

NORTHERN

Near Miss: Dropped Object -Valve Shroud from Heat Medium Bypass

Upstream PS Controlled Document

No. 4900-HS-H0077-03

Revision 0

Issue date: 20/04/2017

This document is to be considered uncontrolled:
 When printed (unless formally issued as a 'controlled copy'); and
 When saved electronically to an area outside of the IMS

Revision history

			s 22 irrelevant mater	rial	
0	20/04/2017	Issued for use			
Rev.	Issue date	Revision summary	Originator	Reviewer	Approver

Approvals

This Near Miss: Dropped Object - Valve Shroud from Heat Medium Bypass has been reviewed by Upstream Production Solutions Pty Ltd and Northern Oil & Gas Australia Pty Ltd and is approved for the Northern Endeavour Project.

Approval: Northern Oil & Gas Australia Pty Ltd

Name	Signature	Date
Northern Oil & Gas Australia Pty Ltd	s 22 irrelevant material	30/5/2017

Approval: Upstream Production Solutions Pty Ltd

Name	Signature	Date
s 22 irrelevant material Upstream Production Solutions Pty Ltd	s 22 irrelevant material	16/5/2017

Distribution list

Copy number	Recipient
1	s 22 , Northern Oil & Gas Australia
2	, Northern Oil & Gas Australia
3	, Northern Oil & Gas Australia
4	Northern Oil & Gas Australia
5	, Upstream Production Solutions Pty Ltd
6	Upstream Production Solutions Pty Ltd
7	, Upstream Production Solutions Pty Ltd
8	, Upstream Production Solutions Pty Ltd
9	, Upstream Production Solutions Pty Ltd
10	, Upstream Production Solutions Pty Ltd
11	, Upstream Production Solutions Pty Ltd
12	NE OIM, Upstream Production Solutions Pty Ltd
13	NE Production Supervisors, Upstream Production Solutions Pty Ltd
14	NE Maintenance Supervisors, Upstream Production Solutions Pty Ltd
15	NE Medic-HSEQ, Upstream Production Solutions Pty Ltd
16	Upstream Production Solutions Pty Ltd

Table of Contents

Revision history	2
Approvals	2
Distribution list	3
Table of Contents	1
1 References	5
2 Term definitions and abbreviations	5
3 Executive Summary	6
4 Investigation Methodology	6
5 Sequence of Incident Events	7
6 Causal Tree	3
7 Discussion	3
8 Summary Recommendations)
9 Actions	1
Appendix A Reports	3
Appendix A.1 5 Whys Report13	3
Appendix A.2 NOPSEMA FM0831 3-Day Report 14	4
Appendix A.3 myOSH Near Miss Dropped Object Incident Report 002761 15	5
Appendix A.4 myOSH Dropped Object Incident Report 002648 16	6
Appendix B Dropped Object Calculator17	7
Appendix B.1 Incident 00264817	7
Appendix B.2 Incident 002761 18	3
Appendix C Photographs	9
Appendix D Witness Statements	3

1

References

Document code	Title
00/HSEQ/GEN/PC03	Incident Investigation

2

Term definitions and abbreviations

Term or abbreviation	Definition
CBTA	Competency Based Training Assessment
CRO	Control Room Operator
ECR	Engineering Change Request
ESD	Emergency Shut Down
FPSO	Floating Production, Storage and Offtake
HSEQ	Health, Safety, Environment and Quality
Maximo	Computerised Maintenance Management System
MICE	Material Inspection Corrosion Engineer
MOC	Management of Change
MTL	Maintenance Team Leader
myOSH	HSEQ Management Software
NE	Northern Endeavour
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
OIM	Offshore Installation Manager
PM	Planned Maintenance
PO	Purchase Order
QA	Quality Assurance
QC	Quality Control
SAP	Computerised Maintenance Management System
ТОР	Temporary Operating Procedure
Upstream PS	Upstream Production Solutions Pty Ltd
VB	Virtual Bookshelf
WHRU	Waste Heat Recovery Unit

3 Executive Summary

At 1616 hours on Monday 12 February 2017, a 3.75 kilogram section of corroded pipe and a steel rod fell 8 meters, missing an operator by 1.5 meters. Analysis indicates that if the objects had struck the operator this would most likely have caused a fatality.

As per Upstream Production Solutions Pty Ltd (Upstream PS) incident investigation procedures, a 5 Whys investigation and causal tree has been completed.

The causal root path has been identified as being based on the neglect of inspection and corrosion management of redundant elevated equipment instigated by s 47G business

This was further compounded by a perception within the Northern Endeavour (NE) team of the need to expedite resumption of normal production and hence not following required management system and Temporary Operating Procedure (TOP) processes.

Key recommendations from the investigation are:

- NE Senior Management to deliver and reemphasise the message that safety/integrity has priority over production, and that if there are any safety or integrity concerns then any activity should be stopped and further reviewed. This commitment needs to be to be visibly demonstrated.
- Carry out a systematic detailed review of all elevated high potential energy locations for corroded items of equipment.
- An engineering structural inspection should be carried out to assess the damage if any sustained during the water hammer incident.
- Redundant equipment to be reviewed and made safe with PM procedures put in place to ensure safety is maintained.
- A review of the facility inspection plans within Maximo to ensure elevated facilities are not excluded from an appropriate level of inspection.
- Prepare and rollout workpack preparation process to ensure TOPs and Implementation work instructions are included. Ensure workflow mandates communication between onshore engineers and offshore management.
- Develop a Quality Assurance/Quality Control (QA/QC) process to ensure fabricated items are inspected and approved at point of fabrication.
- Review open myOSH actions and update where necessary to ensure:
 - Actions are modified where necessary to SMART actions
 - Appropriate allocation of action to correct actionee and person accountable
- Update myOSH workflow to ensure approval is required from the accountable person prior to an action being closed out or action date being extended.

4 Investigation Methodology

The methodology followed the requirements of the Upstream PS Incident Investigation procedure [00/HSEQ/GEN/PC03].

- The high potential/near miss dropped object incident occurred at 1616 hours Monday 12 February 2017.
- An immediate action was taken to make the area safe, collect evidence and restrict access.
- A site investigation was instigated by the NE Medic-HSEQ and the NE Production Engineer.
- Photographs and witness statements were taken and the incident entered into myOSH am Tuesday 13 February 2017.

- Upon receipt of the myOSH report, the incident was upgraded to a Dangerous • Occurrence Which Could Have Caused Death or Serious Injury and verbally reported to National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) at 1509 Tuesday 13 February 2017.
- A site based 5 Whys Investigation was instigated and documented Tuesday (Appendix A1.). The 5 Whys were investigated by the NE Medic-HSEQ and the NE Production Engineer, both are experienced practitioners of 5 Whys investigations.
- The NE Operations Manager was mobilised from Perth to head up the investigation.
- The NOPSEMA 3-Day Report was lodged with NOPSEMA pm Wednesday 14 February 2017.
- Upon arrival at the NE Floating Production, Storage and Offtake (FPSO) Wednesday pm, the NE Operations Manager, NE Medic-HSEQ and Production Engineer revisited the site and interviewed the key witness.
- Upon viewing the elevated platform, three other similar condition valves were located and made safe by removing two further valve shrouds and indicators.
- On Thursday 15 February 2017, a formal investigation was carried out by the NE Operations Manager, Senior Instrument Control Engineer, NE Medic-HSEQ and NE Production Engineer.
- An incident flow chart was developed and analysed, with high level recommendations.
- The output of the analyses was content/sense tested with the NE onshore management team.
- The 5 Whys analysis was updated with some of the insights gathered from the root analyses.
- The data was further analysed and this investigation report produced by the NE Operations Manager during the week following the incident.

Sequence of Incident Events

- (1) Corroded valve handle dropped object from mezzanine to process deck 07 October 2016.
- (2) This was categorised as a "minor" incident as the dropped height/weight calculated was rated as minor. An action arising from this incident review (identify other potential dropped objects in the area) was closed on 14 February 2017.
- (3) Extensive corrosion on redundant Waste Heat Recovery Unit (WHRU) bypass valves on mezzanine deck adjacent to the FRC.
- (4) Heat medium pipework - leak discovered 04 February 2017. Unable to access due to heat/pressure in pipework during normal operations.
- (5) Unplanned Emergency Shut Down (ESD) on 07 February 2017, opportunity to inspect pipework, heat medium drained, extensive corrosion under insulation with breach of pipe integrity confirmed.
- (6) Engineering solution sought from onshore.
- (7)Hot shot parts out to facility on 11 February 2017.
- Engineering solution approved with Engineering Change Request (ECR), however not (8) fabricated to specification (poor QA/QC), modification on site required.
- (9) A deviation from standard operating procedure without proper review led to a reintroduction of water into a hot heat medium system pm 12 February 2017 caused extensive vibration to WHRU as steam flashed off.
- (10) During extensive heat medium vibration 1616 hours 12 February 2017, valve shroud and indicator fell to Process Deck within 1.5 meters of investigating operator.

5

ശ



Page 8 of 23

7 Discussion

The analysis found that the causal path (RED) was the high level of corroded non-process equipment at elevated locations.

The intention of <u>\$ 47G business</u> to abandon the facility in August 2016, led to a strategy of maintenance minimisation (monitor rather than address corrosion issues unless production critical).

The monitoring process was further minimised to exclude redundant equipment and pipework.

The heating medium bypass valves fell into the criteria of redundant pipework located at an elevated location.

Therefore the four heat medium bypass valves were not captured in <u>s 47G business</u> corrosion monitoring program.

With the transfer of maintenance and inspection data from previous SAP to current Maximo, the lack of ongoing inspection monitoring was passed through to Upstream PS' Maximo program.

Three of the four valve shrouds and the associated valve indicators experienced severe unmonitored corrosion to an extent that they were all in a state of failure and given time or an initiating event, could have fallen to the process deck below.

The previous dropped object event on 07 October 2016 had a recommended action to carry out a review of elevated potential dropped objects; refer to the GREY causal path. Within myOSH, no formal 5 Whys were attached and no root cause was identified. The action identified was not assigned to an appropriate accountable person. The action was closed by a non-technical person with no evidence attached that shows action was carried out. Had this action been carried out, it is possible the state of the three valve shrouds would have been identified and immediate action taken.

The BLUE non-causal path can be described as the initiating event however it should be noted that the incident could have occurred without this initiating event in the course of time.

The issues raised above in the RED path with regards to minimising maintenance and inspection possibly contributed to the lack of inspection data relating to the heat medium and to the status of the deteriorated insulation which lead to the external corrosion under insulation and leak in the heat medium.

At the time of the incident there was, within the onshore and offshore teams, a high level of perceived pressure from management to reinstate the heat medium circuit and hence re-establish normal rates of crude production.

The repair methodology and implementation was developed under pressure to restore production capacity. The repair design was subject to the ECR process, however the ECR did not fully address the operational program required to successfully complete the repair (apply heat to the seal material Belzona while managing heat medium flow and pressure). This should have been detailed in a TOP or, at a minimum, in a detailed procedure in the maintenance work pack for the repair.

The fabrication of the patch in Darwin and its immediate dispatch to the NE precluded appropriate Quality Assurance of the repair patch, which should have been clearly defined in the purchase order (PO) and workflow. On further investigation of the contractor evaluation process it was found the evaluation was heavily influenced towards HSEQ with no questions towards engineering QA/QC. To ensure this element is captured in future, a review will be required of the contractor evaluation shall be completed on all NE approved contractors and companies

Failures in communications occurred over the weekend between the repair designers onshore and the offshore maintenance team when the patch arrived on the NE with apparent deviations from design. The offshore team considered that the repair patch supplied was inadequate and defective. A repair program was then instigated offshore which deviated from the ECR without being subject to an appropriate Management of Change (MOC) or communication with the onshore team.

The consequence of the heat medium process conditions to achieve an effective repair was not fully appreciated such that cold heat medium was introduced to a static heat medium system at the same time as parts of the heat medium system were at elevated temperatures. It should be noted that the Control Room Operator (CRO) raised some concerns regarding the procedures, however no action was taken.

The consequence of the reinstatement of the heat medium under the process conditions was the generation of pipework hammer in multiple locations.

The severe vibration caused by hammer most probably dislodged the valve shroud and indicator from the top of the isolation valve causing it to fall 8 meters.

The vibration and noise associated with the heat medium pipework hammering resulted in the operator leaving his work location to investigate the problem, thus locating himself some 1.5 meters from the dropped object.

8 Summary Recommendations

- (1) NE Senior Management to deliver and reemphasise the message that safety/integrity has priority over production, and that if there are any safety or integrity concerns then any activity should be stopped and further reviewed. This commitment needs to be to be visibly demonstrated.
- (2) Carry out a systematic detailed review of all elevated high potential energy locations for corroded items of equipment.
- (3) An engineering structural inspection should be carried out to assess the damage if any sustained during the water hammer incident.
- (4) Redundant equipment to be reviewed and made safe with PM procedures put in place to ensure safety is maintained.
- (5) A review of the facility inspection plans within Maximo to ensure elevated facilities are not excluded from an appropriate level of inspection.
- (6) Prepare and rollout presentation covering learnings, emphasising following startup procedures, else risk review and raising of TOP prior to restart. Include revisit "Right to Stop Work" and "Don't Put Yourself at Risk.
- (7) Prepare and rollout workpack preparation process to ensure TOPs and Implementation work instructions are included. Ensure workflow mandates communication between onshore engineers and offshore management.
- (8) Develop a QA/QC process to ensure fabricated items are inspected and approved at point of fabrication. This will require the following to be completed:
 - Review and revise the contractor evaluation process so engineering QA/QC is included. At present the emphasis is on HSE.
 - Complete the revised contractor evaluation on NE approved fabrication companies to ensure they have internal QA/QC policies and personnel to manage same.
 - Include the QA/QC requirement in the PR/PO template and process and the requirement for the originator to nominate the QA/QC requirements.
 - Engage a third party inspection group to complete final inspection where required. This will require a call off contract to be raised and agreed to by all parties.
- (9) HSEQ Coordinator to organise/facilitate the training of offshore and onshore personnel in accident investigation.
- (10) Review open myOSH actions and update where necessary to ensure:
 - Actions are modified where necessary to SMART actions
 - Appropriate allocation of action to correct actionee and person accountable
- (11) Update myOSH workflow to ensure approval is required from the accountable person prior to an action being closed out or action date being extended.
- (12) HSEQ Coordinator to rollout the updates made to the myOSH workflow to all NE personnel, emphasising the requirement to attach all evidence to the action to enable approval for closeout.

4900-HS-H0077-03 - Revision 0

(13) Review Heating Medium Competency Based Training Assessments (CBTA) and Virtual Bookshelf (VB) Operating Procedures to ensure startup water hammer is adequately addressed.

9 Actions

Actio	Action		Action end of
(1)	Emphasise safety/integrity over production.	NE (Upstream PS/ NOGA) Management	April
(2)	Systematic review of elevated high potential energy corroded items.	MICE	May
(3)	Conduct structural and piping inspection of HM system to ensure no damage due to hammer event.	MICE	June
(4)	Review or put in place as required inspection plans for redundant equipment.	MICE	May
(5)	Review and update as required facility inspection plans for elevated facilities.	MICE	April
(6)	 (a) Prepare presentation covering learnings, emphasising following startup procedures, else risk review and raising of TOP prior to restart. Include revisit "Right to Stop Work" and "Don't Put Yourself at Risk. (b) OIM to rollout presentation. 	HSEQ Coordinator OIM	June
(7)	Prepare and rollout workpack preparation process to ensure TOPs and Implementation work instructions are included. Ensure workflow mandates communication between onshore engineers and offshore management.	MTL	June
(8)	 Develop a QA/QC process to ensure fabricated items are inspected and approved at point of fabrication. This will require the following to be completed; (a) Review and revise the contractor evaluation process so engineering QA/QC is included. At present the emphasis is on HSE. (b) Complete the revised contractor evaluation on NE approved fabrication companies to ensure they have internal QA/QC policies and personnel to manage same. (c) Include the QA/QC requirement in the PR/PO template and process and the requirement for the originator to nominate the QA/QC requirements. (d) Engage a third party inspection group to complete final inspection where required. This will require a call off contract to be raised and agreed to by all parties. 	MTL	July
(9)	Train personnel on the facility and onshore in accident investigation.	HSEQ Coordinator	November
(10)	 Review open myOSH actions and update where necessary to ensure: Actions are modified where necessary to SMART actions Appropriate allocation of action to correct actionee and person accountable 	HSEQ Coordinator	July

Actio	on	Responsible	Action end of
(11)	myOSH system currently allows closeout by actionee with an email notification to the accountable person advising closeout. myOSH workflow to be updated such that closeout can only occur with accountable person's approval. This also includes approval of action date extensions.	HSEQS Manager	To be confirmed by Melbourne Finance department
(12)	Rollout of myOSH workflow changes to all NE personnel. Rollout to include emphasis on evidence that is required to be attached to enable approval for closeout.	HSEQ Coordinator	Following on from item 11
(13)	Review Heating Medium CBTAs and VB Operating Procedures to ensure startup water hammer is adequately addressed.	Engineering Manager	Мау

Appendix AReportsAppendix A.15 Whys Report

Innovation & Quality

People & Community

Safety & Environment



upstreamps.com



Customer Focus & Integrity





The sequence of events as per the investigation.

- Heat Medium pipework leak discovered 4/2/17 unable to access due to heat/pressure in pipework during Normal Operations
- Medium drained Extensive corrosion under insulation with breach of Unplanned PSD on 7/2/17 – Opportunity to inspect pipework – Heat
- Engineering solution sought from town

pipe integrity confirmed

- Hot shot parts out to facility on 11/2/17
- Engineering solution not suitable for application -modification on site required
- As no valve as per original plan and reintroduction of water into a hot system caused extensive vibration to WHRU as steam flashed off.
- Extensive corrosion on redundant WHRU bypass valves, in conjunction with vibration caused the valve shroud to dislodge and fall 8m



Valve Shroud – Corrosion





Valve shroud - Corrosion





Mezzanine deck - Redundant HM bypass valve postion





Distance of fall of the Valve Shroud = 8m





Position of Personnel in relation to the landing of Valve Shroud





Path of fall of the Valve Shroud





Base of Valve shroud – Severe Corrosion





Upstream Monte Shrouds on same deck – Removed by Rope Access Technicians to prevent further dropped objects





Solutions under insulation









Solutions

- consider future life of project as Decommissioning was planned for August did not Corrosion Management – Priority in 2017 as ^{s 47G business information} 2016
- Implement corrective maintenance campaign (Life Extension Project) and prioritise work items according to stored energy potential
- Step back 5x5 always if there is a change in condition
- Communication between Offshore and Onshore utilise expertise in both fields to come up with realistic expectations.
- STOP THE JOB everyone has the right and the duty of care to Stop the job if they are unsure, conditions change, no procedure in place.
- 360 degrees of Safety









Appendix A.2 NOPSEMA FM0831 3-Day Report

in



N-03000-FM0831 Revision 8 January 2015

A554483

Report of an accident, dangerous occurrence or environmental incident

For instructions and general guidance in the use of this form, please see the last page.

Part 1 is required within 3 days of a notified incident. Part 2 is required within 30 days of notified incident.

What was the date and time of the initial verbal incident notification to NOPSEMA?					
Date	Date 13/02/2017		15:09		

NOTE: It is a requirement to request permission to interfere with the site of an accident or dangerous occurrence. Refer OPGGS(S)R, Reg. 2.49.

What is the date and time of this written incident report?			
Date	14/02/2017	Time	15:00

What type of incident is being reported?		Please : inciden	tick appropriate t type		
Accident or dangerous occurrence		Х	Complete parts 1A, 1B & part 2		
Environmental Incident				Complete parts 1A, 1C	
BOTH (Accident or dangerous occ	urrence AND environmental in	cident)		Complete ALL parts (1A, 1B, 1	C, 2)
Please tick all applicable (one or more	categories)	To use	electroni	cally: MS Word 2007-10 – click in cl	heck box
	Accidents	Death or Lost time	Serious i injury <u>></u> 3	njury 3 days	
Categories Please select one or more	Dangerous occurrences	Hydrocarbon release >1 kg or ≥80 L (gas or liquid) Fire or explosion Collision marine vessel and facility Could have caused death, serious injury or LTI Damage to safety-critical equipment Unplanned event - implement ERP Pipeline incident Well kick >50 barrels Other			
	Environmental incidents	Hydrocarbon release Chemical release Drilling fluid/mud release Fauna Incident Other			

Part 1A – Information required within 3 days of an accident, dangerous occurrence or environmental incident

Gene	General information – all incidents					
	Where did the incident	Facility / field / title name	Northern Endeavour			
1.	occur?	Site name and location Latitude/longitude	Timor Sea / 10º 37' S x 125º 59' E			
	Who is the registered	Name	Upstream Production Solutions			
2.	operator/titleholder or other person that controls	Business address	Level 5, 1101 Hay Street, West Perth, 6005			
	the works site or activity?	Business phone no.	(08) 6109 4000			
n	When did the incident	Time and time zone	16:16 CST			
5.	occur?	Date	12/02/2017			
	Did anyone witness the incident?	Yes or no If yes, provide details below	Yes			
	Witness details	Witness no 1	Witness no 2 Witness no 3			
	Full name	s 22 irrelevant material				
	Phone no. (Business hours)	-				
4.	Phone no. (Home) (Mobile)					
	Ema il (Business) (Private)					
	Postal address	Level 5, 1101 Hay Street, West Perth, 6005				
	NB: If	more witnesses, copy and insert th	is section (4) here , and add extra witness numbers appropriately			
		Name	s 22 irrelevant			
5	Details of person submitting	Position	Operations Manager			
5.	this information	Email				
		Telephone no.				
6.	Brief description of incident	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.				

accident, dangerous occurrence or environmental incident								
General information – all incidents								
7.	Work or activity being undertaken at time of incident	Waste heat recovery unit re	Waste heat recovery unit restart after pipework repair.					
8.	What are the internal investigation arrangements?	Onsite investigation team.						
9.		Yes or no If Yes, provide details below	No.					
		Type of fluid (liquid or ges)	Please specify		Hydrocarbon			
		If hydrocarbon release please complete item no.15 as well	Please specify		Non-hydrocarbon			
		Estimated quantity Liquid (L), Gas (kg)						
		Estimation details	Calculation		Measurement			
		Estimation details	Please specify					
	Was there any loss of containment of any fluid (liquid or gas)?	Composition Percentage and description						
	(inquia of gas).	Known toxicity to people	Toxicity to pe	eople				
		and/or environment	Toxicity to environ	ment				
		How was the leak/spill detected?	F&G detection CCTV		Visual Other			
			No Yes		Immediate Delayed			
		Did ignition occur?	If yes, what was the likely ignition source	Sp: Sp	Hotwork ark electrical source oark metallic contact Hot surface Other			
		Yes or no	N/A					
10.	Has the release been	Duration of the release hh:mm:ss						
	stopped and/or contained?	Estimated rate of release Litres or kg per hour						
11.	Location of release	What or where is the location of the release?	N/A					

Part 1A – Information required within 3 days of an accident, dangerous occurrence or environmental incident

		What equipment was involved in the release?	
		Is this functional location listed as safety-critical equipment?	
		Ambient temperature c°	30.1
		Relative humidity %	60.8%
	Weather conditions Please complete as appropriate	Wind speed m/s NB: for enclosed areas use Air change per hour	24.4kn
12.		Wind direction e.g. from SW	258.4 - WSW
		Significant wave height m	0.4m heave, 0.1 degree roll, 1.0 degree pitch
		Swell m	
		Current speed m/s	
		Current direction e.g. from SW	
		System of hydrocarbon release	Process Image: Constraint of the state Drilling Image: Constraint of the state Subsea / Pipeline Image: Constraint of the state
		Estimated inventory in	
		the isolatable system	
	Hydrocarbon release details	, Litres or kg	
12		System pressure and size	Pressure MPag
15.	If hydrocarbon fluid (liquid or gas) was released, please complete this	of piping or vessel	Size and the
	section as well	diameter (d in mm)	Size Piping (d)
		length (l in m)	or Vessel (V)
		or volume (V in L)	
		Estimated equivalent hole	
		diameter	
		d in mm	

Part 1B - Complete for accidents or dangerous occurrences							
Accidents and dangerous occurrences information							
	Was NOPSEMA notified throu notification phone line? Phor	Yes		No			
45	Action taken to make the	Was permission given by a NOPSEMA inspector to interfere with the site?					
15.	work-site safe	OPGGS(S)R 2.49.	Yes		No		

Part 1B - Complete for accidents or dangerous occurrences								
Accidents and dangerous occurrences information								
		Action taken	Restricted access to area Visual inspection of area	above.	-			
		Details of any disturbance of the work site	N/A					
	Was an emergency response initiated?		Yes 🗆	No				
16.		Type of response	Manual □ Automatic alarm □	Muster Evacuation				
		How effective was the emergency response?						
	Was anyone killed o	r injured? Provide details below	Yes 🗆	No				
	Injured persons (IP)		Casualty No 1	I				
	Employer name		Employer address					
	Employer phone no.		Employer email					
	IP full name							
	IP date of birth		Sex	M 🗆 F				
	IP residential address			1				
	IP phone no. (Work)							
17.	IP occupation/job title		Contractor or core crew					
	Details of injury							
	Based on TOOCS (refer last page) Nature of injury	 a. Intracranial injury b. Fractures c. Wounds, lacerations, amputations, internal organ damage 	d. Burn e. Nerve or spinal co f. Joint, ligament, m g. Other	rd injury uscle or tendon injury				
	Part of body	G1. Head or faceG2. NeckG3. TrunkG4. Shoulder or arm	G5. Hip or leg G6. Multiple location G7. Internal systems G8. Other	s				
	Mechanism of injury	G0. Falls, stepping, kneeling, sitting on objectG1. Hitting objectG2. Being hit or trapped	G3. Exposure to soun G4. Muscular stress G5. Heat, cold or radi G6/7 Chemical, biolog G8. Other	d or pressure ation ical substance				

Part 1B - Complete for accidents or dangerous occurrences								
Accidents and dangerous occurrences information								
	Agency of injury	1.Machinery or fixed plant2.Mobile plant or transport3.Powered equipment4.Non-power equipment		als, substances				
	Details of job being undertaken							
	Day and hour of shift	Day e.g. 5 th day of 7 (5 / 7)	Hour e.g. 3 rd hour of 12 (3/	12)				
		NB: If more casualties, please copy/p	aste this section (19) for each ad	ditional casualty and insert he	re			
	Was there any serious	damage? Provide details below	Yes 🗆	No 🛛				
10	Details	Item 1	Item 2	Item 3	_			
18.	Equipment damaged							
	Extent of damage							
	Will the equipment be shutdown?Yes or No	No						
19.	If Yes, for how long?							
		NB: If more equipme	nt seriously damaged, please cop	py/paste this section as require	ed			
	Will the facility be shut down?	Yes or no If yes provide details below	No.					
20.		Date		dd/mm/yyyy				
	Facility shutdown	Time		24 hour clock	_			
		Duration		Completion date	_			
		Action	Responsible party	Actual or intended				
		Personnel cleared from area.	HSEC	12/02/2017				
		Restricted access to area.	PS/MS	12/02/2017				
21.	Immediate action taken/intended, if any, to prevent recurrence of	Carry out visual review of other potential dropped objects.	PS/MS	14/02/2017				
	incident.	Slow refill of heating medium to minimise water hamer.	PS/MS	14/02/2017				
		Mobilise Operations Manager to lead further investigation.	ом	15/02/2017				
22.	What were the immediate causes of the incident?	Corrosion through the base of likely related to flash off of s position.	of the shroud – excessive p team had led to the shroud	ipework vibration most I dislodging from its				

Attachments

Are you attaching any documents?			Yes or no If yes provide details below			
No.	ID	Revision	Date	Title/description		
Insert or delete rows as required						

Part 1C – Complete for environmental incidents							
Envir	onmental Impacts						
23.	What is the current environment plan for this incident?	Environment plan					
		Yes or no If yes provide details below Incident details					
		e.g. estimated area of impact, nature/significance of impact	RS				
	Has the incident resulted in an impact to the environment?	Open ocean				Macroalgae	
		Shoreline Population centre			Coral Reef 🛛 Benthic invertebrates 🗆		
24		Stakeholders Other sensitivity				Seagrass Mangrove	
24.		e.g. conservation area, nestin Further details	g beach				
	Details	Environment 1	Environment 2			Environment 3	;
	Location of receiving environments Lat/Long						
	Date & time of impact						
	Action taken to minimise exposure						
	Specify each matter						
	protected under Part 3 of						
	the EPBC Act impacted	ND 16		1 -1			
		NB: IJ more environments wei	e damageo	u, piease	e copy/paste this s	ection (Item E3) and add ext	ra aata
25.		If yes, provide details					

Part 1C – Complete for environmental incidents

Environmental Impacts

	Are any environments at	Details					
	risk?	e.g. zone of potential impact					
	Including as a result of spill						
	response measures					Maaraalgaa	
		Open	ocean			Coral Reef	
		Population	Centre		Be	enthic Invertebrates	
		Stakeh	olders			Seagrass	
		Other sen	sitivity			Mangrove	
		e.g. conservation area, nestin	, ng beach			Ū.	
	Details	Environment 1	E	nviron	ment 2	Environment 3	
	Estimated location of 'at- risk' environments						
	Estimated impact date & time						
	Action required to minimise exposure						
	Specify each matter protected under Part 3 of the EPBC Act at risk						
		NB: If more environments at risk	of damage	e, please	e copy/paste this s	ection (Item E2) and add ext	ra data
		Yes or no					
	Was an oil pollution	If yes, what action has been					
26.	emergency plan activated?	Implemented /planned?					
		If yes, now effective is/was					
	Was an environmental	Yes or no					
	monitoring program	If ves, what actions have					
27.	initiated?	been implemented and/or					
		planned?					
	Did the incident result in	Yes or no					
	the death or injury of any	(If yes provide details of					
	fauna?	species in the table below)					
	Injured fauna	Species 1	Specie	s 2		Species 3	
28.	Species name (common or scientific name)						
	Number of individuals	Killed:	Killed:			Killed:	
	killed or injured	Injured:	Injured	1:		Injured:	
		NB: If more species were inju	red or killed	d, please	e copy/paste this s	ection (Item E4) and add ext	ra data
	Actions taken to avoid or	Action	Respo	nsible	party	Completion date	
29.	mitigate any adverse environmental impacts of						
	the incident.						

Part 1C – Complete for environmental incidents						
Environmental Impacts						
	Action	NB: If more act Responsible party	tions, please add extra rows as required Completion date			
Corrective actions taken, or proposed, to stop, control or remedy the incident.				-		
	Action	NB: If more act Responsible party	tions, please add extra rows as required Completion date Actual or intended			
Actions taken, or proposed, to prevent a similar incident occurring in the future.				-		
	t 1C – Complete for env ronmental Impacts Corrective actions taken, or proposed, to stop, control or remedy the incident. Actions taken, or proposed, to prevent a similar incident occurring in the future.	t 1C – Complete for environmental incient ronmental Impacts Corrective actions taken, or proposed, to stop, control or remedy the incident. Action Action	t 1C - Complete for environmental incidents ronmental Impacts Image: Second Se	t 1C - Complete for environmental incidents ronmental Impacts Image: complete for environmental incidents ronmental Impacts Image: complete for environmental incidents Image: complete for environmental incident occurring in the future. Image: complete for environmental incident occurring in the future.		

Atta	Attachments							
Are you attaching any documents?			Yes or no If yes provide details below					
No.	ID	Revision	Date	Title/Description				
	•	•	·	Insert or delete rows as required				



Part 2 – Information required within 30 days of accident or dangerous occurrence

NOPSEMA acknowledges that in many circumstances an operator may not have completed an investigation within 3 days of an accident or first detection of a dangerous occurrence and agrees that these items must be provided within 30 days unless otherwise agreed, in writing with NOPSEMA. In circumstances where an investigation has been completed within 3 days, and these items are available (supplemented, as required by any attachments) this part should also be completed at that time.

	Has the investigation been completed?	Yes or no		
		Root cause 1		
		Root cause 2		
	Root cause analysis	Root cause 3		
	What were the root causes?	Other root causes		
32.	Full report			
	Describe investigation in detail,			
	including who conducted the			
	investigation and in accordance			
	with what standard/procedure			
	with reference to attachments			
	listed in the 'attachments table'			
	(jonowing) as applicable			
		Action	Responsible party	Completion date Actual or intended
	Actions to prevent			
	recurrence of same or			
33.	similar incident			
	similar incluent			
			N	B: Add or delete rows as appropriate

Attac	chments (Insert/delete rows as required)			
Are yo	u attaching an	y documents?	Yes or no If yes provide details below	
No.	ID	Revision	Date	Title/description

Instructions and general guidance for use:

- 1. The use of this form is voluntary and is provided to assist operators and titleholders to comply with their obligations to give notice and provide reports of incidents to NOPSEMA under the applicable legislation.
- 2. Accidents, dangerous occurrences or environmental incidents can all be reported using this same form.
- 3. The applicable legislation for incident reporting is:
 - a. Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009 [OPGGS(S)R]; and
 - b. Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 [OPGGS(E)R], for facilities located in Commonwealth waters; or
 - c. for facilities located in designated coastal waters, the relevant State or Territory Act and associated Regulations where there is a current conferral of powers to NOPSEMA.
- 4. In the context of this form an incident is a reportable incident as defined under:
 - a. OPGGSA, Schedule 3, Clause 82.
 - b. OPGGS(E)R, regulation 4.
- 5. This form should be used in conjunction with NOPSEMA Guidance Notes available on the NOPSEMA website:
 - a. N-03000-GN0099 Notification and Reporting of Accidents and Dangerous Occurrences
 - b. N-03000-GN0926 Notification and Reporting of Environmental Incidents
- 6. Part 1 requires completion for all incidents; then ALSO complete part 2 if the incident is an accident or dangerous occurrence.
- 7. NOPSEMA considers that a full report will contain copies of documentary material referenced and/or relied on in the course of completing this form, which may include (but not be limited to) as appropriate: witness statements, management system documents, drawings, diagrams and photographs, third party reports (audit, inspection, material analysis etc.), internal records and correspondence.
- 8. This form is intended to be completed electronically using Microsoft Word by completing the unshaded cells which will expand as required to accept the information required <u>and</u> the check boxes where relevant (NB: check boxes may appear shaded and have reduced functionality in MS Word versions prior to 2010).
- 9. The completed version of this form (and any attachments, where applicable) should be emailed to: <u>submissions@nopsema.gov.au</u> or submitted via secure file transfer at: <u>https://securefile.nopsema.gov.au/filedrop/submissions</u> as soon as practicable, but in any case within three days of the incident.

References

NOPSEMA website: www.nopsema.gov.au

TOOCS – Type of Occurrence Classification System.

The *Type of Occurrence Classifications System, Version 3.0* (TOOCS3.0) was developed to improve the quality and consistency of data. This system aligns with the International Classification of Diseases –Australian Modification (ICD10-AM).

http://www.safeworkaustralia.gov.au/sites/SWA/AboutSafeWorkAustralia/WhatWeDo/Publications/Documents/2 07/TypeOfOccurrenceClassificationSystem(TOOCS)3rdEditionRevision1.pdf

OPGGS(S)R. Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009. Select Legislative Instrument 2009 No. 382 as amended and made under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006*. Commonwealth of Australia.

OPGGS(E)R. Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009. Statutory Rules 1999 No. 228 as amended and made under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006.* Commonwealth of Australia.



Privacy Notice

NOPSEMA collects your personal information for the purpose of investigating accidents, dangerous occurrences and environmental incidents under the Offshore Petroleum and Greenhouse Gas Storage Act 2006.

NOPSEMA will not use or disclose your personal information for any other purpose without your consent, unless it is required or authorised by law, or relates to NOPSEMA's enforcement activities. Your personal information may be disclosed to the following organisations, entities or individuals:

- individuals who make a request under the Freedom of Information Act 1982
- the Australian National Audit Office and other privately-appointed auditors
- other law enforcement bodies (for example, the police or the Coroner)
- NOPSEMA's legal advisors.

NOPSEMA may occasionally be required to disclose information to overseas recipients in order to discharge its functions or exercise its powers, or to perform its necessary business activities.

Information about how you can access, or seek correction to, your personal information is contained in NOPSEMA's APP Privacy Policy at <u>www.nopsema.gov.au/privacy</u>. If you have an enquiry or a complaint about your privacy, please contact NOPSEMA's Privacy Contact Officer on (08) 6188 8700 or by email at: <u>privacy@nopsema.gov.au</u>.

Appendix A.3 myOSH Near Miss Dropped Object Incident Report 002761

Near Miss - Dropped Obj Heat Medium Bypass Va	ect - Valve shroud from lve	Incident Report Accountable: s 22 irrelevant
Composed: 13/02/2017	Created by: s 22 irrelevant material	Status: Open Report Document Number: 002761
Hierarchy		
+ WA Northern Endeavo Western Australia	our/Operations/WA Northern Endeavour/Upstream	m Production Solutions -
Incident Details		
Reporting Person:	s 22 irrelevant material	
Person Involved:	12/02/2017	
Occur Date:	12/02/2017 16:15	
Affiliation:	Employee	
Brief Description: Third Party Involved?	Near Miss - Dropped Object - Valve shroud from No	Heat Medium Bypass Valve
Define Incident		
Classification:	Near Miss	
Actual Incident Category:	1 - Negligible	
Potential/Worst Case	5 - Major	
External Reportable	No	
Specifics		
Description of Occurence: In which part of the workplace did the incident	Gas Turbine Waste Heat Recovery Unit	
What was worker doing at the time?	Walking past on designated walkway	
What happened unexpectedly?	Corroded valve shroud dislodged and fell approx	imately 8 meters to deck level
Details		
Details:	Cold water was being introduced into waste heat system after conducting repair to the Heat mediu introduced into a hot system caused flash off of s the pipework. This caused the corroded heat med dislodge and fall 8m to the deck below. The invol area to investigate the noise coming from the was shroud landed 1.5m from his position. See witnes object calculator. The valve shroud weighs 2.75k	recovery units to restart the m pipework leak. The cold water steam and subsequent vibration of dium bypass valve shroud to ved person was walking past the ste heat recovery unit when the ss statement, photos and dropped g
Immediate/Temporary Controls:	CCR and PS/MS/OIM/HSEC notified. Area made of area.	s safe, all personnel to keep clear
S	s 4/6 rope access technicians on site - remove	ed like valve shrouds in similar
Witnesses:	s 22 irrelevant material	Χ.
Statements		
Sequence of Events:	See attached investigation 5 why.xls for timeline	and sequence of events
Witness Statements:	See attached witness statement from CRO - s 22	irrelevant material
Investigation Report - M	TO Factors	

PERSONNEL FACTORS (M)

Basic Cause:		
Triggering Cause:		
Basic Cause:		
Triggering Cause:		
Basic Cause:		
Triggering Cause:		
Describe hazardous acts:		

TECHNICAL FACTORS (T)	
Basic Cause:	Inadequate Design & Specifications/Standards
Triggering Cause:	
	Lack of Functionality
Basic Cause:	
Triggering Cause:	
Basic Cause:	Inadequate Maintenance
Triggering Cause:	
	Lack of Strength
	Lack of Reliability
	Lack of Functionality
Describe hazardous	Facility taken over in an advanced state of corrosion, s 47G business had
conditions:	ceased corrosion maintenance campaigns as the facility was marked for
	decommissioning. Redundant and extensively corroded pipework remains insitu
	around the facility.

ORGANISATIONAL/OP. FACTORS (O)

Basic Cause: Triggering Cause: Basic Cause: Triggering Cause:	Inadequate Work Standards/Procedures
	Communication failure Inadequate Mangement of Change (MOC)
Basic Cause: Triggering Cause:	Inadequate resources
Describe hazardous acts & conditions:	Communication failure Inadequate Mangement of Change (MOC) Start up of WHRU was outside the normal conditions. Step back 5x5 did not foresee the effect of cold water entering a hot system and the extent of the vibration the steam hammer would cause.

Immediate Contributing Factors

Substandard Conditions Substandard Acts/Practices

Details:	Extensive corrosion left by <u>s 47G business</u> Repair solution to Heat Medium pipework - not suitable for the condition of the pipe ECR - change made on site, which necessitated start up under abnormal conditions.
Root Causes	
Job/System Factors	
Personal Factors	
Type of Contact	

Type of Contact Contact With

Details:

	Root cause: Corrosion of Redundant pipework, corrosion under insulation necessitating a repair and start up of equipment outside its procedure to accommodate extenuating repair circumstances.
Investigation Report	
Recommendations:	2017 Corrosion Management Campaign to focus on potential stored energy releases Communication between onshore and offshore with regards to engineering changes and suitability for site
Estimated Costs:	

Appendix A.4 myOSH Dropped Object Incident Report 002648

Dropped Object from Mez	zzanine to Process Deck	Incident Report
		Accountable:s 22 irrelevant materia Status: Closed (01/03/2017)
Composed: 08/10/2016	Created by: s 22 irrelevant material	Document Number: 002648
Hierarchy		
+ WA Northern Endeavo Australia	ur/Contractor/WA Northern Endeavour/Woodside	- Secondee - Western
Incident Details		
Reporting Person:	s 22 irrelevant material	
Person Involved:		
Date Reported:	08/10/2016	
Occur Date:	07/10/2016 02:00	
Affiliation:	Contractor Drapped Object from Mezzapine to Brasses Deck	
Third Party Involved?	No	
Define Incident		
Classification:	Near Miss	
Actual Incident Category:	1 - Negligible 2 - Minor	
Category:	2 - 1011101	
External Reportable	No	
Specifics		
Description of Occurence:		
In which part of the	Mezzanine Level near Debutaniser column on valv	e 37BL154 (Debutaniser
workplace did the incident	rundown)	
What was worker doing at	Normal operations	
the time?		
What happened	Operator made contact with valve handle which dis	lodged and handle fell 4.8m to
unexpectedly?	Process deck below	
Details		
Details:	Debutaniser rundown Valve 37BL154 - handle dislo	odged falling 4.8m to Process
	deck below. Valve handle weighed 1.4kg. Dropped	Object Calculator rated fall as
	Minor consequence. No personnel working beneat	n on Process deck at the time
Immediate/Temporary	and no damage to other equipment from the fall. Reported incident and valve handle recovered from	the area
Controls:	Reported incident and valve handle recovered non	i ine area.
Witnesses:		
Statements		
Sequence of Events:		
Witness Statements:		
Investigation Papart MT	IO Eactors]
Basic Cause:	(IVI)	
Triggering Cause:		
Basic Cause:		

Triggering Cause: Basic Cause: Triggering Cause: Basic Cause: Triggering Cause: Describe hazardous acts:

TECHNICAL FACTORS (T) Basic Cause: Triggering Cause: Basic Cause: Triggering Cause: Basic Cause:

Triggering Cause: Describe hazardous conditions:

ORGANISATIONAL/OP. FACTORS (O)

Basic Cause: Triggering Cause: Basic Cause: Triggering Cause: Basic Cause: Triggering Cause: Describe hazardous acts & conditions:

Immediate Contributing Factors

Substandard Conditions Substandard Acts/Practices

Details:	n				
Root Causes					
Job/System Factors Personal Factors Type of Contact Contact With					
Details:					
Investigation Report					

Recommendations: Estimated Costs:

Appendix B Dropped Object Calculator

Appendix B.1 Incident 002648



DROPS CALCULATOR

The DROPS Calculator provides a common benchmark in the classification of the potential consequences of a dropped object. One of a number of similar tools, the DROPS Calculator is endorsed by the DROPS Workgroup While other 'calculators' exist, they all follow the same principle – plotting the mass of a dropped object against the distance it falls to determine its possible consequences.

Considerations

•With light objects (<0.1kg) a key influencing factor is the effect of an object punching the skin and damaging tissue/organic functions. The calculator assumes a blunt object so is not compatible with broken glass, metal shards etc.</p>

The wearing of standard PPE, eg hard hat, safety boots and eye protection, is assumed in the calculator.

DROPS Calculator and other similar tools are guides only providing cursory indication of possible outcome - they are not an
 accurate prediction.

. In reality, even a small object failing from height can be lethal.

DROPS CALCULATOR

the distance it falls to determine its possible consequences.

In reality, even a small object falling from height can be lethal.

Considerations

The DROPS Calculator provides a common benchmark in the classification of the potential consequences of a dropped object. One of a number of similar tools, the DROPS Calculator is endorsed by the DROPS Workgroup While other 'calculators' exist, they all follow the same principle – plotting the mass of a dropped object against

With light objects (<0.1kg) a key influencing factor is the effect of an object punching the skin and damaging tissue organic functions. The calculator assumes a blunt object so is not compatible with broken glass, metal shards etc. •The wearing of standard PPE, eg hard hat, safety boots and eye protection, is assumed in the calculator.

DROPS Calculator and other similar tools are guides only providing cursory indication of possible outcome - they are not an

Appendix B.2 Incident 002761



A simple rule of thumb for potential dropped objects...

The heavier the object, the more severe the consequences, the further it falls, the more severe the consequences.









Appendix D Witness Statements

WITNESS ACCOUNT OF EVENT:

General Informa	tion			
Witness Name:	s 22 irrelevant mate		Date:	12 February 2017
Job Description:	MECHANICAL	FITTER	MyOSH Notification	
Production Unit	Northern Endea	vour	Facility	Northern Endeavour
Employer:	1 NE		Roster	3WEEK ON/3 WEEK OFF
Role in Event:	BYSTANDER		Days into Roster	18 DAYS
Activity During Event	WORKING CLO	OSE BY	Hours into Shift	10 HRS
Equipment or System	GAS TURBINE	WASTE HEA	T RECOVERY UNIT	S
Brief Description of the	Event	FALLING O	BJECT FROM 8M PI	LATFORM

Event:

Brief Description of Event:

I was gathering information regarding a faulty inlet valve on fire monitor 61-S-020B on the lower process deck (Stb side) and heard loud banging noises coming from the turbines WHRU (which is not normal).

I was on my way to investigate these noises when a large piece of metal debris and rod fell from the mezzanine deck above me, landing approximately 1metre away from me. I notified the CCR and my HESQ of these findings and incident.

Signed:^{s 22} irrelevant material s 22 irrelevant material

Date:12-2-2017.....

WITNESS ACCOUNT OF EVENT:

Witness Name: s 22 irrelevant material		Date:	13 February 2017
Job Description:	CRO	MyOSH Notification	
Production Unit	Northern Endeavour	Facility	Northern Endeavour
Employer:	Upstream PS	Roster	C Panel
Role in Event:	CRO	Days into Roster	12
Activity During Event	CRO	Hours into Shift	Start
Equipment or System	WHRU's		
Brief Description of the	Event		

Event:

Brief Description of Event:

1200 at the start of my shift heating medium system had been drained and belzona had been applied to holed pipe.

I was instructed to try to raise the temperature with the WHRU's without the circulation pumps to allow the belzona to cure prior to introducing pressure. I explained we would have problems without the circ pump.

At aprox 13:15 I opened valves XV171 & XV176 by-pass inlet valves and introduced heating medium to the system from the expansion tank. This caused an expansion tank LL trip both pressure and level. This had no affect on the system as it trips the by-pass to an open state.

Aprox 1600 the temp was increasing at the waste heat recovery units, and as the expansion tank level was healthy I opened XV170 & XV175 Main inlet to the WHRU's this caused another expansion tank LL trip both pressure and level, causing the lock out of main XV's on both WHRU opening the by pass XV's set the waste heat recovery units to heating and locked the vent valves closed leaving me with no control of the units. I applied a MOS to the LL trip and was still locked out. The report of stem hammer came through and the outside operator went to investigate. I then removed the MOS from the LSLL and placed the MOS on the PSLL This allowed control of the units allowing WHRU heating to be closed off and the vent to be opened.

WITNESS ACCOUNT OF EVENT:

As Above

s 22 irrelevant material

Signed: .

Date: 13/2/2017

.....