Report

Planned Inspection

Facility:	Northern Endeavour - NOGA
Operator:	Upstream Production Solutions Pty Ltd
Offshore Inspection Dates:	19/04/2017 – 21/04/2017

Lead inspector s 22 irrelevant material

Inspection Team

Report Number 1505

REPORT DISTRIBUTION

Position	Company
Records management	NOPSEMA
	Upstream Production Solutions Pty Ltd

REVISION STATUS

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1 Abbreviations

ALARP	As Low As Reasonably Practicable
AWV	Annulus Wing Valve
CBTA	Competency-Based Training and Assessment
CMMS	Computerised Maintenance Management System
DSCE	Damage to Safety-Critical Equipment
DPI	Dye Penetrant Inspections
HSE	Health, Safety and Environment
HSR	Health & Safety Representative
HVAC	Heating, Ventilation and Air Conditioning
ID	Identification
LR	Lloyds Register
LTO	License to Operate
MAE	Major Accident Event
NOPSEMA	National Offshore Petroleum and Environmental Management Authority
OHS	Occupational Health and Safety
PMV	Production Master Valve
PS	Performance Standard
PWV	Production Wing Valve
SBC	Small Bore Connection
SBF	Small Bore Fitting
SCE	Safety-Critical Element
SIF	Safety Instrumented Function
SOLAS	Safety Of Life At Sea
SSSV	Sub Surface Safety Valve
UPS	Upstream Production Solutions Pty Ltd

2 Inspection Method

The inspection team prepared a planned inspection brief and discussed this with the operator prior to the inspection. The brief set out the proposed inspection itinerary and scope. A list of persons present at this pre-inspection meeting is included in Attachment A.

The proposed scope for this inspection included:

- Verification of commitments regarding the recommendations from previous inspections and audits.
- Consultation with Health & Safety Representatives and members of the workforce.
- MAE 02 - Cargo Tank Over / Under pressurisation and associated control measures.
- Management of small bore tubing and piping systems.
- Follow up on the following incidents:
  - 4778 - Small gas leak in the process piping
  - 4807 - GA after leak in gas turbine enclosure
  - 4850 - High Potential Dropped Object
  - 4844 - F07 Reservoir isolation

On arrival at the facility, an entry meeting was held to present the plan to the offshore personnel. Before leaving the facility, the inspection team prepared an Inspection Exit Brief, which was discussed with key offshore personnel during an exit meeting. An attendance list for both the offshore entry and exit meetings is included in Attachment A.

Subsequently, a meeting was held with key onshore personnel of the operating company to discuss key findings from the inspection. Significant details of this meeting are provided in Attachment A.

3 Conclusions and Recommendations

At the time of the inspection, the facility was operating normally with 47 out of a maximum 66 persons on board. All work groups were represented by HSRs and they reported good support from the facility management, with regular safety meetings being held. The majority of HSRs had completed NOPSEMA-accredited HSR training.

Four incidents (4778, 4807, 4844 and 4850) were investigated during the inspection. Recommendations relating to incidents 4778 and 4807 are made in section 3.5. Incidents 4844 and 4850 were found to be adequately addressed by UPS.

MAE-02 Cargo Tank Over / Under Pressurisation was selected as a topic for the inspection and a number of recommendations have been made to address deficiencies or missing information in the Safety Case, Performance Standards, Procedures, Emergency Response Plan, Training plans and records. In at least two cases scheduled Inspection and Test activities were found not to have been completed as planned. There were some shortfalls in training which is yet to be completed following the transition from s 47G business information however UPS had described plans that were in place to address this training shortfall in May 2017.

In response to the recent incidents 4778 (Small gas leak in the process piping) and 4807 (GA after leak in gas turbine enclosure) the management of small bore piping and tubing systems was selected as an inspection topic. Prior to UPS taking over operation of the Northern Endeavour in 2016, there were known issues relating to the cracking of small bore connections on the facility dating back to 2014. s 47G completed a risk assessment of the problem and subsequently implemented a program of either adding bracing to the high-risk fittings or implementing a program of inspecting fittings at lower risk. The justification for avoiding permanent repairs to the lower-risk fittings was based on the end of field life and subsequent decommissioning of the facility planned for 2015.

At the time of the inspection, the inspectors were not able to identify a risk assessment which revisited the assumptions made in the original risk assessment undertaken by s 47G which considered that the life of the facility had been extended beyond that planned by s 47G It has been recommended that this reassessment be completed and plans put in place to reduce the risk on the facility to ALARP.

UPS has standardised on Gyrolok fittings for tubing systems on the facility, which is consistent with the existing fittings in use by the previous operation. The inspectors did not identify any obviously deficient tubing installations in hydrocarbon service, however at least one instance of a damaged instrument air tubing installation was identified. In general the inspectors were not able to identify policies or performance standards which clearly defined safety related requirements for tubing systems and there did not appear to be in place procedures which described the basic safety requirements for the installation, inspection or the reinstatement of tubing systems. In general it seems there is a reliance on the competence and training of the technicians undertaking the work. At time of the inspection, UPS was undertaking a program to train all the Instrument Technicians (Inlecs) in the use of Gyrolok fittings. It was understood that all Inlecs will have completed that training by the end of May 2017.

During the inspection it was identified that a significant portion of electrical equipment in hazardous areas had not been inspected for approximately 6 years exceeding the maximum 4 years recommended by AS/NZS 60079-17 (2009). It has been recommended that this deficiency be addressed as soon as reasonably practical.

Detailed findings are provided in the following sub-sections, which highlight any particular areas where non-compliance or opportunities for improvement have been identified. The inspectors' detailed recommendations are included in the following sub-sections and are repeated in the Recommendations and Follow-up List in Attachment B.

Attachment C also includes the status of previous recommendations from the last inspection report as well as any other open recommendations.

3.1 Previous recommendations

At the conclusion of the facility inspection (21/4/2017) 29 recommendations remained open and 1 item (1489-10) was overdue. Table 1 lists those recommendations which had been closed since the previous inspection.

Table 1 Summary of Recommendations Closed Since Previous Inspection

No. (Note 1)	Recommendation	Remarks
1489-6	UPS to ensure that the reliability of the temporary refuge air inlet dampers is reviewed and the proof testing frequency is updated accordingly so that it can be demonstrated that the dampers will remain fit for purpose on demand.	Response Accepted - Closed
1489-7	UPS to ensure that the proof test methodology for the temporary refuge air inlet dampers is revised to eliminate maintenance immediately prior to the proof test which will prevent detection of a dangerous undetected fault, noting that function testing should still be carried out following any maintenance, and include a visual inspection of the damper blades to verify that a seal is made.	Response Accepted - Closed
1489-8	UPS to ensure that auditing programs are implemented to review MAE 08 (Accommodation Fire) in accordance with Section 1.5.3.20 of the facility safety case.	Response Accepted - Closed
1489-15	UPS to ensure that competency requirements relating to corrosion management are documented for the key roles responsible for corrosion at the facility, in accordance with Section 1.5.3.7 of the facility safety case.	Response Accepted - Closed
1489-16	UPS to ensure that audit programs are implemented, in accordance with Section 1.5.3.20 of the safety case, to review the implementation of the corrosion management systems.	Response Accepted - Closed
1489-18 (1175-5)	Ensure that appropriate certificates, load test results and records that relate to lifting equipment integrity are available on board the facility. The records should include certification and traceable maintenance, inspection and testing history.	Response Accepted - Closed
1489-20 (1175-7)	Conduct a risk assessment to assess the potential impacts of superseding the s47G Lifting Operating Standard (Controlled Reference Number: WM1040SF5599291, Revision 3, dated 7 July 2014) with the s47G Safe Work Control Procedure (Controlled Reference Number: WM0000PG9905472, Revision 0, dated 17 June 2015). The risk assessment should include, but not necessarily be limited to, potential impacts caused by changes such as the removal of compliance with the Lifting Operations and Lifting Equipment regulations (LOLER) 1998, Regulation 5 or an International Equivalent standard as required by the superseded s47G Lifting Operating Standard (Controlled Reference Number: WM1040SF5599291, Revision 3, dated 7 July 2014).	Response Accepted - Closed

No. (Note 1)	Recommendation	Remarks
1489-21 (1175-8)	Conduct a risk assessment to assess the potential impacts of changes adopted by the Lifting Equipment Maintenance, Inspection and Testing Strategy to ensure that risks relating to lifting equipment at the facility are reduced to a level that is ALARP. The risk assessment should include, but not necessarily be limited to, potential impacts caused by changes such as the removal of certification, maintenance and inspection in accordance with manufacturer's recommendations and recognised standards appropriate for the use of cranes as stated in Elements 4 and 5 of the s 47G Standard – Lifting and Hoisting Practise, Document No. s 47G business , Revision 0.	Response Accepted - Closed
1489-29 (1346-8)	Ensure all original test records for sensors and end devices include the name of the individual conducting the test, the date that the test was conducted and the tag number of the device, prior to being scanned and uploaded into SAP in accordance with the nominated standard (IEC 61511).	Response Accepted - Closed
1489-35 (1346-17)	Ensure that corrosion on the overboard sea-water cooling line is addressed and that the existing line is reviewed for fitness for purpose. Ensure that any corrective work is undertaken in a timely manner.	Response Accepted - Closed
1489-36 (1346-18)	Ensure that the cyclic loading of the process cooling sea-water piping, caused by cyclic lateral movements of the overboard sea-water cooling line, is reviewed for the potential for fatigue induced failures. Undertake any corrective work in a timely manner.	Response Accepted - Closed
Note 1: Number in brackets represents the recommendation number under s 47G business information .		

3.2 Consultation with Health & Safety Representatives and members of the workforce

All workgroups are represented by HSRs and reported having good support from management and were conducting regular safety meetings. Photographs and names of the HSRs were posted on the noticeboard outside the mess room.

3.3 Follow up on Previous Incidents

4778 Small gas leak in the process piping

On 29th of November 2016 it was reported that:

"A small gas leak was noted by the plant operator during his rounds of the plant. The leak was on a 150mm diameter feed line from the coalescer to the butaniser and was noted from the ice build-up around the leak. The leak was on a duplex line between gas heaters E3704 and E3703. The quantity of gas leaked is as yet unknown. The leak was isolated by closing the valves at either end of the line. No gas alarms."

The report "LOC Pinhole Gas Train Leak Between E37023 and E3704" (UPS Doc. No. 4900-HS-H0071-02) identified the source of the leak to be at the weld between a 2" weldolet and 6" main line and between two heat exchangers in close proximity to the Debutaniser column. The weldolet was part of a 2" flanged connection which was not used and so was blinded and an instrument tubing connection in the blind

flange was capped. The main line was fabricated from Schedule 10 Duplex Stainless Steel. The 30 day report provided to NOPSEMA identifies the following as root cause 3:

"SBF had an unusual brace arrangement: braced on two sides and due to heating and cooling, expansion and contraction of pipe caused crack propagation at weld defect"

Root causes 1 and 2 identify that there are "known issues with welding on DSS fittings on NE" and that the Small Bore Fitting (SBF) was missed from earlier Dye Penetrant Inspections (DPI) conducted in 2016.
In December 2016 the leak was repaired by cutting out a section of the 6" main line which contained the 2" SBF and replacing with a pipe spool of the same material but without the SBF. Actions taken to prevent reoccurrence of the same or similar incident relate to the management of small bore fittings which is the subject of section 3.5 of this report.

4807 GA after leak in gas turbine enclosure

On 27th of December 2016 it was reported that:

"During normal operations, gas alarm activated within the gas turbine (GT7010) enclosure. CCR operator sent an operations technician to investigate. On inspection, it was confirmed that there was crude fuel leaking inside the enclosure (approx. 20 litres into bunded enclosure). GT enclosure door was shut, and the machine shut down – gas detection instigated an unplanned facility muster."

The 3 day report submitted to NOPSEMA describes the loss of containment to be the result of the failure of instrument tubing in close proximity to a valve. The defective fitting was removed and the tubing blanked off. The damaged valve and tubing was sent to s 47G to establish the cause of failure. s 47G Report "Examination of Failed Valve Instrument Tubing" (UPS Doc. No. 4900-HS-H0075-02_0) summarises the cause of failure as following:

"In summary then it is considered that cracking of the tubing has occurred by a progressive fatigue cracking mechanism with the presence of high vibrational loading being a major contributor to the failures."

The s 47G report provides the following recommendations with respect to this type of failure:

"It is advised that in such cases where high vibration is present that suitable fixtures and clamps be employed to minimise movement of the tubing."

During the onshore inspection UPS advised that the equivalent tubing arrangement does not exist in the other turbine enclosures at the facility and that the remaining tubing within the enclosures was inspected to assess whether there were similar deficient tube supporting arrangements. UPS advised that based on their inspections, they believe the remaining tubing was adequately supported.
The management of small bore tube and fittings is the subject of this report and is discussed in detail in section 3.5 of this report.

4844 Reservoir isolation

On 24th of January 2017 it was reported that:

"LAMINARIA-8ST4 not been in production since Oct 2016, a subsea campaign was required to dissociated [sic] the hydrate preventing flow.

During this campaign (19th to the 24th Jan) the PMV, PWV and AWV on the LAM-8 were found to be partially open during the initial ROV survey (GVI) despite the topsides control system registering them as closed. At the time it was assumed that the likely cause was the hydrate in the pipework as previous history indicated both valves as functional.

The campaign progressed and the hydrate was dissociated successfully and the well was able to kick off production. As part of the campaign completion activities the function of the PMV and PWV were tested on the warm well. Analysis on the results of this testing showed that both valves are only able to move from 100% open to ~75% open and that this restriction in operation is not likely to be caused by hydrates. This represents the failure of a primary and secondary well barrier. The integrity of the subsea production system isolation was confirmed by visual ROV inspection as far as possible.

The well was subsequently stalled by shutting in gaslift and by closing the SSSV. It was however noted on the pressure temperature transmitters in the manifold that the well continued to flow despite the aforementioned measures. It was hence established that the SSSV is not closing as well and that the well is flowing without gaslift. The well was subsequently shut in by closing Lam-8PIV and Lam-8TIV."

In its current state the Laminaria 8 well cannot be isolated via the Lam 8 XT valves (i.e. PWV, PMV and SSSV) and therefore the subsea piping is at well pressure (less static head) between the wellhead and the manifold, where the well is currently isolated (i.e. Lam-8 GIV, TIV and PIV). It is understood that the Laminaria-8 well is not capable of flow without gas lift and therefore the risk to well integrity (and therefore OHS risk) is understood to be low. UPS are currently investigating methods of repairing the valves, however it is understood that this may take up to 12 months and therefore the well may remain in its current state during this time.

4850 High Potential Dropped Object

On 13th of February 2017 it was reported that:

"Cold water was being introduced into the waste heat recovery units to restart the system after conducting a repair to a heat medium pipework leak. The cold water introduced into a hot system caused flash off of steam and subsequent vibration of the pipework. This caused the corroded heat medium bypass valve shroud to dislodge and fall approximately 8m to the deck below. The involved person was walking past the area to investigate the noise coming from the waste heat recovery unit when the shroud landed approx. 1.5m from his position. The valve shroud weighs 2.75kg."

Due to the height and weight of the dropped object, the incident was assessed to have the potential to cause death or serious injury. The immediate action taken in response to the incident was to make the area safe, restrict access and initiate an investigation into the root causes. The investigation was conducted by a site based "5 whys investigation" and via a Tap Root investigation which was headed up by the Northern Endeavour Operations Manager s 22 irrelevant material

The investigations identified 3 root causes:

1. The s 47G business information had planned to abandon the facility in 2016,
2. Lack of corrective maintenance to address corrosion, and
3. TOP was not in place for deviation from start-up procedure; no risk review completed for deviating from procedure.

The inference from root cause 1 and 2 is that routine maintenance, which might have identified excessive corrosion and prompted corrective action, was not conducted on the basis that the s 47G business information had planned to abandon the facility. Root cause 3 implies that a deviation from the start-up procedure for the waste heat recovery unit lead to excessive vibration, causing the corroded valve shroud to dislodge. A temporary operating procedure (TOP) was not in place for the deviation and therefore a risk review was not conducted for the deviation. During the onshore pre-inspection meeting it was also stated that the piping and valves associated with the corroded shroud were redundant.

Immediate actions taken or planned to prevent recurrence included:

- removing shrouds from valves which are in a similar condition;
- include inspection for potential dropped objects in rope access inspection campaigns;
- Identify redundant equipment (for potential removal).

The inspectors sighted a follow up report titled "Near Miss: Dropped Object – Valve Shroud from Heat Medium Bypass" (Doc. No. 4900-HS-H0077-03) that included 9 key recommendations to reduce the risk of a serious incident to as low as reasonably practical. No specific deficiencies in the review or response to the incident have been identified by the inspectors.

3.4 MAE 02 - Cargo Tank Over / Under Pressurisation and Associated Control Measures

Cargo tank over/under pressurisation is identified in the facility safety case as a causal event that could lead to a loss of containment.

Implemented and Functional

Safety Case (SC) Part 2 section 2.6.5.1 states that purging of cargo tanks is to be halted when wind speeds are below 5 knots. Evidence from documents sighted during this inspection however did not reflect this specific weather constraint. Integrity Critical Operating Procedure Inert Cargo Tank (26/OP/GO/MN/P0006.0049 Rev 8) states that "the decision to vent via the purge header must also consider the wind speed/direction and consultation with the facility management team" and "care must be taken as windless condition may cause a vapour cloud to reach gas detectors and trip the plant".

Recommendation 1505-1
UPS to ensure that operational weather constraints within the Safety Case and associated Integrity Critical Operating Procedure for inerting cargo tanks are aligned.

SC, Part 2 section 3.4.4 states that the Inert Gas Generator (IGG) Room is located on B deck, whereas Part 2 section 3.4.5 states the Inert gas (IG) generators, pumps and scrubber are located in the machinery space. During the course of the inspection it was noted that the IGG room is actually located on A deck.

Recommendation 1505-2
UPS to ensure that the Safety case correctly describes the location of the Inert Gas Generating equipment.

Safety Case (SC), Part 2, section 3.9.4 states that gas testing is carried out regularly on ballast tanks. Evidence from documents sighted during this inspection confirmed that these actions were being

undertaken. The previous months work order (W/O) M220048182, dated 2 March 2017, was sighted as complete and a current work order M220051964 is scheduled for 21 April 2017.

SC, Part 2 section 5.1.11 states "*Each COT is equipped with a mechanical Pressure Vacuum (P/V) valve. During normal operations this P/V valve is set to the OPEN position (bypassed) and each P/V valve has a MIL locked open bypass valve*". Performance Standard F21.1 refers to checking the P/V valves in accordance with 26/MN/INT/PL03. During the course of the facility inspection it was noted the P/V and their associated bypass valves were open and car seals in place. However, a s 47 business information letter (s 47G /14 dated 5 March 2003) was sighted; this letter approves the decommissioning of the individual tank P/V valves which requires the isolation of the valves and the opening of the associated bypass valve.

Recommendation 1505-3
UPS to consider amending the Safety case to more accurately reflect that the individual cargo tank P/V valve is no longer performing a duty.

It was stated during the course of the inspection that the operating procedures were developed from the s 47G business information documents and these are progressively undergoing validation and amendment when necessary as they are used. Evidence from documents provided for this inspection included Operating Procedures for:

- Change Cargo Loading Tanks (26/OP/GO/MN/P0006.0052 Rev 3);
- Run IGG on Crude Fuel (26/OP/GO/MN/P0006.0065 Rev 2); and
- COW procedures (26/OP/GO/MN/P0006.0062 Rev 4).

Maintenance

Performance Standards P22 Bilge, Ballast & Cargo Systems (26/OP/INT/PS40 Rev 3), P25 Purge Gas & Blanketing Systems (26/OP/INT/PS42 Rev 5) and F21 Relief Systems (26/OP/INT/PS24 Rev A) are published and copies were provided for this inspection.

It was noted that Performance Standard P22 is titled Bilge, Ballast & Cargo Systems however cargo/slops systems are listed as a specific exclusion from the Performance Standard. Performance Standard P25 Purge Gas & Blanketing System scope states that it covers the inert gas (IG) generation system however there are no specific requirements within the Performance Standard for the inert gas generators (IGG) and it principally addresses the distribution system components only.

Recommendation 1505-4
UPS to ensure that the Performance Standards P22 includes relevant performance standard requirements relating to the cargo and slops systems to ensure their continued safe operation.

Recommendation 1505-5
UPS to ensure that the Performance Standards P25 includes relevant performance standard requirements relating to the Inert Gas Generators, to ensure that the inert gas system continues to function as an effective control measure for MAE 02.

The Performance Standards were sampled and found to align with Safety Case and Computerised Maintenance Management System (CMMS). For example; Load computer function testing records sighted in accordance with Performance Standard P22.2. The most recent function test was achieved 3 April 2017 (W/O M220047239 was sighted).

During the onshore pre-inspection meeting, maintenance management system records were sampled. It was noted that a not all maintenance/inspection activities, scheduled in the CMMS, had been completed. For example; the 1Y P25 IG Main Line NRV Function Test and Inspection has not been completed since June 2015, and the 6M Inergen Inspection and Function Test – IGG and Purifier Room has not been completed since 2014.

Recommendation 1505-6
UPS to ensure that the following inspection and testing activities are completed as soon as reasonably practical: a) 1Y P25 IG Main Line NRV Function Test and Inspection, and b) 6M Inergen Inspection and Function Test – IGG and Purifier Room.

During the course of the inspection, work instructions for the 6M Inergen Inspection and Function Test – IGG and Purifier Room, were sighted.

Competency

SC, Part 3 section 1.5.3.6 states that "*position descriptions have clear accountabilities and reporting lines as well as mandatory training requirements*". Furthermore SC, Part 3 section 1.5.3.7 states "*The NE Competency Profile Information pack (26/SP/TRN/PL02) identifies the skills and, knowledge necessary for prescribed personnel to fulfil their designated tasks on the facility in their primary role*" and an annual training plan (26/SP/TRN/PL01) is developed for the facility.

NE Competency Profile Information document (26/SP/TRN/PL/02 Rev 0) was provided with the pre-inspection documents. This document does not appear to prescribe specific competencies for the operators responsible for the cargo and IG system operations. Reference is made however to a Workplace Assessment skill set (TAESS00001) and Area/Unit Competency although no details are provided as to what these particular skills entail.

Evidence from documents provided for this inspection included Learning Guides and samples of completed workforce CBTA assessments for the following activities:

- Cargo Tank Atmosphere Management (26/OP/GO/MN/P0006.0135 Rev 1);
- Describe IGG System (26/OP/GO/MN/P0006.0136 Rev 1);
- Operate IGG System (26/OP/GO/MN/P0006.0137 Rev 1);and
- Operate Cargo Control System and Mariner Software (26/OP/GO/MN/P0006.0138 Rev 1).

NE Annual Training Plan (26/SP/TRN/PL01 Rev 0) was sighted during the course of the inspection. Section 4.2 of this document identifies that the "Plant Operator", Operator/Maintainer (Inlec) and Operator/Maintainer (Mech) as requiring to complete "Utilities Area Competency" with 1 of each skill being required for the License to Operator (LTO).

It was made known to the inspectors during the course of the inspection that the IG system falls within the responsibility of the "Utilities area". No further details are provided within the document as to the specific requirements for this competency.

During the course of the inspection a NE Competency Matrix (no document number – last updated 8/04/2017) was sighted by the inspectors. This Excel spread-sheet identifies a number of competency areas including the CBTA requirements necessary to fulfil the operator's competency. Specific headings include Prod Tech Panel Operator, Production Tech Utilities, Production Tech Process and Safe Guarding System. It was noted that the 4 cargo/IG CBTAs identified above were listed in the Safe Guarding System section of the Competency Matrix. The matrix identifies in part where a CBTA is required and whether the desired competency has been achieved by individual members of each panel.

It is noted that not all the required competency levels have been achieved across the "Panels". The CBTAs for the operation of the cargo & IG systems were noted as required but not achieved for panel A & panel B Op/Maint (Process) and Op/Maint (Utilities) personnel. Panel C and panel D Op/Maint (Process) personnel were similarly deficient. It was stated by the UPS Operations Manager during the course of the inspection that the UPS Marine Competency Assessor was scheduled to attend the facility in mid May 2017 in order redress the competency (CBTA) achievement. It was also stated whilst there were qualified assessors on the facility their current workload precluded these CBTA assessment tasks from being progressed.

It is the opinion of the inspectors that the training requirements specified within the safety case are not clearly defined and there is a lack of traceability and linkage between the documents sighted.

Recommendation 1505-7
UPS to ensure that the minimum training and competency requirements for each position are clearly established and traceable as required by the Safety Case.

It was noted that one CBTA competency, Cargo & Ballast System (26/OP/GO/MN/P0006.0137 Rev 1) records for an individual was signed off however none of the required Practical Record Objectives were checked as having been assessed.

Recommendation 1505-8
UPS to ensure that a system is implemented which requires that CBTA records clearly establish that all objectives have been completed and the individual assessed as competent.

SC, Part 3 section 1.5.3.4 states "*The ERP has therefore been developed to address emergency events arising out of these MAEs and other situations that would require emergency response procedures to be initiated*". During the course of the inspection the NE Emergency Response Plan (ERP) (26/HSEQ/GEN/PL03 Rev 23) was sighted by the inspectors. Section 2.3 of the ERP states that checklists have been developed to address emergency events arising out of the MAEs; section 3 provides the checklists. It was noted however that the checklists do not specifically address the MAE 02 event Cargo Tank Over/under pressurisation.

Enlarged copies of emergency response checklists were sighted and are available for use in the emergency control area of the CCR. It was observed that the content of the checklists contained within the ERP and those available for use within the CCR were not identical.

During the course of the inspection the Emergency Response Training Schedule Jan–Dec 2017 (26/HSEQ/PL08RG01 Rev 1) was sighted. Unlike the ERP this exercise programme links specific training exercises to applicable MAEs.

Recommendation 1505-9
UPS to ensure that the emergency response requirements for each MAE are described in the Emergency Response Plan (26/HSEQ/GEN/PL03) as required by the Safety Case.

Recommendation 1505-10
UPS to ensure that the emergency response checklists available in the CCR are consistent with the Emergency Response Plan (26/HSEQ/GEN/PL03).

Audited

During the course of the inspection the inspectors were advised that the Classification Society annual survey was completed in late 2016. At the time of the inspection a LR surveyor was on board to witness the Special Survey tank inspection and thickness measurements were in progress.

Internal Audit Schedule 2017 (26HSEQGENPL06 Rev 1 dated 2 March 2017) was sighted and includes planned dates for the conduct of audits for each MAE and Performance Standard. With respect to this inspection topic it was noted that these are scheduled to be audited as follows:

- MAE 02 Loss of Containment – Quarter 2 2018;
- Performance Standard F21 Relief Systems – Quarter 4 2018;
- Performance Standard P22 Bilge, Ballast and Cargo system – Quarter 4 2018; and
- Performance Standard P25 Purge Gas and Blanketing system – Quarter 3 2019.

3.5 Maintenance Management: Management of Small Bore Tubing and Piping Systems

Small bore piping and tubing systems (less than 3") are highly susceptible to failures due to vibration induced fatigue (VIF) when they are not designed and supported correctly. The recent loss of containment events from small bore pipe and tubing fittings, described in section 3.3, highlights this issue and was the basis for selecting the topic for this inspection. NOPSEMA is aware of defects in small bore piping systems being detected by the s 47G business information , as far back as February 2014. The sequence of events relating to the failure of small bore fittings (SBFs), of which NOPSEMA is aware, are summarised below:

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November 2016 – Current Operator (Upstream Production Solutions)

In November, a hydrocarbon gas leak at a SBF was detected between two heat exchangers in proximity to the debutaniser column. This was notified to NOPSEMA (Ref. NOPSEMA ID: 4778). The leaking SBF was repaired by cutting out a section of the main line with the failed SBF and replacing with a new spool without the SBF.

December 2016 – Current Operator (Upstream Production Solutions)

UPS commissioned s 47G to inspect SBF fittings in process gas service. 51 fittings were identified. 27 of 51 were subject to DPI and were found to be crack free. The remaining 24 could not be tested at the time due to access restrictions. Further inspections are planned for 2017 when the SBFs can be accessed.

December 2016 – Current Operator (Upstream Production Solutions)

In late December 2016, a failure of tubing in the GT 7010 turbine enclosure resulted in a leak of approximately 20 litres of liquid hydrocarbon. This was notified to NOPSEMA (Ref. NOPSEMA ID: 4807). The damaged fitting was repaired by removing damaged fitting and capping the tubing.

Implemented and Functional– Small Bore Piping

Connections between small bore piping (e.g. DN 50 and smaller) and larger bore piping (DN 80 and larger) are susceptible to vibration induced fatigue (VIF) due to the fact that small bore piping is less rigid than the larger bore piping to which it is connected. Detailed guidance for the avoidance of failure of small bore connections (SBCs) due to VIF is provided in the Energy Institute "Guidelines for the Avoidance of Vibration Induced Fatigue Failure in Process Pipework" (2nd Edition, 2008) and is endorsed by the Health and Safety Executive of the UK. The document was initiated in response to a growing number of onshore and offshore process piping failures especially in systems deploying extensive use of duplex stainless steel.

VIF leading to the failure of SBCs is usually induced by one of the following mechanisms.

- Flow induced vibration.
- Acoustically induced vibrations (high frequency).
- Mechanically induced vibration (e.g. from compressors, pumps, pulsation).

The Northern Endeavour was commissioned in 1999 and used duplex stainless steel (DSS) piping in a number of systems in hydrocarbon service. DSS is susceptible to VIF failures because it's corrosion resistant properties allow the specification of thinner walled pipe, reducing its resistance to VIF failure mechanisms. The first issue of the Energy Institute Guideline was published by the Marine Technology Directorate in 2000 and therefore post-dated the design of the Northern Endeavour. It may be for this reason that the historical record presented earlier in this section has shown multiple instances of cracking of SBCs and at least one instance where VIF may have lead to a loss of containment event (Incident 4778).

For new plant, avoiding the failure of small bore connections (SBCs) is achieved primarily through design by avoiding the use of SBCs when practical or by correct supporting of the SBCs when not. For existing plant which has not been constructed using current best practice to avoid VIF failures, the Energy Institute guideline suggests the following methodology for identifying and correcting those SBCs at risk:

1. Qualitatively assess existing or new piping for potential risk of VIF failure.
2. Undertake visual assessment of installations at risk in step (1) to verify risk potential.
3. Conduct quantitative likelihood of failure (LOF) analysis for installations at risk from step (2).
4. Use measurement or predictive techniques to verify items at risk from step (3).

5. Implement corrective actions for those items at risk from step (4).

Corrective action as defined in step 5 above for SBCs entails (in order of preference):

a) removing the SBC;
b) changing the design of the SBC; or
c) installing a two plane brace or clamp.

Evidence from documents provided for this inspection suggests that s 47G undertook steps 1 to 3 above when assessing the risk to SBCs from VIF. There is no direct evidence available to NOPSEMA that vibration measurements or predictive technologies were utilised to assess risk as described in step 4. Evidence provided to NOPSEMA suggests that the corrective actions taken, for SBCs at risk, included either repair of the fitting by bracing or 6 monthly inspections. Justification for the use of 6 monthly inspections was stated as following in the "Northern Endeavour: Small Bore Fitting Cracks – Risk Mitigation Plan" (dated 30/6/2014):

1) "A 6M inspection frequency is proposed as a crack is not likely to initiate and develop into a through crack in this period". This statement was supported by calculation.
2) "Although inspection and bracing carry an equal risk, bracing is not preferred as it does not add much value due to the associated inspection and NE forecasted end of field life"; and
3) "Due to the limited remaining field life, the additional cost of engineering and implementing bracing does not add enough value to be viable".

It should be noted that regular inspection of fittings at risk (such as six monthly inspections) is not included in the recommended corrective actions by the Energy Institute guideline. It is also not clear from the risk mitigation plan whether the calculation justifying the 6 monthly inspections assumed that there were no existing undetected cracks or whether this was verified with a 100% inspection.

Recommendation 1505-11
UPS to ensure that all small bore connections (SBCs) have been risk assessed for potential failure due to vibration induced fatigue and corrective actions are planned so that the overall risk to the facility is reduced to as low as reasonably practical. Consider using a methodology such as that described in section 3 (Undertaking Proactive Assessment) of the Energy Institute – Guidelines for the Avoidance of Vibration Induced Fatigue Failure in Process Pipework (2nd Edition).

Implemented and Functional – Small Bore Tubing

Guidance for the management of small bore tubing is provided in the "Guidelines for the Management, Design, Installation and Maintenance of Small Bore Tubing Systems", published by The Institute of Petroleum (IP), London, which is endorsed by the Health and Safety Executive UK. The IP guidance document suggests that a company should develop a control and standardisation policy which describes:

- preferred fitting and tube types;
- a strategy to minimise tubing fittings where practical;
- a directive that new and replacement systems should comply with the preferred tube and fitting types; and
- the requirement for vendors to comply with the policy.

The control and standardisation policy then forms the basis for the development of maintenance and operating procedures to ensure the policy is implemented. It has been stated in interviews that the facility policy is to use Gyrolok fittings; however documented evidence which verified this at a policy level could not be found. The inspectors did sight a document titled "Small Bore Tubing, Fittings, Piping and Hose Management" (Doc. No. 26/MN/INT/PC11 Rev 0), however this document did not define control and standardisation policy for the use of small bore tubing on the facility.

Recommendation 1505-12
UPS to consider implementing a control and standardisation policy or performance standard. The policy should describe: a) preferred fitting and tube types; b) a strategy to minimise tubing fittings where practical; c) a directive that new and replacement systems should comply with the preferred tube and fitting types, and d) the requirement for vendors to comply with the policy.

For new installations, procedures should be available to guide the installation personnel on selection, assembly and inspection of the range of tubing and fittings that will be encountered. The procedures should stipulate the following as a minimum (Ref. IP Guidelines):

- it is not permissible to interchange sub-components of different designs or types of fittings;
- the installation and assembly of particular types of small bore tubing and fittings must be made in accordance with the manufacturer's instructions (note: these can be different between manufacturers and between fitting sizes of the same manufacturer);
- it is essential that a fitting is inspected on completion using gauges where available or by other methods recommended by the manufacturers; and
- appropriate tools should be defined and used and special tools, such as hydraulic swaging machine should be considered for fittings of larger sizes of fittings and tubing.

The inspectors could not identify procedures which described installation practices for small bore tube and fittings, such as those described above.

Recommendation 1505-13
UPS to ensure that installation procedures are developed for small bore tube and fittings which addresses the following as a minimum: a) interchange of sub-components of different designs or types of fittings, b) installation assembly must be in accordance with manufacturer's instructions, c) requirement to inspect fittings on completion using methods recommended by the manufacturer, and d) use of appropriate tools.

In December 2016 a small bore tubing connection failed in the GT 7010 turbine enclosure. A report by s 47G , examining the failed connection attributed the failure to vibration induced fatigue cracking and recommended that for similar installations where high vibration is present, that suitable fixtures and clamps be employed to minimise movement of the tubing. During the onshore pre-inspection meeting, UPS advised that other turbine enclosures where inspected, following the incident, to determine if there

were similar unsupported or insufficiently supported tubing arrangements that were at risk of VIF failure. The advice given was that the inspection did not identify any other similarly susceptible tubing arrangements.

Maintenance

IP guidance recommends that an asset register should be maintained for small bore tubing systems and then maintenance and inspection and repair activities should be managed via the computerised maintenance management system.

The inspectors did not identify any tubing installations on the facility, in hydrocarbon service, with obvious installation defects. At least one example (Figure 1) was sighted of an instrument air tubing installation with a temporary supporting arrangement, likely due to corrosion of the existing supports. It should be noted that this example was isolated and does not indicate imminent loss of hydrocarbon containment; however it may indicate a lack of inspection and maintenance of tubing installations.

Figure 1 - Instrument Air Tubing Arrangement

IP guidelines state that the maintenance strategy should be based on conducting a risk based maintenance strategy review. The outcome of that review could include, for example, regular inspection of small bore tubing systems which are identified to have a high risk (e.g. high pressure hydrocarbon service and systems which are part of emergency action or safety instrumented functions).

Recommendation 1505-14
UPS to consider preparing an asset register for all small bore tubing systems so that maintenance, inspection and repair activities can be scheduled in the computerised maintenance management system (CMMS).

Procedures should be developed for the inspection of high risk systems and should include (Ref. IP Guidelines):

- The overall integrity of the system,
- visual inspection of compression fittings for correct component selection and correct make-up (with use of manufacturer's gauge as applicable);

- process leakage or seepage from compression joints and pipe thread connections;
- sample disassembly of compression fittings to check for correct make-up, tube penetration and internal corrosion of tube and clamp;
- examination of support and mounting for vibration control;
- check to identify possible problems with maintainability (i.e. access, corrosion, ease of removal);
- minimum of full three threads engagement on fully assembled joints.

During the inspection, the Inspectors were not able to identify procedures developed for purpose of inspecting small bore tubing systems.

Recommendation 1505-15
UPS to ensure that procedures are developed for the inspection of small bore tubing installations to ensure the ongoing overall integrity of high risk systems and to reduce the risk of loss of containment of those systems to ALARP.

IP guidance recommends that test procedures be developed for the following situations:

- reinstatement of systems which have been subject to extensive disconnection or involve the installation of untested fabricated equipment;
- reinstatement of individual impulse lines which have been subject to minor disconnection.

The procedures should include pressure and/or service testing and leak detection of all installed fittings. At the time of the inspection, the inspectors were not able to identify procedures developed for the purpose of reinstatement of tubing systems.

Recommendation 1505-16
UPS to ensure that procedures are developed for the reinstatement of small bore tubing systems to ensure their ongoing integrity and to reduce the risk of loss of containment so that the residual risk is reduced to ALARP.

Competency

The Northern Endeavour Annual Training plan identifies instrument tube fitting, delivered by a registered training organization, as a mandatory requirement for Inlecs. Training must be completed within 6 months with refresher training every 4 years. At the time of the inspection 11 of 20 Instrument and Electrical Technicians (Inlecs) had undertaken Gyrolok training and the remaining were scheduled to complete the training in approximately 1 month.

The inspectors were not able to identify any system in place which required the Inlecs on the facility to have undergone Gyrolok training, prior to undertaking inspection or reinstatement activities of tubing installations. It is noted that Inlec competency with the installation, inspection and maintenance of tubing installations is a base requirement for their trade qualifications; however this may or may not have included training with the specific type of fitting used on the facility (i.e. Gyrolok).

Recommendation 1505-17
UPS to ensure that systems are in place to require Inlecs to have completed the requisite training for the tubing systems currently employed on the facility (i.e. Gyrolok), prior to undertaking inspection or reinstatement activities of tubing installations

Audited

Small bore piping systems are audited via the planned arrangements to audit the performance standard Piping Systems (P08) which is currently planned for the third quarter 2019 (Ref. Audit Schedule 2017).

The inspectors were not able to identify any specific auditing arrangements in place for the management of small bore tubing systems. This may be because the inspectors were unable to identify any clear policy or performance standards in place for the management of small bore tubing systems.

Recommendation 1505-18
UPS to ensure that minimum safety standards are documented (e.g. via policy or performance standard) for small bore tubing systems, which are in line with current good practice, and put in place a plan to audit against the documented safety standards.

3.6 General OHS Observations

The inspectors observed that a significant portion of electrical equipment had tags which indicated that the most recent hazard area inspections were conducted in 2011 indicating that periodic inspections had not been conducted for 6 years. It should be noted that the most recent version of AS/NZS 60079.17 (2009) recommends that the periodic inspection interval should not exceed 4 years without a safety audit and the most recent version of IEC 60079-17 (2013) requires that the periodic inspection should not exceed 3 years without a safety audit.

Recommendation 1505-19
UPS to ensure that periodic inspections of hazardous area electrical equipment are conducted, for all equipment which has exceeded the periodicity of inspection described in the adopted standard (e.g. AS/NZS 60079-17, IEC 60079-17), as soon as reasonably practical.

It was observed during the inspection that there were discrepancies in the required training between the "NE Competency Profile Information" (Doc. No. 26/SP/TRN/PL02) and the "Northern Endeavour Annual Training Plan (Doc.No. 26/SP/TRN/PL01). Both documents are referenced in the Safety Case.

Recommendation 1505-20
UPS to ensure that those conflicts between the training required in the NE Training Plan (26/SP/TRN/PL01) and the NE Competency Profile (26/SP/TRN/PL02) are addressed so that definitive training requirements can be established.

4 Attachments

4.1 Attachment A – Meetings

1. Pre-Inspection Meetings

The pre-inspection meetings were held on 27/2/2017 and 1/3/2017 in order to discuss the proposed inspection scope and to ascertain senior management's understanding and expectations of the OHS risks posed by the operation at the facility and the control measures employed to reduce risks to ALARP.

The main topics discussed during these meetings were:

- Review current status of recommendations;
- Follow up on recent incidents;
- Discuss management of small bore piping;
- Discuss management of small bore tube and fittings; and
- Discuss management of cargo tank overpressure/under-pressure (MAE 02).

NOPSEMA **Form**

Meeting Register

Note: Page two of this form contains NOPSEMA Privacy Notice

OPERATOR:	Upstream Production	FACILITY:	Northern Endeavour - NUGA
Meeting date:	1/3/17	Location:	Upstream Production Services

NAME (Please Print)	COMPANY	POSITION	Initial (Please Initial)*
s 22 irrelevant material	NOPSEMA	Lead Inspector	s 22 irrelevant material
	NOPSEMA	Inspector	
	Upstream PS	NZ Operations Manager	
	U	HTL	
	UPS	CRO	
	UPS	HSEQS Manager	
	UPS	Asm Engineer	
	Upstream	HSEQ Co-ord	

Privacy Notice

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National Offshore Petroleum Safety and Environmental Management Authority

NOPSEMA

Form

Meeting Register

Note: Page two of this form contains NOPSEMA Privacy Notice

OPERATOR:	Upstream Production	FACILITY:	Northern Endeavour - NOGA
Meeting date:	27/2/17	Location:	Upstream Production offices

NAME (Please Print)	COMPANY	POSITION	Initial (Please Initial)*
s 22 irrelevant material	NOPSEMA	Lead Inspector	s 22 irrelevant material
	NOPSEMA	Inspector	
	UPS	HSEQS Manager	
	UPS	AIM Engineer	
	UPS	HSEQ Co-ords	
	UPS	NE Ops Mgr	

Privacy Notice

2. Facility Meetings

The facility Entry Meeting provided an opportunity for NOPSEMA to provide an overview of the planned inspection programme and confirm the itinerary. The facility Exit Meeting provided an opportunity for NOPSEMA to present the interim observations and conclusions from the planned inspection and for the facility's workforce to give their views.

A list of personnel at the entry and exit meetings is attached below:

NOPSEMA

Form

Entry and Exit Meeting Register and Notification of Entry

By initialling the 'Entry' column of the form below, I hereby acknowledge that on entering the facility the inspectors notified the entry meeting attendees of the purpose of entering the facility in accordance with Clause 59 (2): "Notification of entry" in Part 4 (OHS Inspections), Division 2 of Schedule 3 to the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGSA).

Note: Page two of this form contains NOPSEMA Privacy Notice

OPERATOR:	Upstream Petroleum	FACILITY:	Northern Endeavour - NOGA
Entry meeting date:	19/4/17	Exit meeting date:	21/4/2017

NAME (Please Print)	COMPANY	POSITION	Entry	Exit
s 22 irrelevant material	NOPSEMA	Lead Inspector	s 22 irrelevant material	
	NOPSEMA	Inspector		
	UPS	Production Supervisor		
	UPS	OIM		
	UPS	MAINT. SUPERVIS		
	UPS	Operation Manager		
	UPS	Maint. Mgr Manu		
	UPS	HSE Coordinator		
	NOGA	Prod Eng		
	UPS	HSEQ / Medic		

Revision: 3
Revision Date: 1 October2014
Page 1 of 2
Reference: N-07100-FM0042
Objective ID: A15392
National Offshore Petroleum Safety and Environmental Management Authority

3. Post-Inspection meetings

A meeting was also held on 24 May 2017 in order to discuss the inspection findings. People present at that meeting are listed below:

Name	Position
s 22 irrelevant material	NOPSEMA Inspector
	NOPSEMA Inspector
	Operations Manager
	HSEQ Coordinator
	Engineering Manager Northern Endeavour

The main points arising from this meeting were:

- Draft report recommendations presented and explained
- Draft report accepted by the operator
- Discussion incident 4896 – Gas Leak
- Discuss recommendation 1489-10

4.2 Attachment B – Detailed Recommendations from this Inspection

NOPSEMA	ID	1505-1
	Recommen-dation	UPS to ensure that operational weather constraints within the Safety Case and associated Integrity Critical Operating Procedure for inerting cargo tanks are aligned.
	Status	Open

NOPSEMA	ID	1505-2
	Recommen-dation	UPS to ensure that the Safety case correctly describes the location of the Inert Gas Generating equipment.
	Status	Open

NOPSEMA	ID	1505-3
	Recommen-dation	UPS to consider amending the Safety case to more accurately reflect that the individual cargo tank P/V valve is no longer performing a duty.
	Status	Open

NOPSEMA	ID	1505-4
	Recommen-dation	UPS to ensure that the Performance Standards P22 includes relevant performance standard requirements relating to the cargo and slops systems to ensure their continued safe operation.
	Status	Open

NOPSEMA	ID	1505-5
	Recommen-dation	UPS to ensure that the Performance Standards P25 includes relevant performance standard requirements relating to the Inert Gas Generators, to ensure that the inert gas system continues to function as an effective control measure for MAE 02.
	Status	Open

NOPSEMA	ID	1505-6
	Recommen-dation	UPS to ensure that the following inspection and testing activities are completed as soon as reasonably practical: a) 1Y P25 IG Main Line NRV Function Test and Inspection, and b) 6M Inergen Inspection and Function Test – IGG and Purifier Room.
	Status	Open

NOPSEMA	ID	1505-7
	Recommen-dation	UPS to ensure that the minimum training and competency requirements for each position are clearly established and traceable as required by the Safety Case.
	Status	Open

NOPSEMA	ID	1505-8
	Recommen-dation	UPS to ensure that a system is implemented which requires that CBTA records clearly establish that all objectives have been completed and the individual assessed as competent.
	Status	Open

NOPSEMA	ID	1505-9
	Recommen-dation	UPS to ensure that the emergency response requirements for each MAE are described in the Emergency Response Plan (26/HSEQ/GEN/PL03) as required by the Safety Case.
	Status	Open

NOPSEMA	ID	1505-10
	Recommen-dation	UPS to ensure that the emergency response checklists available in the CCR are consistent with the Emergency Response Plan (26/HSEQ/GEN/PL03).
	Status	Open

NOPSEMA	ID	1505-11
	Recommen-dation	UPS to ensure that all small bore connections (SBCs) have been risk assessed for potential failure due to vibration induced fatigue and corrective actions are planned so that the overall risk to the facility is reduced to as low as reasonably practical. Consider using a methodology such as that described is section 3 (Undertaking Proactive Assessment) of the Energy Institute – Guidelines for the Avoidance of Vibration Induced Fatigue Failure in Process Pipework (2nd Edition).
	Status	Open

NOPSEMA	ID	1505-12
	Recommen-dation	UPS to consider implementing a control and standardisation policy or performance standard. The policy should describe: a) preferred fitting and tube types; b) a strategy to minimise tubing fittings where practical; c) a directive that new and replacement systems should comply with the preferred tube and fitting types, and d) the requirement for vendors to comply with the policy.
	Status	Open

NOPSEMA	ID	1505-13
	Recommen-dation	UPS to ensure that installation procedures are developed for small bore tube and fittings which addresses the following as a minimum: a) interchange of sub-components of different designs or types of fittings, b) installation assembly must be in accordance with manufacturer's instructions, c) requirement to inspect fittings on completion using methods recommended by the manufacturer, and d) use of appropriate tools.
	Status	Open

NOPSEMA	ID	1505-14
	Recommen-dation	UPS to consider preparing an asset register for all small bore tubing systems so that maintenance, inspection and repair activities can be scheduled in the computerised maintenance management system (CMMS).
	Status	Open

NOPSEMA	ID	1505-15
	Recommen-dation	UPS to ensure that procedures are developed for the inspection of small bore tubing installations to ensure the ongoing overall integrity of high risk systems and to reduce the risk of loss of containment of those systems to ALARP.
	Status	Open

NOPSEMA	ID	1505-16
	Recommen-dation	UPS to ensure that procedures are developed for the reinstatement of small bore tubing systems to ensure their ongoing integrity and to reduce the risk of loss of containment so that the residual risk is reduced to ALARP.
	Status	Open

NOPSEMA	ID	1505-17
	Recommen-dation	UPS to ensure that systems are in place to require Inlecs to have completed the requisite training for the tubing systems currently employed on the facility (i.e. Gyrolok), prior to undertaking inspection or reinstatement activities of tubing installations
	Status	Open

NOPSEMA	ID	1505-18
	Recommen-dation	UPS to ensure that minimum safety standards are documented (e.g. via policy or performance standard) for small bore tubing systems, which are in line with current good practice, and put in place a plan to audit against the documented safety standards.
	Status	Open

NOPSEMA	ID	1505-19
	Recommen-dation	UPS to ensure that periodic inspections of hazardous area electrical equipment are conducted, for all equipment which has exceeded the periodicity inspection described in the adopted standard (e.g. AS/NZS 60079-17, IEC 60079-17), as soon as reasonably practical.
	Status	Open

NOPSEMA	ID	1505-20
	Recommen-dation	UPS to ensure those conflicts between the training required in the NE Training Plan (26/SP/TRN/PL01) and the NE Competency Profile (26/SP/TRN/PL02) are addressed so that definitive training requirements can be established.
	Status	Open

4.3 Attachment C – Recommendations Status from Previous inspections

NOPSEMA	ID	1489-1
	Recommen-dation	UPS to ensure that all valves which contributed to the leakage reported on 8 June 2016 are repaired or replaced to ensure that the slops overboard and IG systems remain fit for purpose.
	Status	Open
Operator	Response	Slops overboard integrity maintained and currently mitigated with nitrogen plug. TOP 2296 is currently in place to prevent flow of produced water from slops tank to the nitrogen system during slops discharge and prevents overpressure of slops discharge piping and cargo pipework/tanks.
	Action	WO M220050483 scheduled for PMS1703 to replace passing valve 48XV652 that meets material spec.
	Position	s 22 irrelevant material
	Due Date	30/06/2017
Operator	Status Update	Upstream PS requests an extension for the due date of action 1489-01, on the following foundation: 1480-01: The original estimated completion date was based and resourced in January 2017. Due to unforeseen supply issues by vendor, which have resulted in a revised lead time for these essential parts of 16 weeks. PO M100633 has been issued and the ETA for this valve is 03 Aug 2017. Due to this new ETA, WO M220050483 has been rescheduled to commence during NE Planned Maintenance Set M1706, which is scheduled for 25/08/2017 – 15/09/2017. Upstream PS request an extension until the 30/09/2017.
NOPSEMA	Status	Extension to due date granted based on email above. The email also included a letter from the vendor explaining the delay (filed in objective).
	Due Date	30/09/2017

NOPSEMA	ID	1489-2
	Recommen-dation	UPS to ensure that the number of heat detectors installed in the galley matches the number specified in the current Fire Control and Safety Plan.
	Status	Open
Operator	Response	Cause and effect diagram (refer to doc. M5820DF377.0139 Rev 0) has been reviewed by Electrical Engineer and heat detectors ascertained to not have any immediate effects on the fire and gas system. Fusible loop is available as fire protection and activates the necessary alarms and actions where relevant for Fire Protection System.

	Action	**Fire Control and Safety Plan to be marked up and as-built to be re-drafted to reflect the current equipment layout once deemed suitable and risk assessment conducted.**
	Position	s 22 irrelevant material
	Due Date	30/06/2017

NOPSEMA	**ID**	1489-3
	Recommen-dation	UPS to ensure that the self-closing fire doors at the entrance to the Mess Room and Galley are not wedged open or held open with hold-back hooks that are not subject to central control station release. Alternatively, fit the doors with remote release mechanisms which meet SOLAS regulations (Ref. SOLAS (2014) Chapter II 2, Regulation 9, Part C, Section 4).
	Status	Open
Operator	**Response**	**Self closing fire door mechanisms to be explored and implemented to meet SOLAS regulations.**
	Action	**Engineering to review the self closing fire doors for installation of door locks and controls with remote release mechanisms from the CCR which meet SOLAS regulations. WO M220050862 raised for implementation of remote release mechanism for fire door.**
	Position	s 22 irrelevant material
	Due Date	01/08/2017

NOPSEMA	**ID**	1489-4
	Recommen-dation	UPS to ensure that the localised breakdown of the H60 fire protection on the forward bulkhead of the accommodation block is repaired or replaced so that it continues to meet its performance standard and provide protection to the Temporary Refuge as indicated in the facility safety case.
	Status	Open
Operator	**Response**	**This Scope of Work has already been prioritised as URGENT/HIGH, and is currently being planned as part of the Fabric Maintenance Scope of Work Prioritisation**
	Action	**WO approved and in Maximo for the repair of Accommodation H60 Fire Protection, as identified in ISR NE 1989 by NE Inspector** s 22 irrelevant material
	Position	s 22 irrelevant material
	Due Date	30/06/2017

NOPSEMA	**ID**	1489-9

	Recommen-dation	UPS to consider implementing policy statements that clearly define the objectives with respect to the corrosion management program on the Northern Endeavour. For example, the policy should: • describe expectations and objectives by which compliance with the policy may be measured; • describe organisation to meet the objectives (who); and • specify arrangements for carrying out that policy.
	Status	Open
Operator	Response	This item will be included as part of the Corrosion Management Plan for Northern Endeavour.
	Action	Policy to be developed and attached to Corrosion Management Plan.
	Position	s 22 irrelevant material
	Due Date	30/01/2017
NOPSEMA	Status	Recommendation deferred until 30/3/17 based on agreement during PI:1505 pre-inspection meeting. Email filed in Objective.
	Due Date	30/03/2017
Operator	Status Update	24 Mar 17: UPS have been developing the Corrosion Management Policy, this policy has been undergoing the document control review process. During the document control process and document review process. UPS have had to delay the issuing of this document while UPS consolidate the procedures, strategies and other referenced documentation in the policy. Please find attached the draft Corrosion Management Policy for review. UPS requests extension until the 31th May 2017.
NOPSEMA	Status	Extension to due date granted based on progress made, to date, on corrosion management policy. Draft policy filed in objective.
	Due Date	31/05/2017

NOPSEMA	ID	1489-10
	Recommen-dation	UPS to ensure that a risk assessment of corrosion at the facility is completed which: • identifies corrosion related hazards at the facility; • assesses those risks (including ranking and prioritisation); and • describes a plan for inspection, monitoring and addressing corrosion hazards in order to reduce corrosion risks to ALARP, including outstanding corrective work orders.
	Status	Open
Operator	Response	This is to be covered in 26/MN/INT/PL01 - Corrosion Management Plan, and its associated procedures
	Action	Ongoing risk assesment of corrosion as per the Corrosion Management Plan
	Position	s 22 irrelevant material

	Due Date	30/03/2017
NOPSEMA	**Status**	Due date revised based on discussion during meeting on 24/5/2017 (Meeting Notes - Objective ID: A553334)
	Due Date	30/09/2017

NOPSEMA	**ID**	1489-11
	Recommen-dation	UPS to ensure that performance standards for safety-critical equipment have clear and objective acceptance criteria for corrosion, where excessive corrosion represents a MAE risk. The acceptance criteria should be quantitative so they can be measured effectively and consistently.
	Status	Open
Operator	**Response**	Performance Standards for safety critical equipment are in place.
	Action	Review safety critical equipment against the Performance Standards and update acceptance criteria as required.
	Position	s 22 irrelevant material
	Due Date	31/07/2017

NOPSEMA	**ID**	1489-12
	Recommen-dation	UPS to consider establishing clear and objective acceptance criteria for corrosion of safety-related equipment (e.g. platforms, walkways, handrails) which are not covered by a Performance Standard. The acceptance criteria should be quantitative so they can be measured effectively and consistently.
	Status	Open
Operator	**Response**	This item will be included as part of the Corrosion Management Plan for Northern Endeavour
	Action	Revise Corrosion Management Plan to state clear objectives with respect to corrosion management of safety related equipment.
	Position	s 22 irrelevant
	Due Date	31/03/2017

Operator	**Status Update**	This item will be included as part of the Corrosion Management Plan for Northern Endeavour. 23Mar17: UPS are utilising a case by case basis for the identification and engineering assessment. A action clarification provided by NOSPEMA during a UPS meeting March 2017, provided reference document "Energy Institute Guidance for corrosion management in oil and gas production and processing". UPS are currently in the process of reviewing this document and prior to determining clear and objective acceptance criteria for corrosion of safety-related equipment. During this current action process, UPS has been continuing with Steel and Fabric Maintenance on these safety elements. Contractors have been offshore measuring and developing repair scopes of work on safety structural elements, particularly existing temporary safety mitigation in the form of scaffold, with offshore assessment of Priority. Scaffold Condition and Fabrication Options (attached) Handrails, Kick Rails, Grating, Ladders UPS requests extension until the 30th September 2017
NOPSEMA	**Status**	Request for extension accepted. Original email filed in objective.
	Due Date	30/09/2017

NOPSEMA	**ID**	1489-14
	Recommen-dation	UPS to ensure that competency requirements relating to corrosion management are documented for the key roles responsible for corrosion at the facility, in accordance with Section 1.5.3.7 of the facility safety case.
	Status	Open
Operator	**Response**	Corrosion Management Plan to be reviewed
	Action	Once the Corrosion Management Plan has been reviewed it will be updated to ensure corrosion management roles are defined.
	Position	s 22 irrelevant material
	Due Date	30/01/2017
NOPSEMA	**Status**	Recommendation deferred until 30/3/17 based on agreement during PI:1505 pre-inspection meeting. Email filed in Objective.
	Due Date	30/03/2017
Operator	**Status Update**	Once the Corrosion Management Plan has been reviewed it will be updated to ensure corrosion management roles are defined. 23 Mar 2017: As noted by the comment above, competency requirements were incorporated into the Corrosion Management Policy, and thus is awaiting consolidation of other associated documents before final UPS approval and issue. Please find attached the draft Corrosion Management Policy for review. UPS requests extension until the 31th of May 2017
NOPSEMA	**Status**	Extension to due date granted based on progress made, to date, on corrosion management policy. Draft policy filed in objective.

	Due Date	31/05/2017

NOPSEMA	**ID**	1489-17 (Formerly 1175-2)
	Recommen-dation	Review the Passive Fire Protection implemented for all RESDVs and associated fittings to ensure that that original design intent has not been compromised.
	Status	Open
Operator	**Response**	First UPS Response. Quotes for fabrication and installation of J60 rated fire jackets have been obtained, with PR - 2600165, WO M220050200 generated.
	Action	WO M22005200 - Repair PFP on Riser Hub Connections in progress - awaiting materials.
	Position	s 22 irrelevant
	Due Date	31/05/2017
Operator	**Status Update**	WO M22005200 - Repair PFP on Riser Hub Connections in progress - awaiting materials. 5/5/2017: J60 Rated Fire Jackets have been ordered, via PO – M100599 Expected Delivery End JUNE 2017. M220050200; Previously Planned for Installation in March; This WO will now be planned for M1705. Request extension to 30 August 2017, to ensure allocated time to deliver parts to vessel and on board rectification.
NOPSEMA	**Status**	Extension to recommendation granted based on evidence/progress sighted. Email filed in objective (PI 1489).
	Due Date	30/08/2017

NOPSEMA	**ID**	1489-19 (Formerly 1175-6)
	Recommen-dation	Ensure that the forward and aft "Favco" cranes are safe and fit for purpose and that risks relating to the use of man riding lifting equipment at the facility are reduced to a level that is ALARP.
	Status	Open
Operator	**Response**	First UPS Response Maintenance of both forward and aft Favco cranes, and inspection and testing of main riding lifting equipment are completed as per maintenance plans.
	Action	Maintenance and inspection regime to continue as per PMs.
	Position	s 22 irrelevant material
	Due Date	30/06/2017

NOPSEMA	**Status**	Response sent to UPS on 12 January 2017: The above proposed action/response does not appear to address the original concern and will be difficult for you to close. The response needs to address the issues outlined in the Planned Inspection Report (PI 1175) which highlighted issues such as: • Records of load test results were not available. • Issues regarding the superseding of the Lifting Operating Standard with the Safety Work Control Procedure. • Certification of man riding cranes was not available. • No evidence was found that a risk assessment had been carried out. I'd suggest that the response directly address the issues outline in the original report, however it will probably make sense that you take us through the evidence in an onshore meeting, perhaps as part of the upcoming inspection in March.
Operator	**Status Update**	A recognised third party inspection vendor is being scheduled at the earliest opportunity to conduct a full offshore inspection and review of the current condition of all cranes on the Northern Endeavour, under Work Order M220050908. During the offshore inspection they will also complete an assessment and re-certification of the Favco cranes for man riding. Until this time, the use of the Favco cranes for man riding has been banned. Following a review of the inspection report, testing will be scheduled. We would also like to take the opportunity to discuss at the proposed onshore pre-inspection meeting in March.
NOPSEMA	**Status**	Response accepted and filed. This will be discussed during inspection 1505.

NOPSEMA	**ID**	1489-22 (Formerly 1175-11)
	Recommen-dation	Ensure that all crane wire ropes are changed out in a timely manner in accordance with the periodicity specified in the maintenance program.
	Status	Open
Operator	**Response**	First UPS Response Crane rope replacements are completed as per PMs, according to last completion date in CMMS.
	Action	Continue wire replacement as per maintenance plans and incorporate in NE specific Lifting Equipment Maintenance, Inspection and Testing Procedure
	Position	s 22 irrelevant material
	Due Date	30/06/2017

NOPSEMA	**Status**	The following response was sent to UPS on 12 January 2017: The original report stated: "The maintenance schedule was sighted and it was noted that the wire rope change out for the jib and hoist wires of the aft main deck crane has been overdue since June 2015." We would be looking for evidence that the overdue replacement has been completed and perhaps any others that have fallen due since the inspection. I understand that there were issues regarding the frequency of the crane wire replacement which may have been increased to avoid wire replacement. Similar to the previous recommendation it may make sense to follow this up with an onshore meeting as part of the upcoming inspection.
Operator	**Status Update**	The Aft Favco hoist rope was replaced on 4/07/16 – see attached rope certification. As part of the planned third party inspection all crane ropes will be inspected and recommendations will be reviewed actioned accordingly. The current wire rope replacement frequency will also be independently reviewed. We would also like to take the opportunity to discuss at the proposed onshore pre-inspection meeting in March.
NOPSEMA	**Status**	Response accepted and filed. Action remains open.

NOPSEMA	**ID**	1489-23 (Formerly 1175-13)
	Recommen-dation	Ensure that chain blocks, pad-eyes and monorails are inspected and colour coded as per PS P20 Lifting Equipment Performance Standard or tagged out of service.
	Status	Open
Operator	**Response**	First UPS Response Chain blocks are inspected and tagged as part of the rigging register. Pad-eyes and monorails are all considered out of service. Pad-eyes and monorails will be inspected and recertified prior to use on an as required basis.
	Action	Review and update Performance Standard P20 to reflect current practice.
	Position	s 22 irrelevant material
	Due Date	30/06/2017

NOPSEMA	ID	1489-24 (Formerly 1175-17)
	Recommen-dation	Ensure that all sections of damaged main deck aqueous film forming foam (AFFF) piping are permanently repaired and fit for purpose.
	Status	Open
Operator	Response	First UPS Response Defects are currently in review, for future mitigation and planning.
	Action	Latest Inspection Report ISR 2101 - AU06.SYSFireFoam ISR NE 2101 1Y Ext & Wraps Insp Nov 2016, completed 19 November 2016 and in review. SR M200132 Raised, Flow Test to be planned. Furmanite Wraps are designed in accordance to ISO/TS 24817 supplier documentation stating a design life of 20 years.
	Position	s 22 irrelevant
	Due Date	30/08/2017
NOPSEMA	Status	The following response was sent to UPS on 12 January 2017: The claim in the planned inspection report (PI 1175) was that the repairs were temporary, but the response states that they have a 20 year design life (and therefore permanent). I'd suggest you just provide evidence that it was designed and installed to appropriate standards/testing etc.. If regular inspection / testing is required then demonstrate that this is planned according to the appropriate standard. You should then be able to close the action. Otherwise I don't see a clear path as to how you will close this.
Operator	Response	The latest Inspection Report ISR 2101 – AU06.SYSFIREFOAM ISR NE 2101 1Y External & Wraps Inspection Nov 2016 and previous NOPSEMA report 1175 photos were reviewed - the two wraps depicted in 1175-17, have been identified in ISR 2101 as Figure 20: Bandage Wrap CF6203-10 and Figure 21: Bandage Wrap CF6203-11. These wraps were previously not individually captured on the s 47G busine 7321470 – NE Defect Register, as AFFF piping defects were being tracked separately by via T2 - 92009877 – Leaks AFFF Piping System. AFFF defects have since been individually added to 26/MN/INT/PC09/RG01 NE Defects Register Master. The above bandage wraps are identified as Defect No: 1118 & 1119. Bandage Wraps (Rapp-it) are intended as a temporary repair with no maximum design life, the supplier recommends the wraps are regularly inspected to ensure condition. The AFFF piping system is currently undergoing Engineering Review and Assessment to determine its Long Term Defect Mitigation Strategy and Service Life.
	Action	Complete Engineering Assessment of AFFF Defects (estimated 10th of February) and determine the ongoing strategy for AFFF Defect Mitigation (estimated 10th of March). Depending on the assessment, Ongoing Wraps, Clamps or Piping Replacement may occur.
	Position	s 22 irrelevant material

	Due Date	30/08/2017
NOPSEMA	**Status**	Response accepted and filed. Action remains open.

NOPSEMA	**ID**	1489-25 (Formerly 1346-4)
	Recommen-dation	Ensure that SIF A.08.0296A meets the SIL 3 requirement as per IEC 61511 specified in the facility safety case.
	Status	Open
Operator	**Response**	First UPS Response. Risk Review of SIF A.08.0296A using Upstream Risk Matrix and develop engineering action plan.
	Action	Risk assess the overspeed protection facilities on K-3300A to prevent damage to compressor due to PT overspeed with practical risk reduction methods to ALARP. SIF A.08.0296A: K-3300A-PT overspeed while coupled to comp. Will consult with SOLAR prior to works.
	Position	s 22 irrelevant material
	Due Date	30/10/2017

NOPSEMA	**ID**	1489-26 (Formerly 1346-5)
	Recommen-dation	Ensure that the recommendations for SIF M.02.064 and M.02.065 as described in the Northern Endeavour Safety Integrity Level Classification and Verification Report s 47G business information are implemented as per IEC 61511 specified in the facility safety case.
	Status	Open
Operator	**Response**	First UPS Response. Risk Review of SIF M.02.064 and M.02.065 using Upstream Risk Matrix and develop engineering action plan.
	Action	Conduct risk assessment review of existing swivel differential oil pressure instrumentation including current process conditions, installed equipment and practical risk reduction methods. Considerations may include installation of replacement and/or additional pressure transmitters to ensure swivel oil pressure instrumentation failure is designed to ALARP. M.02.064 Laminaria Production swivel oil (supply/return) diff pressure. M.02.065 Corallina Production swivel oil (supply/return) diff pressure.
	Position	s 22 irrelevant material
	Due Date	30/10/2017

NOPSEMA	**ID**	1489-27 (Formerly 1346-6)
	Recommen-dation	Ensure that all identified gaps described in the Northern Endeavour Safety Integrity Level Classification and Verification Report s 47G business information have been addressed to meet the requirements of IEC standards as set out in the safety case.

	Status	Open
	Action	First UPS Response. Upstream to conduct a gap analysis following the review of the SIL Report (s 47 business information) and develop action plan.
	Position	s 22 irrelevant material
	Due Date	30/06/2017

NOPSEMA	ID	1489-28 (Formerly 1346-7)
	Recommendation	Ensure that the operation of the SIF functions E.14.3110 and E.14.3111 associated with the HP and LP Flare KO Drums is reinstated so that they meet the performance requirements of IEC standards as set out in the safety case.
	Status	Open
Operator	Response	First UPS Response. Upstream PS are conducting engineering investigations into alternative technologies, followed by procurement and installation in the next available ESD 1 shutdown of suitable duration to isolate the flare systems and install new transmitters.
	Action	Engineering to identify potential replacement level transmitters that provide significant noise level signal immunity and suitable for installation on the HP& LP Flare Knock Out Pots. Quotation to be obtained once engineering assessment is completed.
	Position	s 22 irrelevant material
	Due Date	30/10/2017

NOPSEMA	ID	1489-30 (Formerly 1346-10)
	Recommendation	Ensure that anti-spray arrangements are fitted in the machinery spaces on the lube-oil and fuel oil systems of the emergency power generators and fire water generators.
	Status	Open
Operator	Response	First UPS Response. A review of the current anti-spray arrangements will be conducted by June 2017.
	Action	Following the review, any modifications will be put through the Engineering Change Request process and installed as required.
	Position	s 22 irrelevant material
	Due Date	30/06/2017

NOPSEMA	ID	1489-31 (Formerly 1346-12)
	Recommendation	Ensure that the aft foam tank level gauge cock is repaired in a timely manner and remains fit for purpose.

	Status	Open
Operator	**Response**	First UPS Response. Repair/replacement as required.
	Action	Inspect aft foam tank level gauge cock and Maximo WO M220050242 created for repair
	Position	s 22 irrelevant
	Due Date	30/06/2017

NOPSEMA	**ID**	1489-32 (Formerly 1346-14)
	Recommen-dation	Ensure that annual tests are conducted on the foam concentrate and a produced foam sample in accordance with Performance Standard Foam Systems F16 (document controlled reference number s 47G business information) and take appropriate steps to rectify any identified deficiencies.
	Status	Open
Operator	**Response**	First UPS Response. Testing conducted and result obtained in accordance with current F16 Performance Standard. Current testing methodology to be updated.
	Action	Update Performance Standard F16 and applicable Maintenance Plan and Work Instruction
	Position	s 22 irrelevant material
	Due Date	30/06/2017

NOPSEMA	**ID**	1489-33 (Formerly 1346-15)
	Recommen-dation	Ensure that the sections of damaged (wrapped) crude fuel supply line to GT7010 and GT7020 are permanently repaired and fit for purpose.
	Status	Open
Operator	**Response**	First UPS Response. Two Defects - Defect No: 670 & 671 identified on Defect Register both on line 050-FL-4956-01S01-0 TP1 & TP2.
	Action	Defects have been mitigated via engineered wraps, these wraps are to be inspected during the ongoing regular piping inspections on the crude fuel piping system.
	Position	s 22 irrelevant material
	Due Date	30/08/2017
NOPSEMA	**Status**	The following response was sent to UPS on 12 January 2017: Similar to the previous recommendation, the claim in the planned inspection report (PI 1346) was that the repairs were temporary. The response implies that they are "engineered" wraps and are presumably considered to have a life and design equivalent to or better than the base pipe. If so, I'd suggest you just provide evidence that it was designed and installed to appropriate standards/testing etc.. If regular inspection / testing is required then

		demonstrate that this is planned according to the appropriate standard. You should then be able to close the action.
Operator	**Status Update**	Please find attached Evidence of the Service life of the attached Wraps, Note both wrapped were installed under assuming a EOFL ~2018. Thus Defect 670 will require further long term mitigation prior to March 2018 and Defect 671 will require further long term mitigation prior to Dec 2020. Regular Inspections of AU06.SYSCRUDEOIL, are in MAXIMO; All wraps are to be inspected as part of the inspection procedure. Please Find Attached: Defect 670: 050-FL-4956-01S01-0 TP1 (Doc No: CRD-495-TS_MS and CRD-487-DJ_DA)) Please find attached Furmanite Composite Repair Method Statement stating a Design life of 3 Years; Installation Completed Mar 2015; Defect 671: 050-FL-4956-01S01-0 TP2 (Doc No: IC-TWR-P-102675-BE-01) Please find attached IC Integrity – 2nd Campaign Northern Endeavour FPSO Technowrap Repairs Scopes of Work Document stating a Design Life of 5 Years; Installation Completed Dec 2015.
NOPSEMA	**Status**	Email sent to UPS on 30 January 2017: With respect to 1489-33 (formerly 1346-15), we note the nominal design life of 3 and 5 years for defect 670 and 671 respectively. As stated in your response this means that defect 670 is due for follow up repair work by March 2018 and defect 671 is due for follow up repair work by December 2020. In line with the original recommendation we would like to see that you have plans in place to implement permanent repairs for both these defects so that the repairs are completed before the end of their respective lives. Of particular urgency is defect 670, given that this is just over a year away. We can discuss this further during the upcoming inspection in March if necessary.

NOPSEMA	**ID**	1489-34 (Formerly 1346-16)
	Recommen-dation	Ensure that the damaged passive fire protection on the Debutaniser column is repaired so that it will meet the requirements of the associated performance standard and is fit for purpose.
	Status	Open
Operator	**Response**	First UPS Response. WO - M220050198 Repair of passive fire protection on Debutaniser Column, extensive damage assessment has been completed in 2012 by EM&I (DRIMS 92006199)
	Action	Maximo WO M220050198 is in place and will be completed as per the Fabric Maintenance Scope of Work prioritisation.
	Position	s 22 irrelevant

	Due Date	30/08/2017

NOPSEMA	**ID**	1489-37 (Formerly 1346-19)
	Recommen-dation	Ensure that corrosion on the deck penetrations of #1 and #2 water ballast tanks and cargo tanks including Butterworth hatches and tank lids are assessed for fitness for service and that corrective work is undertaken in a timely manner.
	Status	Open
Operator	**Response**	First UPS Response. WO - M220050219 raised for Inspection of WBT 1 & 2 deck areas. Onboard inspector to complete fitness for service with Upstream PS Engineering. Any required fabric maintenance to be completed as per the Corrosion Mangement Plan.
	Action	Following condition assessment, fabric maintenance work orders to be raised.
	Position	s 22 irrelevant material
	Due Date	30/06/2017