secured sufficient information on the use of a motion-compensated walkway and the risk of injury to people and/or damage to the facility.
 - Statistical material emerged during the investigation which shows that incidents with the walkway sliding off the landing platform and similar events are not unusual.
- b) Issues related to the use of the motion-compensated walkway were not comprehensively and adequately identified before decisions were taken.
 - Hazard identification (Hazid) as a basis for work on understanding, administering and managing the walkway activity did not begin until after the decision to use a W2W vessel had been taken.
 - The Hazid analysis identified a number of actions, but was more in the nature of a Hazop review of operational procedures than a hazard identification (Hazid). It therefore failed to provide an appropriate and adequate basis for further work on understanding and managing the walkway activity.
 - Since Uptime was not present at the first analysis meeting, a second was held on the basis of updated operational procedures. This review again identified a number of actions or measures.
 - These two analysis meetings were supplemented by several internal reviews in Aker BP, such as emergency response reviews and “day in life” workshops, but all analysis meetings and reviews focused unilaterally on operational and organisational barriers and measures. Technical conditions and barriers were apparently assumed to be taken into account.
 - Aker BP conducted a pre-mobilisation verification of *Island Diligence*, but attention again concentrated on health and working environment conditions in addition to the standard verification in Aker BP’s vetting process for vessel hire. Verification did not cover the technical part of the walkway process.
- c) Decisions at various levels were not adequately coordinated.

- Aker BP's follow-up and completion of actions identified in various analyses and reviews were not systematic or documented. It is unclear whether all actions had been completed at the time of the incident, but Aker BP reports that it would have been ready to begin the walkway activities after the test landing.
- During the planning, the company made changes and took new decisions which were not sufficiently clarified and coordinated in terms of the overall risk picture. Examples include taking lunch on the ships and changes to plans for personnel changes.
- The TAL project was given responsibility for modifications, but it emerged from interviews that those involved were not familiar with the background or the basis for the decision to protect the adjacent areas at the south landing site.

Requirements

Section 29, paragraph 1 of the activities regulations on planning

Section 11, paragraphs 1 and 3 of the management regulations on the basis for making decisions and decision criteria

8.1.4 Inadequate organisation and coordination of roles, responsibilities and information exchange

Nonconformity

Inadequate organisation and coordination of roles, responsibilities and information exchange.

Grounds

- a) Interfaces, roles and responsibilities between the walkway and TAL projects were unclear. A similar lack of clarity existed between Aker BP and Island Offshore.
 - The technical interface between the walkway and the landing area, incorporating a safe, integrated solution as well as the suitability of the actual site, was lacking when planning the operation.
 - Information of significance for suitability and the overall safety of the solution was not exchanged.
 - Interviews and presentations have established that important information about areas of the facility close to the landing sites was not passed on to Island Offshore during planning of the walkway solution.

- b) Since communication of other relevant information was also inadequate, the users of the walkway received few details about the risk involved and insufficient information on its practical use. They accordingly had little opportunity to influence the choice of solution. The walkway activity was to start a few days after the test landing, and all procedures were meant to be in place by then. The test landing procedure was based on the operational procedure.
 - Personnel on the Tambar facility during the test landing had to seek procedures for use of the walkway on their own initiative. Before going offshore, they were only asked to take valid ID with them. No managed procedure existed for ensuring that the users were familiar with the procedure for using the walkway. They had no access to the appendices referenced in the operational procedure, including bridge documents.
 - Future users of the walkway were given no opportunity to assess the procedure documents and make suggestions.

- c) Personnel on the facility before the incident contacted the vessel several times to ask that the landing test be reassessed, but their views were not taken into account.
- Based on the landing tests they had already observed, the personnel took the view that the landing solution was too unstable because of walkway motion.

Requirement

Section 6, paragraph 2 of the management regulations on management of health, safety and the environment

Section 15, paragraph 2 of the management regulations on information

9 Assessment of the player's investigation report

Aker BP's investigation was conducted at level two (a dedicated investigation team appointed in Aker BP, led by the HSE manager for performance and investigation). The description of the course of events and of the direct and underlying causes is virtually identical with the team's information and assessments, but Aker BP's report goes into greater detail on the actual incident and the walkway design. The team paid less attention to these conditions since the mandate for its investigation emphasises Aker BP's planning of the walkway activity.

Two considerations could have been included in the Aker BP report.

- According to the DNV GL report, two Hazops were conducted with the operational procedures rather than the one Hazid and one Hazop reported by Aker BP. The brief time between contract award and the first Hazop meant that Uptime could not participate in it.
- Three landing tests were conducted, including the one resulting in the incident. The walkway hit the upper edge of the landing platform on each occasion. The first time, it fell into place. On both the next occasions, it slid off and hit the railings. Vessel motion determined whether the walkway fell into place.

10 Documents

The following documents have been used in the investigation.

1. GA drawings, layout drawings, photographs of W2W vessel
2. Operational procedure for using walkway on *Island Diligence*
3. Collision risk analysis (Global Maritime)
4. Assessment of personnel risk with walkway solutions (DNV GL)
5. Gap analysis of Uptime walkway in relation to codes and standards (DNV GL)
6. Verification report (Faroe)
7. Hazid conducted 20 June 2018, including action lists
8. Hazop conducted 4 July 2018, including action lists
9. Order/scope to DNV GL for Hazid/Hazop
10. Documentation of the management of change (MOC) process for use of W2W vessel, including:
 - a. change to personnel transport
 - b. change to project plan

11. Business case for use of walkway
12. Walkway project's top 10 risks
13. TAL risk matrix at the time of the incident
14. Ula Asset - risk matrix at the time of the incident
15. Operational risk register
16. Readiness for operation W2W checklist (to be gone through before starting the activity)
17. Work permit for use of walkway on Tambar on the day of the incident
18. Emergency response dimensioning (Safetec)
19. Day in life workshop 26 June 2018
20. Design requirements for walkway landing, structural integrity, layout, protective arrangements, etc
21. 55-04-01 Plan execute marine vetting and assurance
 - a. 72-01 Strategic procurement
22. 55-04-02 Plan execute marine operation
 - a. 80-01-01 Assess risk
23. 52-01-04 Perform facilities project execute stage
 - a. 77-03-01 Handle management of change
24. Evaluation criteria for choice of shipping company and walkway solution
25. Vessel inspection report, 27-28 June 2018
26. DNV GL 2017: TAL modification phase risk assessment
27. Close-out report for implemented Hazid and Hazop, 20 June and 4 July 2018 respectively, status at 28 July 2018.
28. Close-out report (follow-up of actions) after TAL-ABP-S-RA-0005 *Day in life workshop* and TAL-ABP-S-RA-004 *Assessment of emergency preparedness during increased POB on Tambar*, status at 28 July 2018.
29. Bridge documents and possible instructions which were to apply for manning on Tambar with the walkway solution. (Documents in addition to or as replacement for Ula HSE instruction 58 *Operasjonelle tiltak ved bemanning av Tambar*). TAL-ABP-Z-RA-00002 *Tambar W2W Marine Operation Procedure* and HSE instruction 58 have been received.
30. E-mails with questions from offshore personnel related to walkway use on Tambar.

11 Appendix

A: Overview of personnel interviewed.