

Assessment findings

Assessment ID **3148**

Duty holder: Woodside Energy Ltd
Facility/Activity: Northern Endeavour
Facility type: Floating production storage and offloading facility
Assessment type: Safety Case

Findings relating to OPGGS(S)

Regulation Clause ID	Regulation Clause	Topic Scope	Comment
2.10	Permit to work system for safe performance of various activities	General	
2.11	Involvement of members of the workforce (a) & (b)	General	
2.12	Design, construction, installation, maintenance and modification	General	
2.13	Medical and pharmaceutical supplies and services	General	
2.14	Machinery and equipment	Dropped Objects	The FSA, at the bowtie for MAE-05 describes the following technical controls: Load Indication and Monitoring System Overload Protection Limit Stops Certified Lifting Equipment Radios for communicating between the crane operator and other personnel These controls are described in the FD at s 3.9.19 describes the Material Handling System, including cranes, and other lifting equipment. .
		General	
		Loss of Containment	
2.15	Drugs and intoxicants	General	
2.16	Evacuation, escape and rescue analysis	General	
2.17	Fire and explosion risk analysis	Accommodation Fire	FSA, s.4.2 describes the original FERA - this description does not mention accommodation fires. It appears that the FERA was "reviewed" in the context of the 5-yearly workshop, refinement of the Hazard Register including "MAE refinement", revision of MAE datasheets and BT & ALARP review (FSA, s.1.2). The FERA does not appear to have been re-done to take account of accommodation or machinery space fires. The "TR Analysis" conducted in 1999 is described in s.4.4 - this analysis takes no account of a fire event in the accommodation block. Reg. 2.17(2)(f) requires the FERA to take account of EERA considerations. The description of the FSA does not provide evidence that this assessment has been done in relation to accommodation fires.
		General	FSA s.4.2.1 Fire & Explosion Events only identifies MAE-01 & MAE-02 as potential types of fires and explosions that could occur and does not address/describe MAE-08 & MAE-09

2.17	Fire and explosion risk analysis	Loss of Containment	
2.18	Emergency communications systems	General	
2.19	Control systems	General	
2.20	Emergency preparedness	General	
2.21	Pipes	General	
2.22	Vessel and aircraft control	General	
2.23	Arrangements for records	General	
2.26/34(1)	Safety Case is appropriate	General	
2.32	Revision after 5 years	General	
2.40	Validation - Measures consistent with FSA	General	
	Validation - Measures to protect health & safety	General	
	Validation - Statement agrees with scope	General	
	Validation - Validator access to data	General	
	Validation - Validator competence & ability	General	
	Validation - Validator independence	General	
2.5(1)	The description of the facility	Accommodation Fire	<p>FD s.3.4.4 describes the Accommodation including deep fat fryer double thermostats and fire detection and suppression systems.</p> <p>FD, s.3.9.13 describes RCD coverage on accommodation GPO including laundry and galley outlets.</p> <p>FD, s.3.9.14 describes the firewater system.</p> <p>FD, s.5.4.1 describes smoke detection within accommodation HVAC intakes (and executive actions for fans and dampers) and in "accommodation rooms"</p> <p>FD, s.5.12.1 describes passive fire protection as applied to accommodation</p> <p>FD, s.5.12.2.1 & 2 describe active fire protection for accommodation spaces</p> <p>FD, s.5.12.2 describes the galley fire suppression system</p> <p>FD, s.5.13.4 describes escape provisions for the accommodation block</p> <p>FD, s.5.14.1 describes the aft Temporary Refuge. It does not state that it is pressurised - is it? - SCRN</p> <p>The BT for this MAE states that "galley shutters" are a mitigating control for this MAE - they are not described in the FD - SCRN</p>
		Dropped Objects	<p>FD s.5.2.1.1 describes "subsea dropped object protection", s.5.2.1.2 describes "FPSO dropped object protection".</p> <p>FD s.3.9.19.1 describes the facility cranes and FROG equipment adequately.</p> <p>FD s.3.9.19.2 describes other lifting equipment and the applicable WEL standard</p>

2.5(1)	The description of the facility	General	<p>FD s.2.9 does not acknowledge the requirement to downgrade of the vessel longitudinal strength due to material condition of the hull structure</p> <p>FD s.3.2 does not describe the actual operating state of the subsea infrastructure, ie 4 x Laminaria wells & Corallina gas lift flowline out of service - SCR N</p> <p>FD s.3.9.20 states there are "separate HPUs for topsides, turret, subsea and hull system" however only a description of the topsides HPU is provided. Please provide a description for each of the listed hydraulic systems.</p> <p>FD s.5.8.1 Safety/Exclusion Zone states "Furthermore, as previously described, there is a zone of 5nm within which contracted vessels must seek approval from the OIM before entering". There is no previous discussion regarding a 5nm zone - SCR N</p> <p>FD s.5.16.3.1 states "In the case of a helicopter stationed on-board, the cold response time is approximately 15 minutes". there is no discussion/risk assessment within the safety case regarding the retention of a helicopter on-board - SCR N</p> <p>FD s.5.16.3.2 3rd sub paragraph states that "25 yellow perimeter lights outline the Helideck" this appears to be contrary to CAP437 Appendix C & CAAP 94-4 which requires green perimeter lights. - SCR N</p>
		Loss of Containment	
2.5(2)(a)	FSA HAZID	Accommodation Fire	<p>Accommodation fires identified as MAE-08</p> <p>The bowtie identifies 4 credible hazards leading to this MAE outcome - ignition of furnishings on the accommodation, galley / mess fire, laundry fire & electrical fault.</p>
		Dropped Objects	<p>FSA, s.2.1 references the "dropped object study" that formed part of the original FSA. "Loss of Control of Suspended Load" is identified as MAE-05. FSA, s.4.6.2 describes the "Dropped Object Study".</p> <p>MAE as a result of personnel transfer identified in MAE-07 "Occupational" and described on the MAE-07 bowtie diagram.</p>
		General	
		Loss of Containment	
2.5(2)(b)	FSA Risk assessment	Accommodation Fire	<p>FSA, section 3.2, Table 2 states that the consequence is assessed as "B" (multiple fatalities) and the likelihood as "0" (remote). Assessor's comment - the WEL matrix (part 3, table 2.2) describes "remote" as "unheard of in the industry". This appears simplistic - while there seems to be no record of such fires in the offshore petroleum industry the facility is a marine structure with accommodation similar to that on ships - galley, laundry and furnishing fires have occurred on ships. The levels of "highly unlikely" or "unlikely" (as described on WEL risk matrix) would seem more appropriate, these result in a "high" risk ranking. SCR N - justification for the "remote" likelihood assessment?</p> <p>FSA, s.4.2.3.1 states that "fire events in the FPSO machinery spaces are considered to be local events that are unlikely to escalate to other areas". It is not clear how this statement tallies with the assessment that machinery space fires are an MAE. This goes to an assessment that the risk assessment of the new MAEs (MAE 08 & MAE 09) is not sufficiently detailed and systematic.</p> <p>The MAE DS (FSA, s.6.3.8) states in "outcomes" that there is a "potential for impairment of the CCR and evacuation systems... would result in loss of control functionality." How does this link with FERA, EERA & survivability?</p> <p>The FSA gives an adequate description of the studies that were undertaken in 1999. s.4.8 is an inadequate (1 paragraph) summary of the "FSA Studies Review" that is said to have been undertaken for this SCR.</p>
		Dropped Objects	<p>FSA, s.4.6.2 - FSA references the "Dropped Object Study" from 1999. Stated to have been reviewed in the 2014 hazard register update. The FSA describes the contribution of this MAE to the IRPA & PLL figures on the facility.</p> <p>The FSA makes the link between a dropped object event and a consequent hydrocarbon loss of containment.</p>
		General	
		Loss of Containment	
2.5(2)(c)	FSA controls to achieve ALARP	Accommodation Fire	<p>FSA, s.4.2.2.9 describes the H60 rated firewall & water curtain at the accommodation. This is a control that in part guards against escalation of a topsides LoC MAE.</p> <p>MAE-08 bowtie addresses the standard controls for this type of MAE.</p> <p>Note - typos in FSA, s 4.2.2.8 refers to details of AFP at s.5.15.2 in Part 2, the correct reference s. 5.12.2, s 4.2.2.9 refers to details of AFP at s.5.15.1 in Part 2, the correct reference s. 5.12.1. SCR N</p>

2.5(2)(c)	FSA controls to achieve ALARP	Dropped Objects	<p>FSA, s.5.2.1 - Technical Controls related to this MAE listed, with performance standards, in Table 7.</p> <p>FSA, s.5.3.1 - "Management System Based Controls" listed - competency, procedures, maintenance, PTW, change management.</p> <p>FSA, s.6.3.5 is the MAE Datasheet for this MAE.</p> <p>FD, s.5.2 describes "Dropped Object Protection"</p> <p>FD, s.2.6.10 & s.3.9.19.1 describe personnel transfer by crane and FROG.</p> <p>FSA, s.4.3.3 makes a brief reference to personnel transfer operations and procedural controls, but they are not described in detail.</p>
		General	<p>There are a number of cross referencing errors within the FSA to other sections of the Safety Case; for example - SCRNs</p> <ol style="list-style-type: none"> 1. FSA s.4.2.2.8 reference to FD s.5.15.2 2. FSA s.4.2.2.9 reference to FD s.5.15.1 3. FSA s.4.2.2.10 reference to FD s.5.9.1 4. FSA s.4.2.3.2 reference to FD s.3.9.7 & FD s.3.9.8 5. FSA s.4.6.3 reference to FD s.5.19.3.1 6. FSA 6.3 each of the 9 MAEDS reference to FD Table 2 for SCE detailed description <p>FSA s.6.1 Figure 4 MAEDS (Content Diagram) states that each Bow-tie diagram includes a "summary of the safety critical & management elements identified for each MAE". The summary is not provided for any of the 9 Bow-tie diagrams. Please provide the SCE & ME summary information committed to within the Safety Case - SCRNs</p> <p>FSA s.7 describes the activities undertaken as part of the 5-year revision & includes in FSA s.7.3 reference to "a periodic Safety Integrity Level (SIL) Classification and Verification review [21]". It is noted that the referenced report is dated December 2012. Please describe what SIL review was undertaken as part of the 5-year safety case review - SCRNs</p>
		Loss of Containment	
2.5.(3)(a)	SMS comprehensiveness and integration	General	
2.5.(3)(b)	SMS scope	General	
2.5.(3)(c)	SMS HAZID	General	
2.5.(3)(d)	SMS assessment of OHS hazards & risks:	General	
2.5.(3)(e)	SMS risk reduction (ALARP)	Accommodation Fire	<p>FSA, s.5.3.1 cross-references to "management system based controls" in part 3 of the safety case.</p> <p>SMS, s.9 describes "Emergency Management". There is no description in this section of contingencies for the circumstance described in the MAE 08 DS (FSA, s.6.3.8), which states in "outcomes" that there is a "potential for impairment of the CCR and evacuation systems" What is the plan if the primary emergency management centre (the CCR) is untenable due to this MAE? SCRNs</p> <p>SMS, s.6.5 describes maintenance & inspection of technical controls for this MAE adequately.</p>
		Dropped Objects	<p>SMS s.6.4 describes "Management System Based Controls" including "lifting procedures also encompass lifting for personnel transfer".</p> <p>SMS s.6.5 describes "Maintenance and inspection". The SMS section references WEL's "Lifting Operations Standard", Rev3, July 2014. and the WEL "Lifting Operations" Golden Safety Rule.</p> <p>SMS s.4.3.1 describes the "Competency Assurance Process" including the requirement for crane operators to be competency-assured and the tracking of these roles.</p>
		General	
		Loss of Containment	
2.5.(3)(f)	SMS provides for inspection, testing and maintenance	General	

2.5.(3)(f)	SMS provides for inspection, testing and maintenance	Inspection Maintenance and Repair	<p>FD s.2.6.5 states Inspection, Testing & Maintenance conducted iaw defined planned routines & strategies. details provided in SMS s.6.5</p> <p>FD s.2.6.5.1 describes Flowline Isolation Valve Testing</p> <p>FD s.2.6.14 states Maintenance and inspection of the hull and near-surface subsea equipment will be carried out as required using ROV & not manned diving</p> <p>FD s.2.7 describes in general terms Access for Servicing & Maintenance</p> <p>FD s.2.11.3.1 identifies maintenance & Inspection as a Management System Based Control</p> <p>SMS s.6.3 Performance Standards for Safety Critical Elements identifies the assurance activities and an assurance schedule have also been developed and conducted through the Plan, Schedule and Execute Maintenance sub-process (described in SMS s.6.5.5)</p> <p>SMS s.6.5 states maintenance & inspection is to be conducted iaw WEL Operating Standard</p> <p>SMS s.6.5.1 describes the objectives & principals for conducting an inspection</p> <p>SMS s.6.5.2 states that the maintenance, inspection and corrosion strategies used to determine the work programs are defined and validated on the facility, are at an appropriate level to ensure ALARP & that targets are set for reliability & availability.</p> <p>SMS s.6.5.3 identifies SAP-PM as the Computerised Maintenance Management System (CMMS)</p> <p>SMS s.6.5.4 states Maintenance Reference Plans (MRPs) are used to provide a high-level overview of the maintenance activities that need to be done for the next 5 years & is updated annually.</p> <p>SMS s.6.5.5 identifies the Plan, Schedule and Execute Maintenance sub-process used to define a consistent CMMS work flow management process</p> <p>SMS s.6.5.6 identifies the Measure, Analyse and Improve Performance sub-process used to monitoring the effectiveness of the maintenance effort and through identifying the actual or likely deviations from the specification and standards established for technical integrity. The use of Reliability Centred Maintenance (RCM), Risk Based Inspection (RBI) & Instrumented Protective Function (IPF) studies are noted as used to optimise maintenance and inspection programs based on actual maintenance performance.</p> <p>FSA s.6.3 Maintenance & Inspection is identified as an SMS control for each of the threats in the MAE Bow-ties.</p>
2.5.(3)(g)	SMS provisions for adequate communications	General	
2.5.(3)(i)	SMS performance standards.	General	
2.6	SMS Implementation and improvement	General	
2.7	Standards to be applied	General	
2.8	Command structure (Refer to N-4300-PL0052 with respect to FPSOs)	General	
2.9	Members of the workforce must be competent	General	