Helicopter Safety
Advisory Conference

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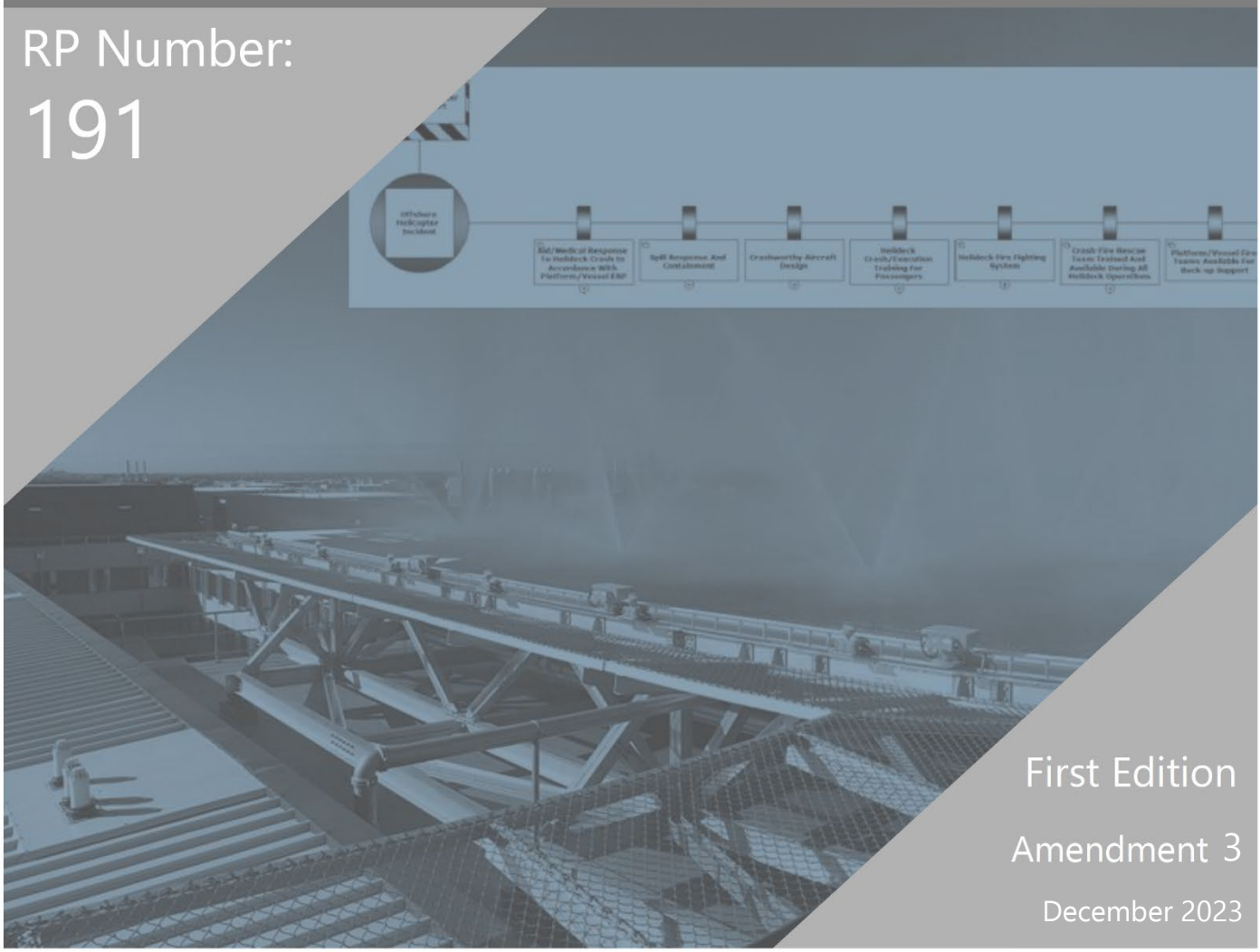
Offshore Helicopter Incident Bowtie

RP Number:
191



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1. THE BOW-TIE METHODOLOGY AND STRUCTURE

The Bow-Tie methodology is used for risk assessment, risk management, and most importantly risk communication. The method is designed to give a better overview of any situation in which risks are present; to help people understand the relationship between the risks of known hazards and organizational processes and procedures. The strength of the methodology lies in its simplicity.

1.1. General

Risk in Bow-Tie methodology demonstrates the relationship between Hazards, Top Events, Threats and Consequences. Controls are used to display what measures an organization has in place to control the identified hazard. Below is an explanation of symbols, terms and definitions used in the Helideck Incident Bowtie that was used as a basis for the Risk Analysis and Hazard Effects Management Process for Offshore Helideck Operations.

1.1.1. Hazard

Figure 1: Hazard

When we refer to hazards in relation to safety and health the most commonly used definition is 'A Hazard is a potential source of harm or adverse effect on (a) person(s) or (an) asset(s) or reduction of ability to perform a prescribed function'. Hazards can be present in the environment in which one must operate. For example, in the aviation industry, 'operating helicopters in adverse weather conditions' is considered a hazard. It needs to be managed because as long as it is under control, the release of the hazard resulting in adverse effect can be prevented or the risk is reduced to acceptable levels, and operations can continue safely.

1.1.2. Top Event

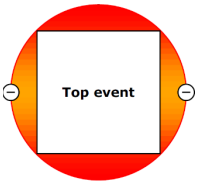


Figure 2: Top Event

As long as a hazard is controlled, it is in its desired state. For example, an aircraft free of discrepancies is in an airworthy state, but certain events can cause an unairworthy aircraft (hazard) to be released unintentionally. In the Bow-Tie methodology, such an event is called a Top Event. The Top Event is not yet catastrophic, but the dangerous characteristics of the Hazard are now in the open. For example, the unairworthy aircraft is now engaged in flight operations, which if not mitigated effectively, may result in more unwanted events (consequences). An aviation example of a Top Event is: 'aircraft un- intentionally deviates from normal in-flight parameters (aircraft upset)'

1.1.3. Threat

Figure 3: Threat

For each top event, there must be a direct cause that could cause the release of the Hazard. In the Bow-Tie methodology, such direct causes are referred to as "Threats." A threat is a possible direct cause that will potentially release the Hazard by producing a Top Event. For example, VFR flight operations within close proximity to adverse weather is a "Threat" to the Top Event 'Flight into Inadvertent Instrument Meteorological Conditions (IIMC)'. Each threat identified should have the ability to cause the "Top Event."

1.1.4. Consequence

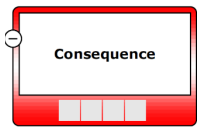


Figure 4: Consequence

When a Top Event has occurred, it can lead to certain consequences. A consequence is a potential event resulting from the release of the hazard which results directly in injury, loss, or damage. Consequences in the Bow-Tie method are unwanted events that an organization wants to avoid. For example, aircraft accidents, significant aircraft incidents, injuries or casualties are all events that should be avoided. A more specific aviation example for a 'Consequence' is 'Mid-Air collision resulting in multiple fatalities'.

1.1.5. Control/Barrier

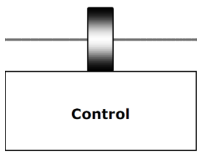


Figure 5: Control

Risk management is about minimizing the likelihood of the Hazard occurring and minimizing the impact of such occurrence, resulting in a lower risk level. This is done by placing barriers to prevent, or reducing the likelihood, of occurrence of certain events. A Control or Barrier can be any measure taken against risk or hazards in order to maintain a desired safe state. In the Bow-Tie method, there are proactive Cause Controls (on the left side of the Top Event) that prevent the Top Event from happening and reactive Outcome Controls (on the right side of the Top Event) that prevent the Top Event resulting into unwanted consequences, minimize the impact of the consequences or improves recovery from the Top Event.

1.1.6. Escalation Factor

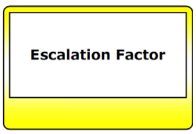
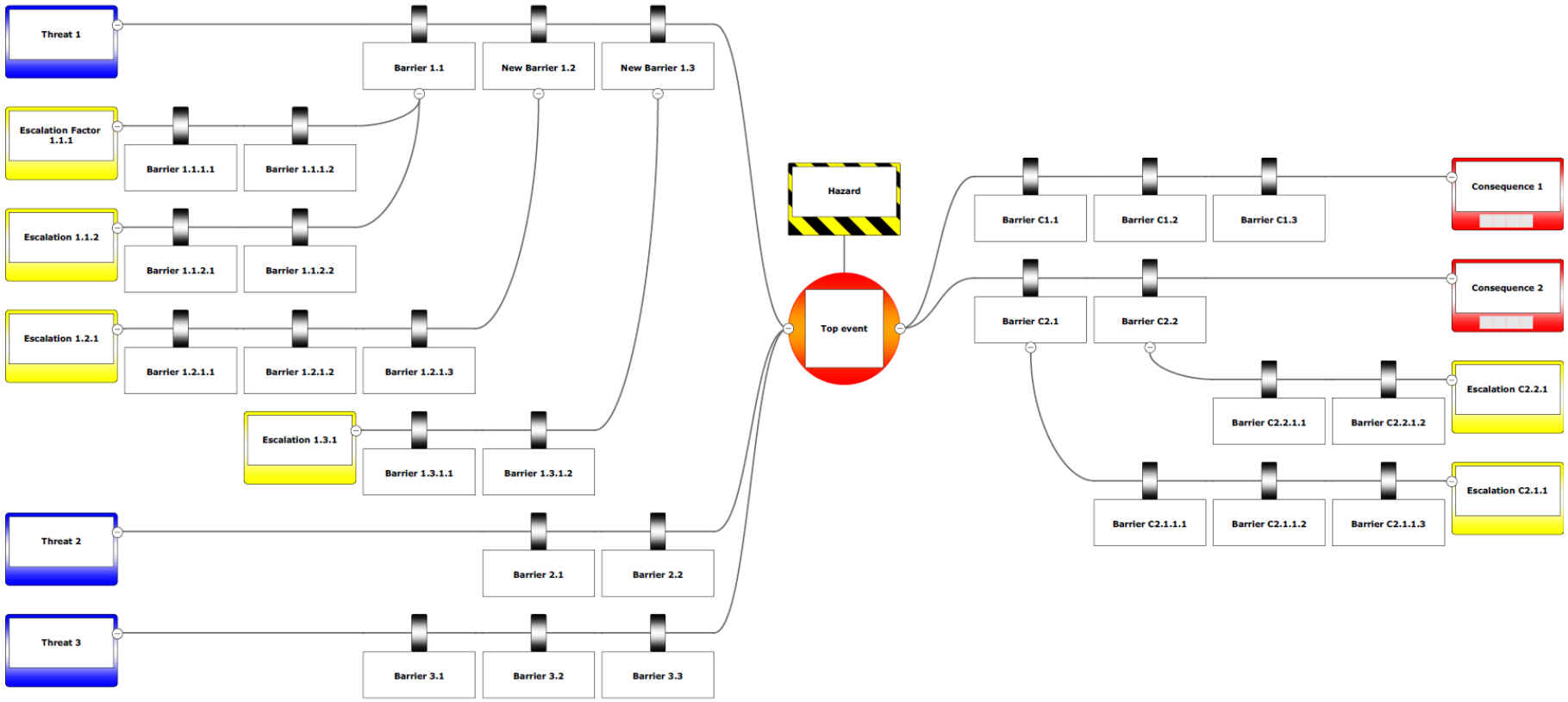


Figure 6: Escalation

In an ideal situation, Controls will stop Threats from causing the Top Event. However, many Controls are not 100 percent effective. There are conditions that may cause a Control to fail (ineffective) or become less effective. In the Bow-Tie method, these are called Escalation Factors. An Escalation Factor is a condition that leads to increased risk by defeating or reducing the effectiveness of a control. For example, the development and implementation of inadequate procedures, a failure to follow established procedures, poorly maintained equipment, etc. To prevent an Escalation Factor to degrade the associated Control additional Escalation Controls can be added between the escalation factor and the control it might affect (see *Control/Barrier* paragraph above).

1.1.7. ALARP

To be completely sure that there is no risk present, the hazard must be completely removed. However, since hazards are part of normal business, this is not always possible. Always expect that there are risks and try to do everything possible to keep the risks As Low As Reasonably Practicable (ALARP). For a risk to be ALARP, it should be demonstrated that the cost involved in monetary or operational terms in reducing the risk further would be grossly disproportionate to the benefit gained. What ALARP means is different for every organization as it depends on what risks an organization does or does not want to take and what an organization wants to spend monetarily, operationally or in time control measures.



Hazard	Hazard: What are the **hazards** in the environment we operate in?	Consequence	Consequence: What unwanted outcomes can arise from the top event?	Escalation Factor	Escalation (defeating) Factor: In what way could the control fail?
Top event	Top Event: What **occurs** when the control over the hazard is lost, and the hazard is released?	Control	Cause Control/Barrier (left side of Top Event): How can be stop the hazard from being released?	Control	Escalation Control/Barrier: How do we maintain the control, so it doesn't fail?
Threat	Threat: What can directly cause a loss of control of the hazard?	Control	Outcome Control/Barrier (right side of Top Event): How can we reduce the severity (or likelihood) of the potential outcome?		

Figure 7: Example Generic Bow-Tie Diagram

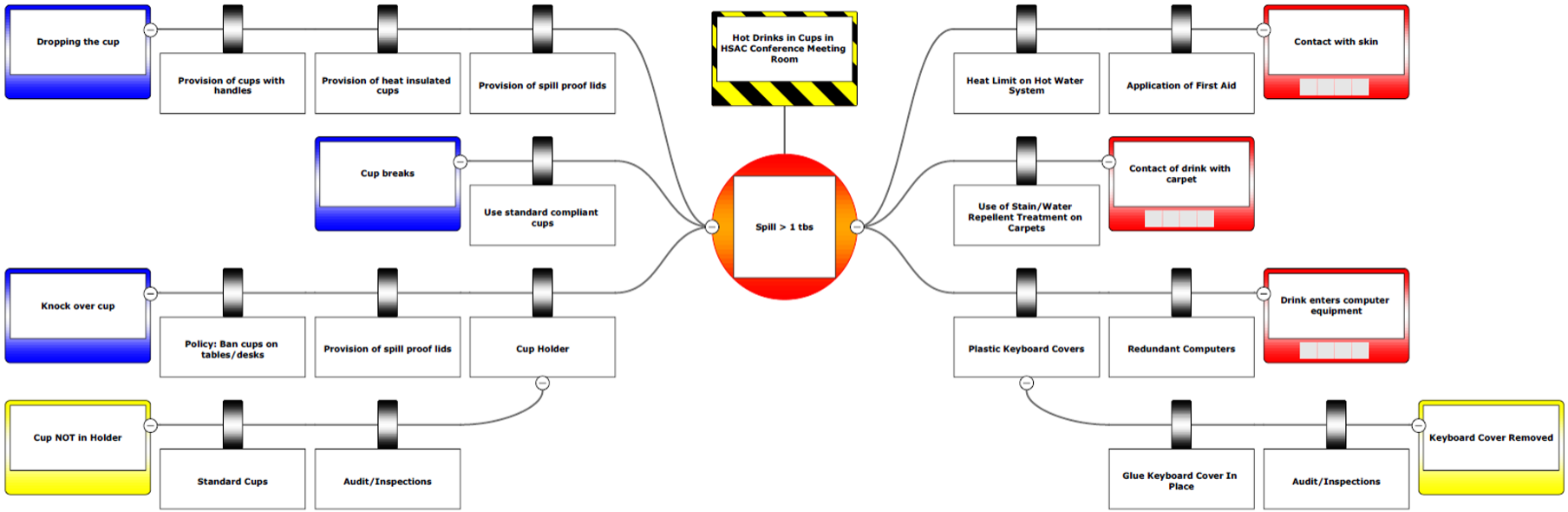


Figure 8: Example Practical Bow-Tie Diagram - Spill of Hot Drink in Meeting Room

2. MANAGING RISK

2.1. General

With the basic knowledge of the Bow-Tie methodology, this Recommended Practice focuses on the application of the Bow-Tie methodology to offshore helicopter operations. The key stakeholders in offshore helicopter operations are the Offshore Facility owners and the Air Operators operating to those facilities. The majority of helideck design and helideck management related controls will be applicable to facility owners; however, some might reside with air operators. The following paragraphs address the area of responsibility for offshore facility owners.

2.2. Facility Safety Management System and HSE/Safety Case

The facility Safety Management System (SMS) and HSE/Safety Case should address all aspects of helicopter operations on offshore installations, Mobile Offshore Drilling Units (MODU), and vessels. The HSE/Safety case should have the following elements:

a) Evidence to support that all helideck activities specific to the facility are adequately controlled and recorded within the management system.
b) Procedures developed to confirm that activities remain appropriate, are being properly implemented and remain in accordance with HSAC RP Numbers: 161 thru 164.
c) Responsibilities assigned and a custodian identified to ensure that all procedures associated with helideck operations are updated at prescribed intervals.

When addressing "all aspects of helicopter operations" the following should be considered:

a) Routine crew change and cargo flights.
b) Emergency flights such as MEDEVAC and platform evacuation.
c) Visits by Government and third-party helicopters with facility landing rights.
d) Specialized operations such as helicopter hoist operations (HHO), external load delivery and pickup, and flare-tip replacement.

The facility HSE/Safety Case, HOM (HOM), and Emergency Response Plan (ERP) should be fully linked to ensure all aviation risks are adequately addressed and mitigated to as low as reasonably practical (ALARP).

2.3. Controls and Recovery Measures

Offshore facilities should as a minimum identify and implement Controls and Recovery Measures for an Offshore Helicopter Incident Top Event, as shown in paragraphs below, in the facility HSE/Safety Case or equivalent document.

2.4. Manual of Permitted Operations

Offshore facilities shall address asset specific conditions and activities posing aviation hazards in the facility HSE/Safety Case and define and control them through the facility Manual of Permitted Operations (MOPO), or equivalent document.

The following conditions posing aviation hazards shall be included in the facility MOPO or equivalent document:

a) External influences section:
    i. Adverse weather including ceiling, visibility, wind, convective activity (lightning, wind shear, hail), and icing; and
    ii. Adverse sea states prohibiting rescue of ditching survivors.

b) Concurrent/simultaneous operations section:
    i. Combined operations of vessels in the helideck OFDS zone creating obstacles, turbulence, or hot/cold gas emission.
    ii. Crane – helicopter operations.
    iii. Multi-helicopter operations on offshore helidecks (multiple helicopters on a single helideck).
    iv. Perforating operations.
    v. Presence of Hydrogen Sulfide (H_2S) gas (where applicable).
    vi. Turbulence and hot exhaust gas emissions from facility structure, flaring, and machinery.
    vii. Flammable cold gas venting.
    viii. Emergency hydrocarbon gas release.
    ix. Vessels and MODUs: Facility motion exceeding helicopter operating limits.
    x. Dynamic Positioning (DP) vessels: Adverse vessel movement during DP malfunction or drive off; and
    xi. Other conditions and activities posing aviation hazards determined through Hazard Analysis.

2.5. Safety Critical Equipment

Offshore facilities should identify asset specific Safety Critical Equipment/Elements (SCE) serving as critical Controls and Recovery Measures for aviation hazards, and mitigate their degraded function through the facility MOPO, or equivalent document.

Facilities should analyze the equipment/elements in Chapter 3 'Offshore Helicopter Incident Bow-Tie' for designation as Safety Critical Equipment/Elements and inclusion in the facility MOPO impaired systems section, as well as the facility maintenance management system to ensure the completion of required preventive maintenance and periodic inspections.

2.6. Safety Critical Roles

Offshore facilities should identify asset specific Safety Critical Roles (SCR) responsible for maintaining critical Controls and Recovery Measures for aviation hazards and establish minimum staffing levels for these roles documented in the facility HSE/Safety Case, or equivalent document. These Safety Critical Roles are an amalgamation of identified Safety Critical Tasks that assure the effectiveness of critical Controls and Recovery Measures.

Facilities should analyze and assess the following roles for designation as Safety Critical Roles:

a) Offshore Installation Manager/Vessel Master.
b) Helideck Landing Officers (HLOs).
c) Facility/vessel Emergency Response Team and/or Fire Team.
d) Radio Operator.

e) Offshore logistics coordinators or equivalent conducting weighing and aircraft manifesting.
f) Store-men/Materials Controllers responsible for the shipment and acceptance of dangerous goods by air; and
g) Other roles determined through Hazard Analysis.

2.7. Normally Unattended Installations (NUIs)

Parent facility HSE/Safety Cases covering NUIs should include each NUI for mandatory requirements mentioned above, or they should be addressed separately for each NUI.

Facility HSE/Safety Cases and their MOPO (or equivalent document) should document how individual exposure to NUI helicopter operations is managed to ALARP.

Facilities should ensure the Controls and Recovery Measures for an Offshore Helicopter Incident Top Event, as shown in paragraphs below, are fully explored for each NUI, taking into account its distance from the parent facility and the ability to adequately respond with existing personnel and equipment at the NUI prior to external support arriving.

Consider the following items for NUIs:

a) The maximum number of personnel to be transported by helicopter to a NUI.
b) The minimum number and type of Safety Critical personnel required to safely handle the helicopter on the NUI helideck.
c) If a helicopter can safely "bus-stop" passengers to two or more NUIs in a single round trip flight, exposing some passengers to multiple NUI landings; (Where a parent facility has more than one NUI)
d) Passenger movement on undersized helidecks; (Where the NUI helideck is less than 1.0D for the helicopter)
e) Allowance for night NUI helicopter operations and specific Controls and Recovery Measures for these operations.
f) Extended personnel presence on NUIs (beyond 24 hours) requiring routine support and crew change flights; and
g) Personnel health hazards and flight hazards posed by bird guano accumulation.

3. OFFSHORE HELICOPTER INCIDENT BOW-TIE

Offshore Helideck Departures and Arrivals are inherently complicated with inherent risk and therefore Offshore Helicopter Transport is considered a Hazard. For every safe flight this hazard is contained. The small landing surfaces, environmental conditions and vicinity to objects and obstacles associated with the offshore facility and its helideck layout result in many threats and consequences that might release the Offshore Helicopter Air Transport Hazard into an Offshore Helicopter Incident top event. The complexity of offshore helicopter operations makes the depiction of all associated threats and consequences in a single Bowtie very comprehensive. Without pretending to be complete, the HSAC Helidecks Committee has developed a Bowtie that incorporates the major threats and consequences associated with offshore helicopter operations to a helideck. *Figure 9* is a depiction of all the threats and consequences taken into consideration for this Offshore Helicopter Incident Bowtie.

If all associated controls, escalation factors and escalation controls were to be shown for this Bow-Tie, the printed version would cover the space of a single wall of the average office; therefore the rolled-up version shown in

paragraphs 3.1 and 3.2 only depicts threats and consequences and is split up in the following pages in a specific section for each separate threat-line and consequence-line, where for each specific line the controls, escalation factors and escalation controls are shown in a tabular depiction. Each cause control, outcome control and escalation control were reviewed, and the associated Safety Critical Tasks (SCTs) and Safety Critical Equipment (SCE) were identified. In the continued development and improvement of HSAC RP Nbr: 163 these SCTs and SCE are used to:

a) create the roles and responsibilities for key positions by combining safety critical tasks (SCTs) into safety critical roles.
b) provide a list of SCEs needed to safely perform offshore helideck operations. For SCE the inspection and maintenance requirements to keep it fully operational are also provided in the Helideck HSAC RP Series[1].

The tabular representation of controls, escalation factors and escalation controls in the pages hereafter provides a paragraph reference to important information related to the specified SCTs and SCE in an active HSAC Recommended Practice. Although the Bowtie was developed for manned facilities, a column is added to show if specific elements of the Bowtie are applicable to Normally Unmanned Installations (NUI) or not. If the threat is still applicable to a NUI alternative controls to prevent the threat from releasing the hazard might have to be developed.

For helideck operations on NUIs, an onboard HLO that travels with the helicopter and coordinates helideck operations and passenger control upon landing should be considered. In some cases, a certain group that visits NUIs on a regular basis could be HLO trained to mitigate some of the remaining risks that exist on NUIs compared to manned facilities with a competent helideck team.

Note 1: Cross reference paragraph numbers include, in brackets, the RP number, such as "[161] Par 3.16" which would refer to paragraph 3.16 in HSAC RP Nbr: 161.

Note 2: Where 'TBD' is mentioned in the representations in paragraphs 3.1 and 3.2 a cross reference to an active HSAC RP is not present, which could be a trigger for future development of further guidance to cover all aspects of the bow-tie represented in this RP. A purple background marked 'TBD' will result in an update in either RP 161, 162 or 163 in the future to assure every aspect of mitigation has a valid reference, where a blue background marked 'TBD' item will have to be compiled in a future amendment of HSAC RP 165. Completion of replacing the 'TBD' marked items with a link to applicable guidance material is anticipated to be completed by the HSAC Helideck Committee at the end of 2024, with publication in Amendment 4.

[1] The Helideck HSAC RP Series consists of the following Recommended Practices:
HSAC RP Nbr: 161 'New Build Helideck Design Guidelines'
HSAC RP Nbr: 162 'Legacy Helideck Design & Marking Guidelines'
HSAC RP Nbr: 163 'Inspection, Maintenance and Operations of Offshore Helidecks'
HSAC RP Nbr: 164 'Standardization of Helideck Information Plates'
HSAC RP Nbr: 165 'Offshore Helicopter Operations for Air Operators'
HSAC RP Nbr: 191 'Offshore Helicopter Incident Bowtie'

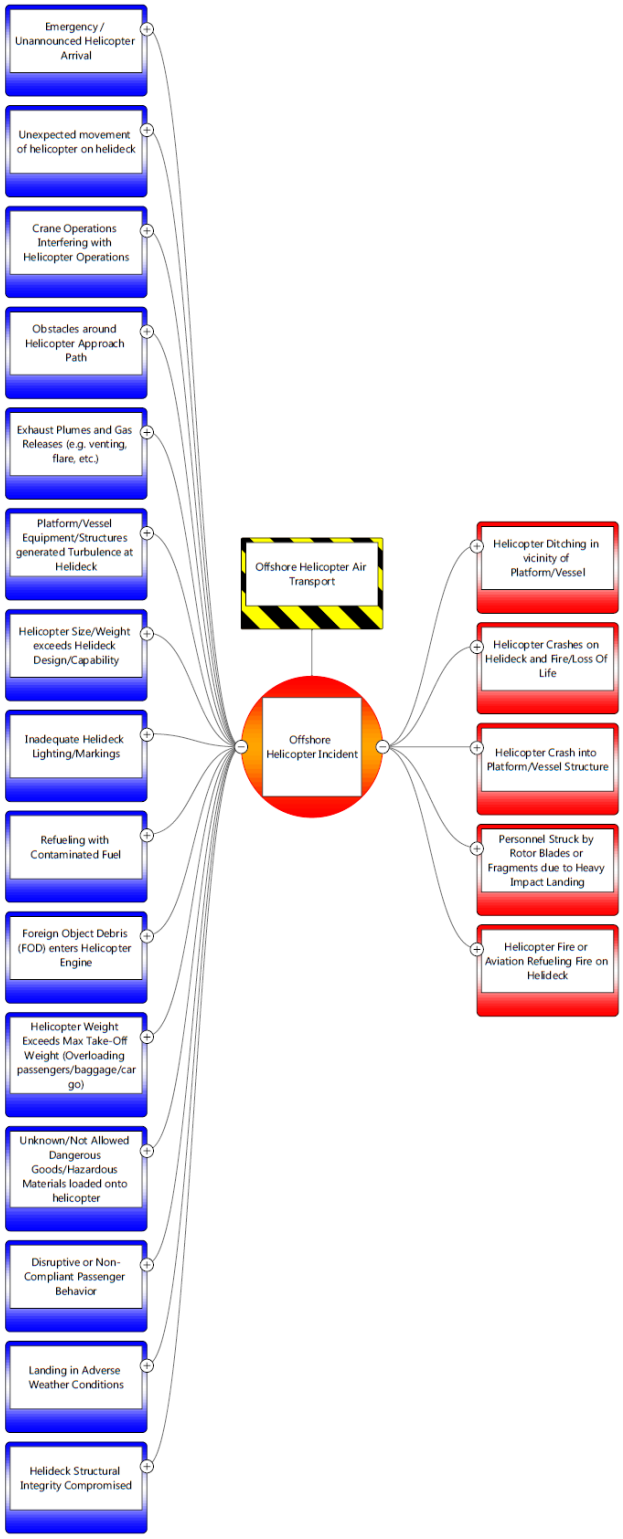


Figure 9: Offshore Helicopter Incident Bowtie

3.1. Threats

Each Control could have one or more Escalation Factors that could render the Control ineffective, to prevent this from happening, Escalation Controls are put in place. The Escalation Factors and Escalation Controls are NOT shown in the graphical depiction of the Bow-Tie Threat branch, but are shown in the table below using the following color coding (legend is repeated on each page in the header):

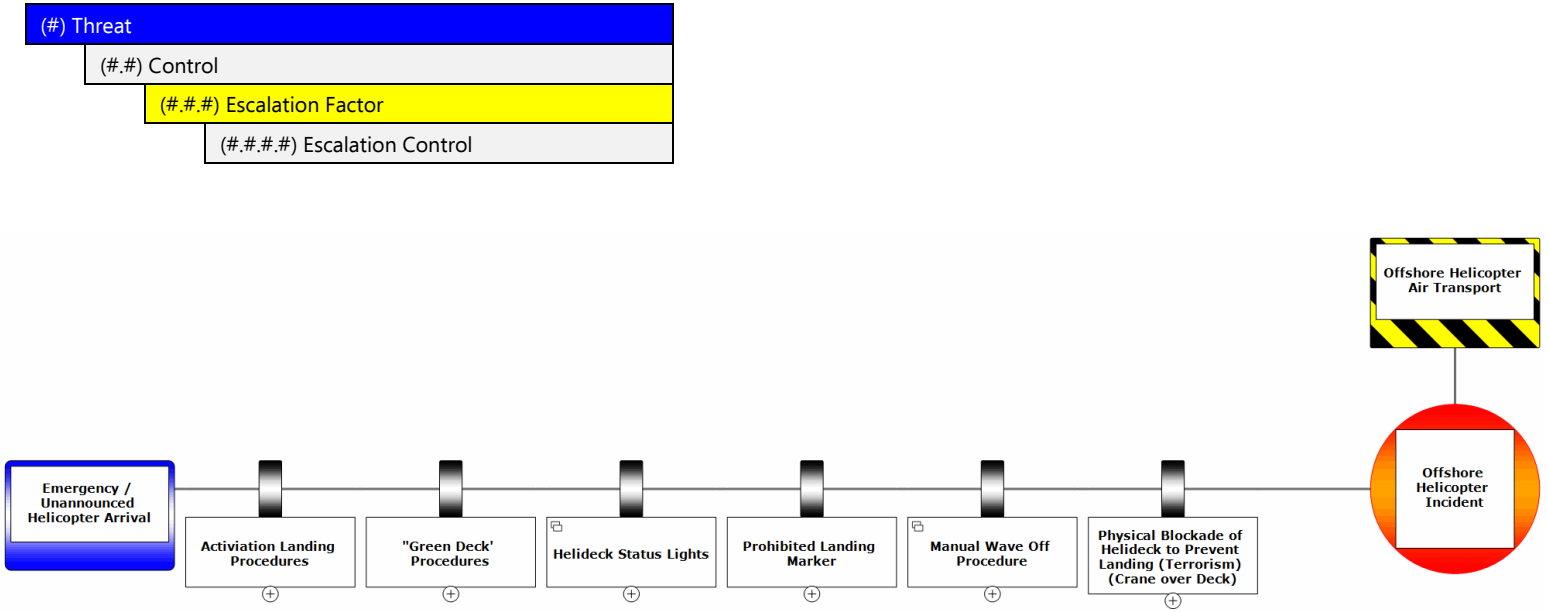


Figure 10: Threat - Emergency/Unannounced Helicopter Arrival

3.1.1. Emergency/Unannounced Helicopter Arrival

The threat of a non-scheduled/unplanned helicopter attempting to land on the facility's helideck. This could be a helicopter having an emergency looking for a landing surface, a helicopter attempting to land on the wrong deck, a governmental agency aircraft coming in for an unannounced inspection, a potential terrorist threat where a helicopter attempts to land on the offshore facility with bad intentions, etc.

				Safety Critical Equipment	Safety Critical Task	NUI
1	**Threat 1: Emergency / Unannounced Helicopter Arrival**					
	1.1	**Activation Landing Procedures**		**[163] Par 5.2.1, [163] Par 7.2, [163] Par 13.3. HOM**	**[163] Chapter 9**	**N/A**
		1.1.1	**Helideck Team Member Unavailable**			N/A
			1.1.1.1 Safety Critical Role Assignment by Leadership	HOM	[163] Ch 9	N/A
			1.1.1.2 Roster Redundancy (Multiple HLOs/HDAs on each shift/hitch)	HOM	[163] Par 9.1	N/A
			1.1.1.3 Helideck Team Assembly Procedures	HOM	[163] Par 9.3	N/A
			1.1.1.4 Helideck Manning Levels in HLO Manual	HOM	[163] Par 9.1	N/A
		1.1.2	**Landing Procedure not followed**			N/A
			1.1.2.1 Landing Procedures in HLO Manual	HOM	[163] Par 9.3	N/A
			1.1.2.2 Helideck Team Training	HOM	[163] Par 12.2	N/A
			1.1.2.3 Helideck Team Drills/Exercises	HOM	[163] Par 13.6	N/A
			1.1.2.4 Helideck Team Competency Assessments	HOM	[163] Par 12.2	N/A
			1.1.2.5 Annual Helideck Inspection	HOM	[163] Par 10.2, 11.4.4	✓
		1.1.3	**Platform/Vessel Unaware of Incoming Aircraft**			N/A
			1.1.3.1 Air Operator Phone Call Prior to Departure	[164] Air Operator's Ops Manual. [165] Par 11.2.2	[163] Par 7.7 [163] Par 8.18 [163] Appendix 7	N/A
			1.1.3.2 Air Operator Comms/Ops Center procedure to Call Platform/Vessel	[164] Air Operator's Ops Manual.	[165] Par 11.2.1	N/A
			1.1.3.3 Radio Calls - Radio Frequency Marked On Helideck	[161] Par 6.11, [162] Par 4.8, [163] Par 7.7, [164]. VHF Radio.	[163] Ch 9	N/A
			1.1.3.4 Federal Agency Alert (Rogue Aircraft)	HOM	CFR Title 14 Chapter I Subchapter F Part 99 SECURITY CONTROL OF AIR TRAFFIC	N/A
	1.2	**"Green Deck' Procedures**		**HOM, VHF Radio.**	**[165] Par 5.3**	**N/A**
		1.2.1	**Pilot ignores 20 min/ 5 min / Green Deck Calls**			N/A
			1.2.1.1 Standardized 'Green Deck' Procedures in HSAC RP 2016-03	[163] Appendix 1, HOM, VHF Radio.	[163] Par 9.3	N/A

	1.2.1.2	"Green Deck" Procedures part of Initial and Recurrent Pilot + HLO Training	HOM, Air Operator's Ops Manual.	[165] Par 20.1	N/A
	1.2.1.3	"Green Deck" Procedures part of Checklists used during Flight	Air Operator's Ops Manual.	[165] Par 5.3	N/A
	1.2.1.4	LOSA/Check Flight Audits adherence to procedure	Air Operator's SMS Manual.	[165] Par 6.3	N/A
	1.2.1.5	Simulator Rides include verification of adherence to procedure	Air Operator's Training Manual.	[165] Par 20.2	N/A
1.2.2	**Communication Failure (Pilot/Helicopter)**				N/A
	1.2.2.1	Helicopter Preventive Maintenance Schedule and MEL	Air Operators General Maintenance Manual.	CFR Title 14 Chapter I Subchapter G Part 135 Subpart J § 135.425 Maintenance, preventive maintenance, and alteration programs, and CFR Title 14 Chapter I Subchapter G Part 135 Subpart C § 135.179 Inoperable instruments and equipment.	N/A
	1.2.2.2	Helicopter Equipment Fit including Multiple Air band Radios/Marine Band/Sat Phone	Air Band (VHF and Marine Band) Radios, Sat Phone.	[165] Par 4.1	N/A
	1.2.2.3	Helicopter Operator Comms/Ops Center Relay Procedure	VHF Radio.	[165) Par 11.2	N/A
	1.2.2.4	HSAC RP 2016-03 Light Signal Procedures	[163] Par 9.9 HOM, Signal Light.	[163] Par 9.9	N/A
1.2.3	**Communication Failure (Platform/Vessel/HLO)**				N/A
	1.2.3.1	Daily Comms Checks	[163] Appendix 1. HOM, VHF Radio.	[163] Appendix 3 Attachment 1 Par 4.1 & 4.2	N/A
	1.2.3.2	Back-up Communications Systems	[161] Chapter 11, [163] Par 7.7 HOM, Back-up VHF Radio.	[163] Appendix 3 Attachment 1 Par 4.1 & 4.2	N/A
	1.2.3.3	Manned Radio Room During Helicopter Operations window	[163] Par 7.7. HOM, VHF Radio in Radio Room.	[163] Par 7.7	N/A
	1.2.3.4	Hand Signals	HOM	[163] Par 9.9	N/A
	1.2.3.5	HSAC RP 2016-03 Light Signal Procedures	[163] Par 9.9 HOM, Signal Light.	[163] Par 9.9	N/A

1.3	**Helideck Status Lights**		**[161] Par 7.5, [162] Par 5.5, [163] Par 7.5 Helideck Status Lights.**	**[163] Appendix 1 [163] Appendix 3 Attachment 1 Par 3.1**	✓
	1.3.1	**Status Not Changed**			✓
		1.3.1.1 Ability For Pilot To Challenge By Radio	Helideck Status Lights, VHF Radio.	[165] Par 5.3	N/A
		1.3.1.2 HLO Pre-Landing Checklist	HOM	[163] Par 9.3	N/A
		1.3.1.3 HSAC RP 2016-03 Light Signal Procedures	[163] Par 9.9 HOM, Signal Light.	[163] Par 9.9	N/A
	1.3.2	**Equipment Malfunction**			✓
		1.3.2.1 Industry Standard Procedures for Helideck Status Lights	[163] Appendix 1. HOM, Helideck Status Lights.	[165] Par 5.4	✓
		1.3.2.2 Routine Inspection and Maintenance	[163] Appendix 1 . HOM, Helideck Status Lights.	[163] Appendix 1	✓
		1.3.2.3 HLO Daily Serviceability Check	HOM, Helideck Status Lights.	[163] Appendix 3 Attachment 1 Par 3.1	N/A
		1.3.2.4 Spare Light (Bulbs) Available	[163] Appendix 3 Attachment 1 Par 3.1. Spare Light Bulbs.	[163] Appendix 3 Attachment 1 Par 3.1	N/A
		1.3.2.5 HSAC RP 2016-03 Light Signal Procedures	[163] Par 9.9 HOM, Signal Light.	[163] Par 9.9	N/A
	1.3.3	**Electrical Failure**			✓
		1.3.3.1 Routine Inspection and Maintenance	[161] Par 7, [162] Par 5.5. HOM, Helideck Status Lights.	[163] Appendix 3 Attachment 1 Par 3.1	✓
		1.3.3.2 Status Light Connected to Emergency Back-up Generator or UPS	[161] Par 7.7, [162] Par 5.7. HOM, Helideck Status Lights, Back-up Generator, UPS.	N/A	✓
		1.3.3.3 HSAC RP 2016-03 Light Signal Procedures	[163] Par 9.9 HOM, Signal Light.	[163] Par 9.9	N/A
	1.3.4	**Pilot Not Aware Of Lights**			✓
		1.3.4.1 Industry Standard Procedures for Helideck Status Lights	[163] Appendix 1. HOM, Helicopter Operator's Ops Manual.	[165] Par 5.4	✓
		1.3.4.2 Initial and Recurrent Pilot Training	Helicopter Operator's Training Manual.	[165] Par 20.1	✓

		1.3.4.3	Standardized Helideck Information Plates to include Status Lights Availability	[164] HIPs.	N/A	✓
		1.3.4.4	NOTAM System	NOTAM System	[163] Par 8.19	✓
		1.3.4.5	HSAC RP 2016-03 Light Signal Procedures	[163] Par 9.9 HOM, Signal Light.	[163] Par 9.9	N/A
1.4	**Prohibited Landing Marker**			**[163] Par 8.8 Prohibited Landing Marker.**	**[163] Par 8.8 [163] Appendix 1 [163] Appendix 3 Attachment 1 Par 5.2 [163] Appendix 3 Attachment 3 Par 7 [163] Appendix 3 Attachment 4**	✓
	1.4.1	**Marker Missing / Unawareness**				✓
		1.4.1.1	Marker Stored in HLO Locker	[163] Appendix 1. Prohibited Landing Marker.	[163] Appendix 3 Attachment 1 Par 5.2	N/A
		1.4.1.2	Helideck Team Training	HOM	[163] Par 12.2	N/A
		1.4.1.3	Annual Exercise to Roll-out Marker	Prohibited Landing Marker, HOM	[163] Par 13.6	N/A
		1.4.1.4	Annual Helideck Inspection	HOM	[163] Par 10.2.4 , 11.4.4	✓
	1.4.2	**Pilot ignores Marker**				✓
		1.4.2.1	Initial/Recurrent Pilot Training	Prohibited Landing Marker,	[165] Par 20.1	✓
		1.4.2.2	Air Operator OPS Manual Reference for 'Closed' Helidecks	Helicopter Operator's Training Manual.	[165] Par 12.1	N/A
		1.4.2.3	HLO Communication	HOM	[163] Par 7.7.3.4	N/A
		1.4.2.4	NOTAM System	NOTAM System	[163] Par 8.19	✓
		1.4.2.5	HSAC RP 2016-03 Light Signal Procedures	[163] Par 9.9 HOM, Signal Light.	[163] Par 9.9	N/A
	1.4.3	**Marker Improperly Secured**				✓
		1.4.3.1	Helideck Team Training	Prohibited Landing Marker, HOM	[163] Par 12.2	N/A
		1.4.3.2	Annual Exercise to Roll-out Marker	Prohibited Landing Marker, HOM	[163] Par 13.6	N/A
		1.4.3.3	Procedures in HLO Manual	[163] Appendix 3 Attachment 1 Par 5.1. HOM	[163] Par 8.8.1	✓
		1.4.3.4	Annual Helideck Inspection	HOM	[163] Par 11.4.4	N/A

1.5	**Manual Wave Off Procedure (**HSAC RP 2016-03 Light Signal Procedures)		**[163] Par 9.9 HOM, Signal Light.**	**[163] Par 9.9**	**N/A**
	1.5.1	**Pilot Not Aware of Wave Off Signals**			N/A
	1.5.1.1	Initial/Recurrent Pilot Training	Helicopter Operator's Training Manual.	[165] Par 20.1	N/A
	1.5.1.2	Air Operator OPS Manual Reference for 'Manual Wave Off'	Helicopter Operator's Ops Manual.	[165] Par 12.4	N/A
	1.5.1.3	NOTAM System	NOTAM System	[163] Par 8.19	N/A
	1.5.1.4	HSAC RP 2016-03 Light Signal Procedures	[163] Par 9.9 HOM, Signal Light.	[163] Par 9.9	N/A
	1.5.1.5	Hand Signals	HOM	[163] Par 9.9	N/A
	1.5.2	**HLO Does Not Initiate Manual Wave-Off**			N/A
	1.5.2.1	Helideck Team Training	HOM	[163] Par 12.2	N/A
	1.5.2.2	HSAC RP 2016-03 Light Signal Procedures	[163] Par 9.9 HOM, Signal Light.	[163] Par 9.9	N/A
	1.5.2.3	Manual Wave Off Periodically Exercised	HOM	[165] Par 20.1 [163] Par 9.9.2	N/A
	1.5.2.4	Hand Signals	HOM	[163] Par 9.9	N/A
1.6	**Physical blockade of helideck by crane over deck or other means to prevent landing of a rogue aircraft due to the associated threat of terrorism or other upon notification.**		**Crane or other Blockade Equipment, HOM**	**[165] Par 12.2**	**N/A**
	1.6.1	**Crane Operator Unaware of Incoming Flight**			N/A
	1.6.1.1	HLO Cross Check	HOM, Radio or PA.	[163] Par 8.10	N/A
	1.6.1.2	Daily Flight Schedule Briefing	HOM	[163] Par 9.1.1	N/A
	1.6.1.3	Platform PA Announcement of Incoming Flights	HOM, PA.	[163] Par 8.10.1	N/A
	1.6.2	**Communications Failure (Crane Operator - HLO)**			N/A
	1.6.2.1	Portable Comms Check	[161] Chapter 11, [163] Par 7.7. HOM, VHF Radios /w headsets	[163] Par 9.3	N/A
	1.6.2.2	Crane Operations Warning Light	HSAC RP 89-1, [163] Appendix 1. Crane Operating Lights, HOM	[163] Par 8.10	N/A

	1.6.2.3	Helideck Status Light Activated when Crane not in Cradle	[161] Par 7.5, [162] Par 5.5, [163] Appendix 1. Helideck Status Lights.	[163] Par 7.5	N/A
	1.6.2.4	Crane Operations Procedures in HLO Manual	HOM	[163] Par 8.10	N/A
	1.6.2.5	Platform PA Announcements	HOM, PA.	[163] Par 13.5.12	N/A
	1.6.2.6	Hand Signals	HOM	[163] Par 9.9	N/A
1.6.3	**Crane Not Working**				N/A
	1.6.3.1	Inspection / Maintenance Schedule	Facility Maintenance Program	[163] Par 8.10	N/A
	1.6.3.2	Alternative way to physically block helideck when needed	HOM, ERP, Crane	[163] Par 13.5.12	N/A
1.6.4	**Crane Operator Unavailable**				N/A
	1.6.4.1	Assigned Crane Operators Available 24/7	HOM	[163] Par 8.10	N/A
	1.6.4.2	Alternative way to physically block helideck when needed	[165] Par 12.2 HOM, ERP	[165] Par 12.2 [163] Par 13.5.12	N/A

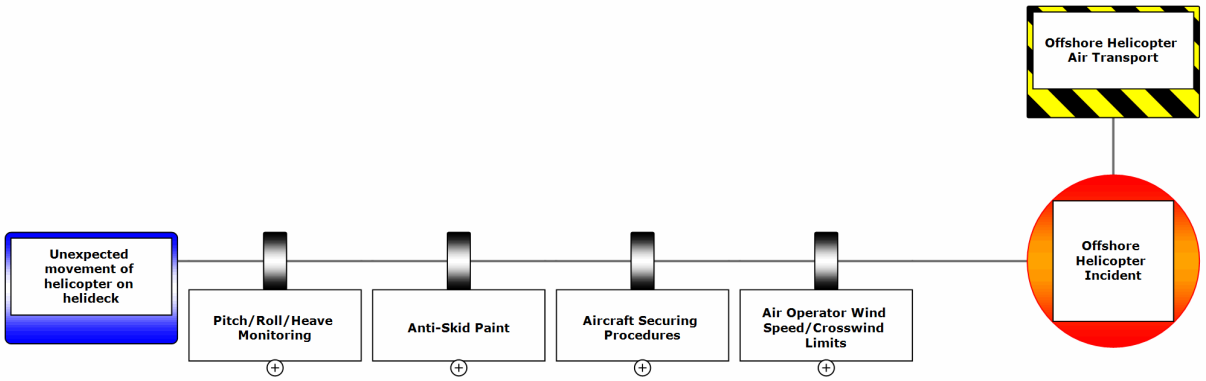


Figure 11: Threat - Unexpected movement of helicopter on helideck

3.1.2. Unexpected movement of helicopter on helideck

The threat of unexpected helicopter movement on the helideck due to environmental conditions (wind, pitch/roll/heave, helideck surface issues). This excludes pilot control input problems (airmanship or knocking a control when exiting/entering the aircraft) or helicopter mechanical issues as they are mainly outside the helideck owner's purview.

				Safety Critical Equipment	Safety Critical Task	NUI
2	**Unexpected movement of helicopter on helideck**					
	2.1	**Pitch/Roll/Heave Monitoring**		**[161] Par 9.3, Helideck Monitoring System (HMS)**	**[163] Par 8.16**	**N/A**
		2.1.1	**Equipment Malfunction**			N/A
			2.1.1.1 Routine Inspection and Maintenance	**HMS, HOM, Facility Maintenance Program.**	[163] Par 8.16.5	N/A
			2.1.1.2 Redundant Systems	HOM	[163] Par 8.16.5	N/A
			2.1.1.3 NOTAM System	NOTAM System	[163] Par 8.19	N/A
		2.1.2	**Electrical Failure**			N/A
			2.1.2.1 System is connected to Emergency Generator / UPS	[161] Par 7.7, [162] Par 5.7, [163] Par 7.5 Emergency Generator, UPS, HMS.	[163] Par 7.7	N/A

	2.1.2.2	Routine Inspection and Maintenance	[161] Par 7, [162] Par 5.7, [163] Par 7.5 Facility Maintenance Program.	[163] Appendix 3 Attachment 1 Par 3.5	N/A
2.1.3	**Lack of Communication whilst Helicopter is Manned**				N/A
	2.1.3.1	Back-up Comms Systems	[163] Par 7.7 Back-up Radio(s).	N/A	N/A
	2.1.3.2	Manned Radio Room During Helicopter Ops Window	[163] Par 7.7 HOM, VHF Radio in Radio Room.	[163] Par 9.3	N/A
	2.1.3.3	Hand Signals	HOM	[163] Par 9.9	N/A
	2.1.3.4	Helideck Status Lights	[161] Par 7.5, [162] Par 5.7. HOM, Helideck Status Lights, Back-up Generator, UPS.	[163] Appendix 1 [163] Appendix 3 Attachment 1 Par 3.1	N/A
	2.1.3.5	HSAC RP 2016-03 Light Signal Procedures	[163] Par 9.9 HOM, Signal Light.	[163] Par 9.9	N/A
2.1.4	**P/R/H Limits of Air Operator Different from Platform/HMS Setup**				N/A
	2.1.4.1	Agreement on P/R/H Limits in Use	HMS, HOM	[165] Par 21.3.1	N/A
	2.1.4.2	Programmed Agreed P/R/H Limits in Helideck Monitoring System	[161] Par 9.3. HMS	[163] Par 8.16	N/A
	2.1.4.3	HLO Announcement of P/R/H in 20 min and 5 min Calls	HOM, VHF Radio.	[165] Par 5.2.3	N/A
	2.1.4.4	Pilot To Cancel Landing and Return To Base	Helicopter Operator's Ops Manual.	[165] Par 5.5	N/A
2.2	**Anti-Skid Paint**		**[161] Par 5.5, [162] Par 3.3. Helideck Paint Program.**	**[163] Appendix 1**	✓
2.2.1	**Degradation of friction**				✓
	2.2.1.1	Annual Friction Test	[161] Par 5.5. Friction Test Equipment or Contracted Third Party Program, HOM, Facility Maintenance Program.	[163] Appendix 1	✓
	2.2.1.2	Potential to Install Helideck Landing Net	[163] Par 7.3.2. Helideck Landing Net, HOM	[163] Par 7.3.2 [163] Par 9.12 [163] Par 10.3 [163] Appendix 1 [163] Appendix 3 Attachment 1 Par 1.5 Note 2 & 1.6	✓

	2.2.1.3	Visual Inspection and Intervention when Required	HOM	[163] Appendix 1 [163] Appendix 3 Attachment 1 Par 1.5 Note 2 & 1.6	✓
2.2.2	**Inadequate Maintenance**				✓
	2.2.2.1	Painting Procedure	[161] 5.5, [162] 3.3. Helideck Paint Program, Facility Maintenance Program.	[163] Par 7.3.1	✓
	2.2.2.2	Daily Check By HLO	HOM	[163] Appendix 3 Attachment 1 Par 1.3	N/A
2.3	**Aircraft Securing Procedures**		**Helicopter Operator's Ops Manual.**	**[165] Par 12.4**	✓
2.3.1	**Procedure not followed**				✓
	2.3.1.1	HLO Training	HOM	[163] Par 12.2.4.k.	N/A
	2.3.1.2	Pilot Training	Helicopter Operator's Training Manual.	[165] Par 20.1	✓
	2.3.1.3	Cross check Pilot/HLO	HOM, Helicopter Operator's Ops Manual.	[165] Par 5.2.2	N/A
	2.3.1.4	Securing Procedures in Air Operator's Ops Manual	Helicopter Operator's Ops Manual.	[165] Par 12.5	✓
	2.3.1.5	Securing Procedures in HLO Manual	HOM	[163] Par 163 7.2.1.a)12.	N/A
	2.3.1.6	HLO Competency Assessment	HOM	[163] Par 12.2	N/A
	2.3.1.7	Annual Helideck Inspection	HOM	[163] Par 11.4.4 [163] Appendix 3 Attachment 4	✓
2.3.2	**Tiedown Equipment not Available**				✓
	2.3.2.1	Tiedown equipment available at offshore facility	HOM [163] Appendix 3 Attachment 3 Par 2.5	[163] Par 7.2.1	N/A
	2.3.2.2	Tiedown equipment on-board helicopter	Helicopter Operator's General Operations Manual	Helicopter Operator's General Operations Manual	✓

2.4	**Air Operator Wind Speed/Crosswind Limits**		**[161] Chapter 9. HOM, Helicopter Operator's Ops Manual.**	**[165] Par 21.3.2**	✓
	2.4.1	**Pilot Unaware of Wind Speed/Cross Wind Limitations**			✓
		2.4.1.1 Enhanced Operational Controls (EOCs) in Place	Helicopter Operator's Ops Manual.	[165] Par 21.3.3	✓
		2.4.1.2 Use of 'Official' Weather Information (AWOS/ASOS/Weather Observer)	[161] Chapter 9. HOM, Helicopter Operator's Ops Manual, AWOS/ASOS.	[161] Chapter 9, [163] Par 7.6.1, 7.6.3., 7.6.4, 12.6 and Appendix 7, [165] Par 21	✓
		2.4.1.3 HLO Procedure to Provide Weather Information during 5-minute call	HOM	[165] Par 21, [163] Table 21	N/A
		2.4.1.4 Helideck Status Lights	[161] 7.5, [162] 5.5, [163] Par 7.5 HOM, Helideck Status Lights, Back-up Generator, UPS.	[163] Appendix 1 [163] Appendix 3 Attachment 1 Par 3.1	✓
	2.4.2	**(Un)Intentional Exceedance of (Cross)Wind Limitations**			✓
		2.4.2.1 Prevention of Helicopter Repositioning Above Certain Wind speeds	[163] Par 7.3.7 HOM, Helicopter Operator's Ops Manual.	[165] Par 21.3.2	✓
		2.4.2.2 Calibrated Weather Equipment	[161] Chapter 9, Weather Equipment, Facility Maintenance Program, HOM	[163] Appendix 7	✓
		2.4.2.3 HLO Using Handheld Anemometer	[163] Appendix 1, HOM, Handheld Anemometer.	[163] Appendix 3 Attachment 1 Par 2.5	N/A
		2.4.2.4 Temporary Closing Procedures of Helideck Based on Wind Exceedances (MOPO)	HOM, MOPO, Helideck Status Lights, Prohibited Landing Marker, NOTAM System.	[163] Par 8.8	N/A

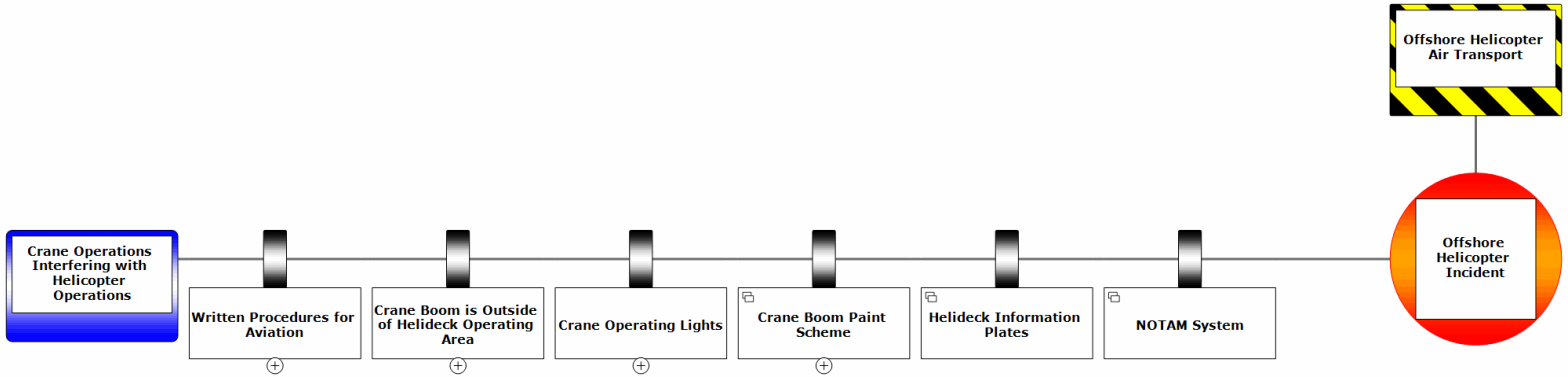


Figure 12: Threat - Crane Operations Interfering with Helicopter Operations

3.1.3. Crane Operations Interfering with Helicopter Operations

The threat of a facility crane interfering with the Take-off and Landing Surface or overall helicopter operations. For example: infringement of the Obstacle Free Sector

				Safety Critical Equipment	Safety Critical Task	NUI
3	**Crane Operations Interfering with Helicopter Operations**					
	3.1	**Written Procedures for Aviation**		**HOM**	**[163] Par 5.2**	**N/A**
		3.1.1	**Procedure Not Followed**			N/A
			3.1.1.1 Helideck Team Training	HOM	[163] Par 12.2	N/A
			3.1.1.2 HLO Competency Assessment	HOM	[163] Par 12.2	N/A
			3.1.1.3 Helideck Team Exercises	HOM	[163] Par 13.6	N/A
			3.1.1.4 Annual Helideck Inspection	HOM	[163] Par 11.4.4 [163] Appendix 3 Attachment 4	N/A
		3.1.2	**Crane Operator Still In Crane Cab**			N/A
			3.1.2.1 Platform / Vessel PA Announcements	HOM, PA System.	[163] Par 13.5.12	N/A
			3.1.2.2 HLO Verification Crane Operator is outside cab before giving Green Deck	HOM, Radios, PA System.	[163] Par 9.1.1.1, [165] Par 5.3	N/A

3.2	**Crane Boom is Outside of Helideck Operating Area**		**HOM**	**[163] Par 9.1.1.1, [165] Par 5.1 [165] Par 5.2.1 [165] Par 5.2.6**	**N/A**
	3.2.1	**Crane Boom Infringes Helideck Operating Area**			N/A
		3.2.1.1 HLO Visual Verification of Crane Boom Cradled (or Safe Position) prior to giving Green Deck	HOM	[163] Par 9.1.1.1, [165] Par 5.3	N/A
		3.2.1.2 Helideck Status Lights	[161] 7.5, [162] 5.5, [163] Par 7.5 HOM, Helideck Status Lights, Back-up Generator, UPS.	[163] Appendix 1 [163] Appendix 3 Attachment 1 Par 3.1	N/A
		3.2.1.3 Crane Boom Paint Scheme	Crane Boom Paint Scheme.	[163] Par 8.10	N/A
		3.2.1.4 Pilot Opportunity to Challenge	Helicopter Operator's Ops Manual.	[165] Par 5.2.1	N/A
		3.2.1.5 Air Operator to perform a 360-degree orbit prior to landing	Helicopter Operator's Ops Manual.	[165] Par 5.1	N/A
3.3	**Crane Operating Lights**		**HSAC RP 89-1, [163] Par 8.10, Crane Operating Lights.**	**[163] Appendix 1 [163] Appendix 3 Attachment 1 Par 4.4**	**N/A**
	3.3.1	**Equipment Failure**			N/A
		3.3.1.1 Daily Check	HOM	[163] Appendix 3 Attachment 2 – Item 7	N/A
		3.3.1.2 Routine Inspections and Maintenance	HOM, Facility Maintenance Program.	[163] Appendix 1 [163] Appendix 3 Attachment 1 Par 4.4	N/A
		3.3.1.3 NOTAM System	NOTAM System	[163] Par 8.19	N/A
		3.3.1.4 HLO-Pilot Radio Communication	[161] Chapter 11, [163] Par 7.7. HOM, VHF Radio(s) /w headset(s).	[163] Appendix 1 [163] Appendix 3 Attachment 1 Par 4	N/A
		3.3.1.5 Crane Cradled before giving Green Deck	HOM	[163] Par 8.10	N/A
	3.3.2	**Electrical Failure**			N/A
		3.3.2.1 Crane on Emergency Back-up Generator	[161] 7.7, [162] 5.7, Back-up Generator.	[161] Par 7.7 [163] Par 7.5.1.6	N/A
		3.3.2.2 Routine Inspections and Maintenance	HOM, Facility Maintenance Program.	[163] Appendix 1	N/A

		3.3.2.3	HLO-Pilot Radio Communication	[161] Chapter 11, [163] Par 7.7. HOM, VHF Radio(s) /w headset(s).	[163] Appendix 1 [163] Appendix 3 Attachment 1 Par 4	N/A
		3.3.2.4	Air Operator to perform a 360-degree orbit prior to landing	Helicopter Operator's Ops Manual.	[165] Par 5.1	N/A
3.4	**Crane Boom Paint Scheme**			**Crane Boom Paint Scheme.**	**[163] Par 8.10**	**N/A**
	3.4.1	**Degradation of Paint Scheme**				N/A
		3.4.1.1	Routine Inspections and Maintenance	HOM, Facility Maintenance Program.	[163] Appendix 3 Attachment 4 Par 4.9.2	N/A
		3.4.1.2	Crane Boom Lighting	HSAC RP 89-1, [163] Appendix 1, Crane Boom Lighting.	[163] Par 8.10	N/A
		3.4.1.3	Annual Helideck Inspection	HOM, Facility Maintenance Program.	[163] Par 11.4.4 [163] Appendix 3 Attachment 4	N/A
3.5	**Helideck Information Plates**			**[164]. Helideck Info Plate (HIP).**	[165] Par 8.1.2	**N/A**
3.6	**NOTAM System**			**NOTAM System**	[163] Par 8.19	**N/A**

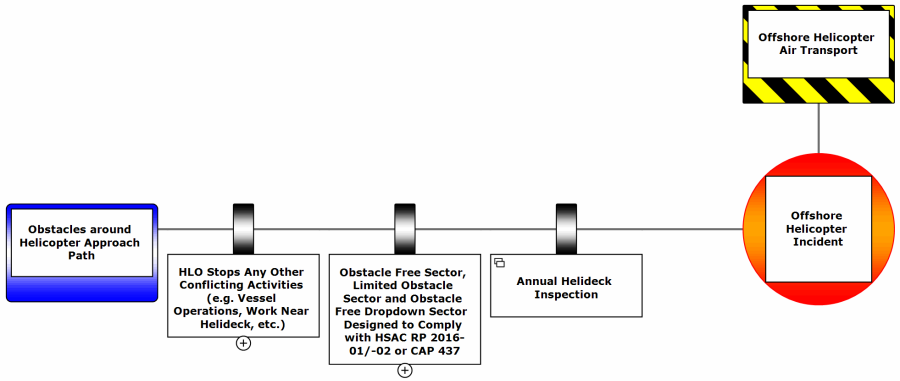


Figure 13: Threat - Obstacles Around Helicopter Approach Path

3.1.4. Obstacles Around Helicopter Approach Path

The threat of temporary or permanent obstacles infringing on either the Obstacle Free Sector (OFS), Limited Obstacle Sector (LOS) or Obstacle Free Dropdown Sector (OFDS). Examples are Supply boats in the OFDS, helideck access point handrails not folded down, fire monitors extending into the OFS and equipment like antennas mounted in a location infringing on either of the sectors.

				Safety Critical Equipment	Safety Critical Task	NUI
4	**Obstacles around Helicopter Approach Path**					
	4.1	**HLO Stops Any Other Conflicting Activities (e.g., Vessel Operations, Work Near Helideck, etc.)**		**HOM**	**[163] Par 9.1**	**N/A**
		4.1.1	**Failure to Follow Procedures**			N/A
			4.1.1.1 Helideck Team Training	HOM	[163] Par 12.2	N/A
			4.1.1.2 HLO Manual	HOM	[163] Par 5.2	N/A
			4.1.1.3 HLO Competency Assessment	HOM	[163] Par 12.2	N/A
			4.1.1.4 Helideck Team Exercises/Drills	HOM	[163] Par 13.6	N/A
			4.1.1.5 Annual Helideck Inspection	HOM, Facility Maintenance Program.	[163] Par 11.4.4 [163] Appendix 3 Attachment 4	N/A
			4.1.1.6 Pilot Decision to Return to Base	Helicopter Operator's Ops Manual.	[165] Par 5.5	N/A

	4.1.2	**Lack of Warning During Approach**				✓
		4.1.2.1	Pilot Notification during 20-min and 5-min call	[163] Appendix 1. Helicopter Operator's Ops Manual, VHF Radio(s) /w headset(s).	[165] Par 5.2.6	N/A
		4.1.2.2	Air Operator to perform a 360-degree orbit prior to landing	Helicopter Operator's Ops Manual.	[165] Par 5.1	✓
		4.1.2.3	Helideck Status Lights	[161] 7.5, [162] 5.5, [163] Par 7.5. HOM, Helideck Status Lights, Back-up Generator, UPS.	[163] Appendix 1 [163] Appendix 3 Attachment 1 Par 3.1	✓
		4.1.2.4	HSAC RP 2016-03 Light Signal Procedures	[163] Par 9.9 HOM, Signal Light.	[163] Par 9.9	N/A
		4.1.2.5	Pilot Decision to Return to Base	Helicopter Operator's Ops Manual.	[165] Par 5.5	✓
4.2	**Obstacle Free Sector, Limited Obstacle Sector and Obstacle Free Dropdown Sector Designed to Comply with HSAC RP 161, HSAC RP 162 or CAP 437**			**[161] Par 4.3.5, [162] Chapter 4. Helideck Paint Scheme.**	**[163] Par 7.3.5 [163] Par 10.2.7**	✓
	4.2.1	**Infringement by a Foreign Obstacle**				✓
		4.2.1.1	Marking of Obstacle and Potentially A Non-Nose Section on TDPM	[161] 6.9 & 6.10. Helideck Paint Scheme.	N/A	✓
		4.2.1.2	Captured as limitation or restriction in Helideck Information Plate for (semi-) Permanent Infringements	[163] 5.2, [164]. HIP.	[163] Par 5.2	✓
		4.2.1.3	HLO Pre-Landing Checklist	HOM	[163] Par 9.3	N/A
		4.2.1.4	Pilot Notification during 20-min and 5-min call	[163] Appendix 1. Helicopter Operator's Ops Manual.	[165] Par 5.2.6	N/A
		4.2.1.5	NOTAM Issued	NOTAM System	[163] Par 8.19	✓
		4.2.1.6	Helideck Status Lights	[161] 7.5, [162] 5.5, [163] Par 7.5. HOM, Helideck Status Lights, Back-up Generator, UPS.	[163] Appendix 1 [163] Appendix 3 Attachment 1 Par 3.1	✓
		4.2.1.7	HSAC RP 2016-03 Light Signal Procedures	[163] Par 9.9 HOM, Signal Light.	[163] Par 9.9	N/A
		4.2.1.8	Pilot Decision to Return to Base	Helicopter Operator's Ops Manual.	[165] Par 5.5	✓

4.3	**Annual Helideck Inspection**	**HOM, Facility Maintenance Program.**	**[163] Par 11.4.4 [163] Appendix 3 Attachment 4**	✓

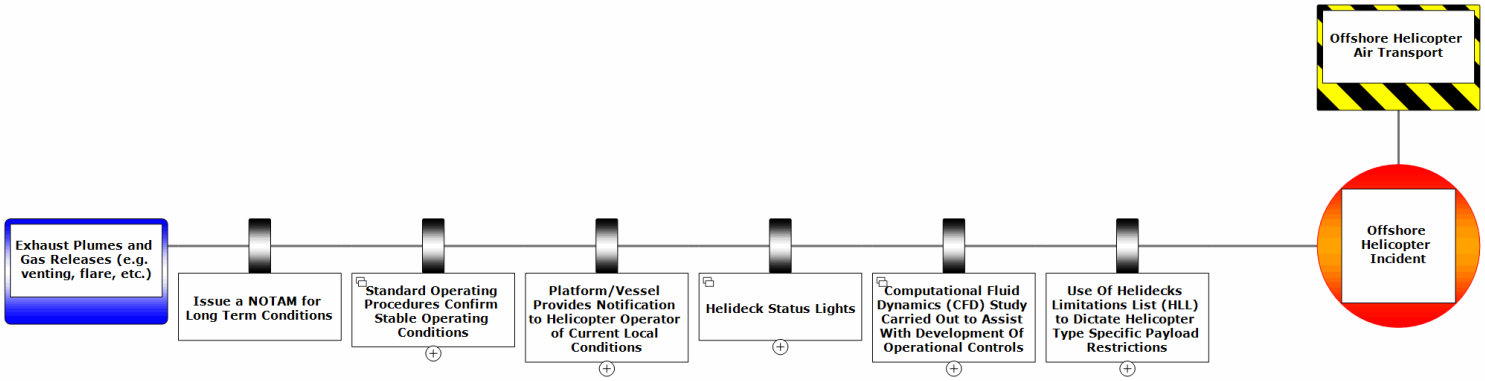


Figure 14: Threat - Exhaust Plumes and Gas Releases

3.1.5. Exhaust Plumes and Gas Releases

The threat of exhaust plumes or other gas releases impacting helideck operations that could result in a helicopter incident. Exhaust plumes or other heat sources like HVAC vents can result in an area of significantly increased ambient temperature. If this area covers the approach/take-off path of a helicopter, the warmer air will negatively impact the helicopter's performance characteristics. In addition, hydrocarbon gas releases provide a dual threat. The helicopters engines could act as ignitor for the gas plume and create a disaster for the platform. On the other hand, the intake of the gas plume into the engines will influence the fuel/air mixture and could either result in instant engine damage or a flame-out.

				Safety Critical Equipment	Safety Critical Task	NUI
5	**Exhaust Plumes and Gas Releases (e.g., venting, flare, etc.)**					
	5.1	**Issue a NOTAM for Long Term Conditions**		**NOTAM System.**	**[163] Par 8.19**	✓
	5.2	**Standard Operating Procedures Confirm Stable Operating Conditions**		**HOM**	**[163] Par 8.7 thru 8.19 [163] Par 10.2.6**	✓
		5.2.1	**Procedure not followed**			✓
			5.2.1.1 Onsite Supervisor to Communicate with HLO if process onboard Platform/Vessel becomes Unstable	HOM, Radio(s), PA System, Platform Alarms.	[163] Par 8.13	N/A
			5.2.1.2 Helideck Team Training	HOM	[163] Par 12.2	N/A
			5.2.1.3 HLO Competency Assessment	HOM	[163] Par 12.2	N/A

		5.2.1.4	Automatically Triggered Helideck Status Lights	[161] 7.5, [162] 5.5, [163] Par 7.5. HOM, Helideck Status Lights, Back-up Generator, UPS.	[163] Appendix 1 [163] Appendix 3 Attachment 1 Par 3.1	✓
5.3	**Platform/Vessel Provides Notification to Helicopter Operator of Current Local Conditions**			**NOTAM System, VHF Radio(s), HOM**	**[163] Par 8.13**	✓
	5.3.1	**Communications Equipment Failure**				✓
		5.3.1.1	Daily Comms Check	[163] Appendix 1. HOM, VHF Radio(s) /w headset(s).	[163] Appendix 3 Attachment 1 Par 4.1 & 4.2	N/A
		5.3.1.2	Comms System is Connected to Emergency Back-up Generator / UPS	[161] 7.7, [162] 5.7, [163] Par 7.5. VHF Radio, Backup Generator, UPS.	[163] Par 7.7 , [165] Par 11.2.2	N/A
		5.3.1.3	Routine Inspections and Maintenance	HOM, Facility Maintenance Program	[163] Appendix 1	✓
	5.3.2	**HLO Unaware of Hydrocarbon (or other type) Release**				N/A
		5.3.2.1	Fire & Gas Leak/Vent Detection	[161] 4.7, [161] 13.1, [162] Chapter 9. Helideck Status Lights, VHF Radio(s) /w headset(s), Platform Alarms.	[163] Par 7.3.7	N/A
		5.3.2.2	Automatically Triggered Helideck Status Lights	[161] 7.5 [162] 5.5 [163] Par 7.5 HOM, Helideck Status Lights, Back-up Generator, UPS.	[163] Appendix 1 [163] Appendix 3 Attachment 1 Par 3.1	✓
		5.3.2.3	Platform/Vessel Alarm	Platform/Vessel Alarm.	[163] Par 12.2 [163] Par 13.5	N/A
		5.3.2.4	HLO To Verify No Leaks/Venting Prior to Providing Green Deck	HOM, Helideck Status Lights, VHF Radio(s) /w headset(s).	[163] Par 8.12, 8.13, 9.3, 9.5	N/A

5.4	**Helideck Status Lights**		**[161] 7.5, [162] 5.5, [163] Par 7.5. HOM, Helideck Status Lights, Back-up Generator, UPS.**	**[163] Appendix 1 [163] Appendix 3 Attachment 1 Par 3.1**	✓
	5.4.1	**Electrical Failure**			✓
		5.4.1.1 Routine Inspection and Maintenance	[161] 7.5, [162] 5.5, [163] Par 7.5. HOM, Helideck Status Lights, Back-up Generator, UPS.	[163] Appendix 1	✓
		5.4.1.2 Status Light Connected to Emergency Back-up Generator or UPS	[161] Par 7.7, [162] Par 5.7. HOM, Helideck Status Lights, Back-up Generator, UPS.	[163] Par 7.7	✓
		5.4.1.3 HSAC RP 2016-03 Light Signal Procedures	[163] Par 9.9 HOM, Signal Light.	[163] Par 9.9	N/A
	5.4.2	**Equipment Malfunction**			✓
		5.4.2.1 Routine Inspection and Maintenance	[161] 7.5, [162] 5.5, [163] Par 7.5. HOM, Helideck Status Lights, Back-up Generator, UPS.	[163] Appendix 1	✓
		5.4.2.2 HLO Daily Serviceability Check	HOM	[163] Appendix 3 Attachment 1 Par 3.1	N/A
		5.4.2.3 Spare Light (Bulbs) Available	[163] Appendix 3 Attachment 1 Par 3.1. Spare Light Bulbs.	[163] Appendix 3 Attachment 1 Par 3.1	N/A
		5.4.2.4 HSAC RP 2016-03 Light Signal Procedures	[163] Par 9.9 HOM, Signal Light.	[163] Par 9.9	N/A
	5.4.3	**Pilot Not Aware Of Lights**			✓
		5.4.3.1 Industry Standard Procedures for Helideck Status Lights	[163] Appendix 1. HOM, Helicopter Operator's Ops Manual.	[165] Par 12.3	✓
		5.4.3.2 Initial and Recurrent Pilot Training	Helicopter Operator's Training Manual.	[165] Par 20.1	✓
		5.4.3.3 Standardized Helideck Information Plates to include Status Lights	[164] HIPs.	N/A	✓
		5.4.3.4 NOTAM System	NOTAM System	[163] Par 8.19	✓
		5.4.3.5 HSAC RP 2016-03 Light Signal Procedures	[163] Par 9.9 HOM, Signal Light.	[163] Par 9.9	N/A

	5.4.4	**Status Not Changed**			N/A
		5.4.4.1	Ability For Pilot To Challenge By Radio	Helideck Status Lights, VHF Radio.	[165] Par 5.2.1	N/A
		5.4.4.2	HLO Pre-Landing Checklist	HOM	[163] Par 9.3	N/A
		5.4.4.3	HSAC RP 2016-03 Light Signal Procedures	[163] Par 9.9 HOM, Signal Light.	[163] Par 9.9	N/A
5.5	**Computational Fluid Dynamics (CFD) Study Carried Out to Assist With Development Of Operational Controls**			**[161] 4.3.5.6, 4.7.3, [162] Chapter 9. CFD Study Report.**	[165] Par 11.3, [165] Par 5.5	✓
	5.5.1	**No or Incorrect CFD Data Available**				✓
		5.5.1.1	Helideck Owner Requirement to perform CFD study for new design or modifications to legacy helidecks	[161] 4.3.5.6, 4.7.3, [162] Chapter 9. CFD Study Report.	[165] Par 5.5	✓
		5.5.1.2	Implement Helideck Limitations List (HLL) restrictions per Helicopter Type for each flight	Helideck Limitations List (HLL), HIP, HOM, NOTAM System.	[165] Par 11.3 TBD	✓
		5.5.1.3	100% No Landing and Return to Base Procedure for Hydrocarbon and H2S venting/leaking events	Helideck Limitations List (HLL), HIP, HOM, NOTAM System, Helicopter Operator's Ops Manual.	[165] Par 5.5	✓
	5.5.2	**Operational Control Information Not Shared With Air Operator**				✓
		5.5.2.1	Procedure to Inform Air Operator Any Time Turbulence, Heat Dispersion or Gas Releases Occur	HIP, HOM, NOTAM System, VHF Radio.	[163] Par 8.12, 8.13	✓
		5.5.2.2	HLO to Inform Pilot of Actual Turbulence, Heat Dispersion or Gas Release Events	HIP, HOM, NOTAM System, VHF Radio.	[163] Par 8.12, 8.13	N/A
		5.5.2.3	Automatic Trigger Helideck Status Lights	[161] 7.5 [162] 5.5 HOM, Helideck Status Lights, Back-up Generator, UPS.	[163] Appendix 1 [163] Appendix 3 Attachment 1 Par 3.1	✓
5.6	**Use Of Helidecks Limitations List (HLL) to Dictate Helicopter Type Specific Payload Restrictions**			**Helideck Limitations List (HLL), Helideck Info Plate (HIP), Helideck Operations Manual (HOM), NOTAM System.**	**[165] Par 11.3.1**	✓
	5.6.1	**Pilot/HLO Unaware of HLL Limits**				✓
		5.6.1.1	HLL Limits of Helideck in HLO Manual	Helideck Limitations List (HLL), HIP, HOM, NOTAM System.	[165] Par 11.3 TBD	N/A
		5.6.1.2	HLL Limits of Helideck in Helideck Information Plate	Helideck Limitations List (HLL), HIP, HOM, NOTAM System.	N/A	✓

5.6.1.3	NOTAM System	Helideck Limitations List (HLL), HIP, HOM, NOTAM System.	[163] Par 8.19	✓

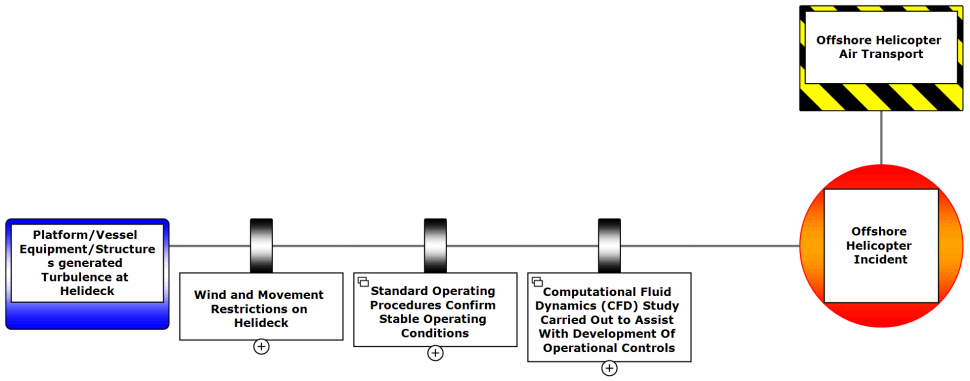


Figure 15: Threat - Platform/Vessel/Equipment/Structures generated Turbulence at Helideck

3.1.6. Platform/Vessel/Equipment/Structures generated Turbulence at Helideck

The threat of turbulence created by structures in certain wind conditions that negatively impact helicopter operations to/from/on the helideck.

				Safety Critical Equipment	Safety Critical Task	NUI
6	**Platform/Vessel Equipment/Structures generated Turbulence at Helideck**					
	6.1	**Wind and Movement Restrictions on Helideck**		**[161] 9.3. Weather Equipment, Helideck Monitoring System, HIP, HOM, Helideck Limitations List.**	**[163] Par 8.16**	✓
		6.1.1	**Equipment Malfunction**			✓
			6.1.1.1 Routine Inspections And Maintenance	HOM, Facility Maintenance Program.	[163] Appendix 1	✓
			6.1.1.2 HLO Has Handheld Anemometer for Wind Speed, Direction and Barometric Pressure as back-up	HOM, Facility Maintenance Program.	[163] Appendix 1 [163] Appendix 3 Attachment 1 Par 2.5	N/A
			6.1.1.3 Use of Nearby Platform/Vessel Weather Reporting Equipment Data	HOM	[161] Par 9.2	✓
	6.2	**Standard Operating Procedures Confirm Stable Operating Conditions**		**HOM**	**[163] Par 8.7 thru 8.19** **[163] Par 10.2.6**	✓
		6.2.1	**Procedure not followed**			✓
			6.2.1.1 Onsite Supervisor to Communicate with HLO if process onboard Platform/Vessel becomes Unstable	HOM, Radio(s), PA System, Platform Alarms.	[163] Par 8.13	N/A
			6.2.1.2 Helideck Team Training	HOM	[163] Par 12.2	N/A

		6.2.1.3	HLO Competency Assessment	HOM	[163] Par 12.2	N/A
		6.2.1.4	Automatically Triggered Helideck Status Lights	[161] Par 7.5, [162] Par 5.5, [163] Par 7.5. HOM, Helideck Status Lights, Back-up Generator, UPS.	[163] Appendix 1 [163] Appendix 3 Attachment 1 Par 3.1	✓
6.3	**Computational Fluid Dynamics (CFD) Study Carried Out to Assist With Development Of Operational Controls**			**[161] Par 4.3.5.6, 4.7.3, [162] Chapter 9. CFD Study Report.**	**TBD**	✓
	6.3.1	**No or Incorrect CFD Data Available**				✓
		6.3.1.1	Helideck Owner Requirement to perform CFD study for new design or modifications to legacy helidecks	[161] Par 4.3.5.6, 4.7.3, [162] Chapter 9. CFD Study Report.	TBD	✓
		6.3.1.2	Implement Helideck Limitations List (HLL) restrictions per Helicopter Type for each flight	Helideck Limitations List (HLL), HIP, HOM, NOTAM System.	[165] Par 11.3.1	✓
		6.3.1.3	100% No Landing and Return to Base Procedure for Hydrocarbon and H2S venting/leaking events	Helideck Limitations List (HLL), HIP, HOM, NOTAM System, Helicopter Operator's Ops Manual.	[165] Par 5.5	✓
	6.3.2	**Operational Control Information Not Shared With Air Operator**				✓
		6.3.2.1	Procedure to Inform Air Operator Any Time Turbulence, Heat Dispersion or Gas Releases Occur	HIP, HOM, NOTAM System, VHF Radio.	[163] Par 8.13	✓
		6.3.2.2	HLO to Inform Pilot of Actual Turbulence, Heat Dispersion or Gas Release Events	HIP, HOM, NOTAM System, VHF Radio.	[163] Par 8.13	N/A
		6.3.2.3	Automatic Trigger Helideck Status Lights	[161] Par 7.5 [162] Par 5.5 HOM, Helideck Status Lights, Back-up Generator, UPS.	[163] Appendix 1 [163] Appendix 3 Attachment 1 Par 3.1	✓

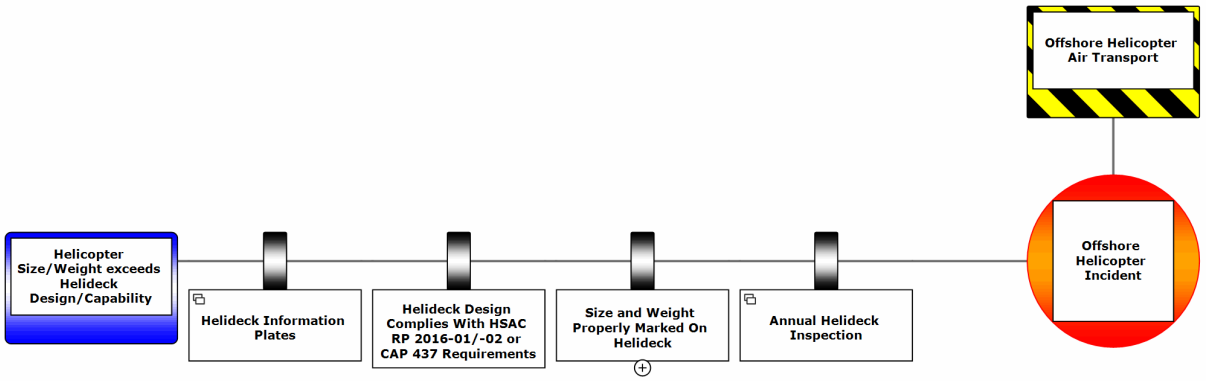


Figure 16: Threat - Helicopter Size/Weight exceeds Helideck Design/Capability

3.1.7. Helicopter Size/Weight exceeds Helideck Design/Capability

The threat of a mismatch of helicopter type and helideck capability where either the helicopter weight/size exceeds the helideck design, or the helideck design is not compliant with design standards to safely accommodate the helicopter type.

			Safety Critical Equipment	Safety Critical Task	NUI
7	**Helicopter Size/Weight exceeds Helideck Design/Capability**				
	7.1	**Helideck Information Plates**	**[164]. HOM**	**[163] Par 5.2 [163] Par 7.2.2, [163] Par 10.6.**	✓
	7.2	**Helideck Design Complies With HSAC RP 161, HSAC RP 163 or CAP 437 Requirements**	**[161], [162]. Helideck Commissioning Compliance Report, Annual Helideck Inspection.**	**[163] Par 11.4.4.**	✓
	7.3	**Size and Weight Properly Marked On Helideck**	**[161] Par 6.6, [162] Par 4.8 [163] Par 7.3.6 & 7.4. Helideck Markings Drawing, Helideck Operations Manual (HOM), Helideck Commissioning Compliance Report, Annual Helideck Inspection Report.**	**[163] Par 7.3.8, [163] Par 7.4.**	✓

	7.3.1	**Markings Degraded/Invisible**				✓
		7.3.1.1	Routine Inspections And Maintenance	HOM, Facility Maintenance Program.	[163] Par 7.3.8, [163] Appendix 1, [163] Appendix 3 Attachment 1 Par 1.2 and 1.3, [163] Appendix 3 Attachment 3 Par 3, [163] Appendix 3 Attachment 4.	✓
		7.3.1.2	HLO Checklist Item	HOM	[163] Par 7.4, [163] Par 10.3, [163] Appendix 1, [163] Appendix 3 Attachment 1 Par 1.2 and 1.3, [163] Appendix 3 Attachment 3 Par 3, [163] Appendix 3 Attachment 4.	N/A
		7.3.1.3	Annual Helideck Inspection	HOM, Annual Helideck Inspection Report	[163] Par 11.4.4, [163] Appendix 3 Attachment 4.	✓
		7.3.1.4	Pilot Reporting and Feedback	Helicopter Operator's Ops Manual	[165] Par 19.1	✓
7.4	**Annual Helideck Inspection**			**HOM, Annual Helideck Inspection Report**	**[163] Par 11.4.4, [163] Appendix 3 Attachment 4.**	✓

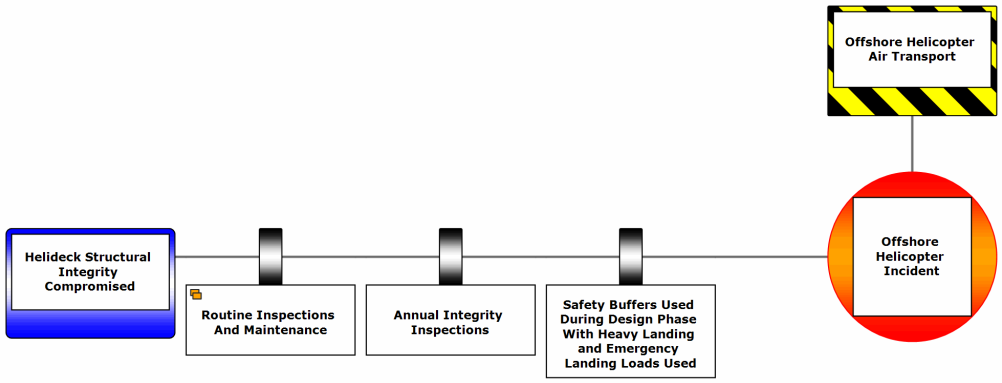


Figure 17: Threat - Helideck Structural Integrity Compromised

3.1.8. Helideck Structural Integrity Compromised

The threat of a helideck's structural integrity being degraded to a level where it does not meet the design requirement anymore and compromises safe helicopter operations to the helideck. Examples are corroded structural beams or holes in helideck landing surface or perimeter netting/safety shelf.

			Safety Critical Equipment	Safety Critical Task	NUI
8	**Helideck Structural Integrity Compromised**				
	8.1	**Routine Inspections And Maintenance**	**HOM, Facility Maintenance Program.**	**[163] Par 6.1, [163] Par 6.2, [163] Appendix 1, [163] Appendix 3 Attachment 1 Par 1.8.**	✓
	8.2	**Annual Integrity Inspections**	**HOM, Facility Maintenance Program, Structural Integrity Report.**	**[163] Par 6.1, [163] Par 6.2, [163] Appendix 1, [163] Appendix 3 Attachment 1 Par 1.8.**	✓
	8.3	**Safety Buffers Used During Design Phase With Heavy Landing and Emergency Landing Loads Used**	**[161] Par 5.2. HOM, Helideck Commissioning Compliance Report.**	**N/A**	✓

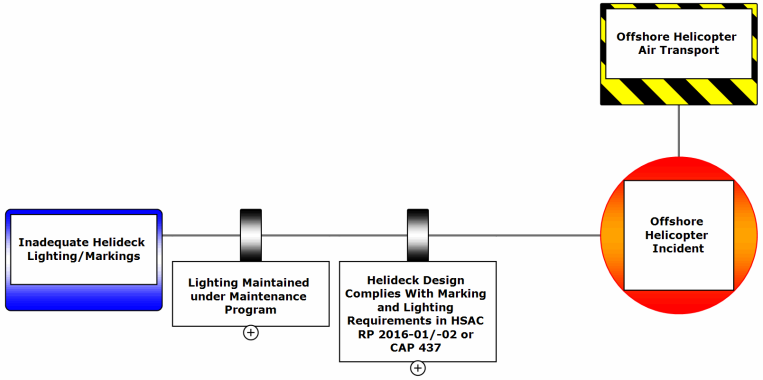


Figure 18: Threat - Inadequate Helideck Lighting/Markings

3.1.9. Inadequate Helideck Lighting/Markings

The threat of missing, misleading, or illegible markings, or missing or non-functional lighting to helicopter operations, where either the marking scheme or lighting arrangement is non-compliant with HSAC RP2016-01/-02 or CAP 437 or serviceability/readability of compliant lighting/markings is not assured.

				Safety Critical Equipment	Safety Critical Task	NUI
9	**Inadequate Helideck Lighting/Markings**					
	9.1	**Lighting Maintained under Maintenance Program**		**[161] Chapter 7, [162] Chapter 5. HOM, Facility Maintenance Program.**	**[163] Par 7.5, [163] Par 8.3, [163] Par 9.13, [163] Par 11.5, [163] Appendix 1, [163] Appendix 3 Attachment 1 Par 3, [163] Appendix 3 Attachment 2, [163] Appendix 3 Attachment 4.**	✓
		9.1.1	**Electrical Malfunction**			✓
			9.1.1.1 Lighting Connected to Emergency Back-up Generator/UPS	[161] Par 7.7 [162] Par 5.7 [163] Par 7.5.1.6	[163] Appendix 3 Attachment 1 Par 3	✓
			9.1.1.2 Daily Check	[161] Chapter 7, [162] Chapter 5.	[163] Appendix 3 Attachment 2	N/A

			HOM, Facility Maintenance Program.		
	9.1.1.3	Adequate Spare Light(bulbs) Available	[163] Appendix 3 Attachment 1 Par 3.1. Spare Light Bulbs.	[163] Appendix 3 Attachment 1 Par 3.1	N/A
9.2	**Helideck Design Complies With Marking and Lighting Requirements in HSAC RP 161, HSAC RP 162 or CAP 437**		**[161] Chapter 6, [161] Chapter 7, [162] Chapter 4, [162] Chapter 5. HOM, Helideck Commissioning Compliance Report, Annual Helideck Inspection Report.**	**[163] Par 11.4.4 [163] Appendix 3 Attachment 4**	✓
	9.2.1	**Degradation/Change of Markings/Lighting**			✓
	9.2.1.1	MOC Process	HOM	TBD	✓
	9.2.1.2	Compliance Check/Commissioning or Certification of Helideck	[161] Chapter 6, [161] Chapter 7, [162] Chapter 4, [162] Chapter 5. HOM, Helideck Commissioning Compliance Report.	[163] Par 11.4.4 [163] Appendix 3 Attachment 4	✓
	9.2.1.3	Annual Helideck Inspection	HOM, Annual Helideck Inspection Report	[163] Par 11.4.4, [163] Appendix 3 Attachment 4.	✓
	9.2.2	**Inherited Legacy/Non-Compliant Markings/Lighting**			✓
	9.2.2.1	MOC Process to Comply with HSAC RP 162 or CAP 437	[162] HOM	TBD	✓
	9.2.2.2	Compliance Check/Commissioning or Certification of Helideck	[161] Chapter 6, [161] Chapter 7, [162] Chapter 4, [162] Chapter 5. HOM, Helideck Commissioning Compliance Report.	[163] Par 11.4.4 [163] Appendix 3 Attachment 4	✓
	9.2.2.3	Annual Helideck Inspection	HOM, Annual Helideck Inspection Report	[163] Par 11.4.4, [163] Appendix 3 Attachment 4.	✓

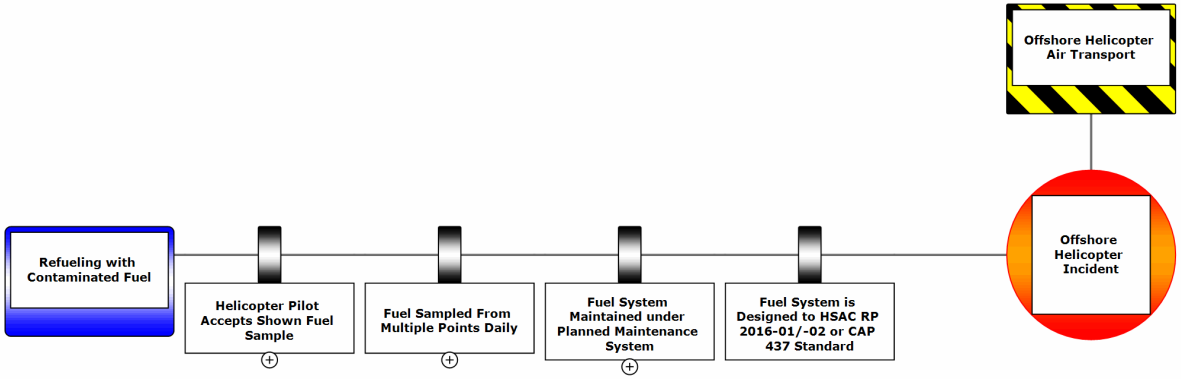


Figure 19: Threat - Refueling with Contaminated Fuel

3.1.10. Refueling with Contaminated Fuel

The threat of having offshore refueling performed with contaminated fuel causing the helicopter engines not to perform as expected. Contamination could consist of (suspended) water, particulates, or biological growth.

				Safety Critical Equipment	Safety Critical Task	NUI
10	**Refueling with Contaminated Fuel**					
	10.1	**Helicopter Pilot Accepts Shown Fuel Sample**		**[161] Chapter 8 [162] Chapter 7 [163] Appendix 4 Attachment 1, HOM**	**[163] Par 9.6 (2), [163] Par 10.7.4.2, [163] Appendix 3 Attachment 1 Par 1.8, [163] Appendix 4 Attachment 1**	✓
		10.1.1	**Fuel Sample Not Shown**			N/A
			10.1.1.1 Daily Fuel System Checklist Signoff	[163] Par 10.7, [163] Appendix 4 Attachment 3, HOM	[163] Appendix 4 Attachment 3, [163] Appendix 4 Attachment 7.	N/A
			10.1.1.2 HLO Manual	[163] Appendix 4 Attachment 3, HOM	[163] Appendix 4 Attachment 3, [163] Appendix 4 Attachment 7.	N/A

		10.1.1.3	Trained Operators	[163] Par 10.7, [163] Chapter 12, HOM	[163] Par 12.2, [163] Appendix 4 Attachment 7 Par 9.1.	N/A
		10.1.1.4	Marked and Dated Sample Jars Retained	HOM	[165] Par 18.1.1 TBD	N/A
		10.1.1.5	Pilot Option To Request Re-Take Sample	HOM	[165] Par 18.1.1	N/A
	10.1.2	**Wrong/Contaminated Fuel Sample Shown**				N/A
		10.1.2.1	Marked and Dated Sample Jars Retained	HOM	[165] Par 18.1.1 TBD	N/A
		10.1.2.2	Use of Water Detector Capsules	HOM, Water Detector Capsules	[163] Appendix 4 Attachment 7 Par 9.1. TBD	N/A
		10.1.2.3	Jar Swirl Technique to Find Particles	HOM	TBD	N/A
		10.1.2.4	HLO Manual	[163] Appendix 4 Attachment 3, HOM	[163] Appendix 4 Attachment 3, [163] Appendix 4 Attachment 7.	N/A
		10.1.2.5	Trained Operators	[163] Par 10.7, [163] Chapter 12, HOM	[163] Par 12.2, [163] Appendix 4 Attachment 7	N/A
		10.1.2.6	Jar Cleaning Procedure Prior To Taking New Sample	HOM	TBD	N/A
		10.1.2.7	Pilot Option To Request Re-Take Sample	HOM	[165] Par 18.1.1	N/A
10.2	**Fuel Sampled From Multiple Points Daily**			**[161] Chapter 8 [162] Chapter 7 [163] Appendix 4 Attachment 1, HOM**	**[163] Par 9.6 (2), [163] Par 10.7.4.2, [163] Appendix 3 Attachment 1 Par 1.8, [163] Appendix 4 Attachment 1, [163] Appendix 4 Attachment 3**	✓
	10.2.1	**Failure to Follow Procedures**				✓
		10.2.1.1	Helicopter Operations Audit	[165] Par 6.1	[165] Par 6.1	✓
		10.2.1.2	Refueler Trainer/Certification	[163] Par 10.7, [163] Chapter 12, HOM	[163] Par 12.2, [163] Appendix 4 Attachment 7 Par 9.1.	N/A

	10.2.1.3	HLO Manual	[163] Appendix 4 Attachment 3, HOM	[163] Appendix 4 Attachment 3, [163] Appendix 4 Attachment 7.	N/A
	10.2.1.4	Daily Fuel System Checklist Signoff	[163] Par 10.7, [163] Appendix 4 Attachment 3, HOM	[163] Appendix 4 Attachment 3, [163] Appendix 4 Attachment 7.	N/A
	10.2.1.5	Marked and Dated Sample Jars Retained	HOM	TBD	N/A
	10.2.1.6	Annual Fuel System/Helideck Inspection	HOM, Annual Helideck Inspection Report, Annual Fuel System Inspection Report.	[163] Par 7.2.5, [163] Par 10.2.4, [163] Par 10.2.5, [163] Par 11.4.4, [163] Appendix 3 Attachment 4, [163] Appendix 4 Attachment 7	✓
10.2.2	**Wrong Tote Tank or Hose Used**				✓
	10.2.2.1	Tote Tanks Labeled	[161] Par 8.4, [163] Appendix 4 Attachment 1, HOM, Facility Maintenance Program.	[163] Appendix 4 Attachment 1	✓
	10.2.2.2	Standard Hose Couplings/Connectors for Jet-Fuel Only	TBD	[163] Appendix 4 Attachment 2 [163] Appendix 4 Attachment 6 [163] Appendix 4 Attachment 8	✓
	10.2.2.3	Trained Operators	HOM or separate Fuel Operations Manual	[163] Par 12.5 [163] Appendix 3 Attachment 3 [163] Appendix 4 Attachment 7 [163] Appendix 4 Attachment 9	✓
	10.2.2.4	Sampling/Sumping Before Decanting	HOM or separate Fuel Operations Manual	TBD	✓

	10.2.3	**Wrong Shipment**			✓
	10.2.3.1	Product Quality Assurance at Filling Location	HOM or separate Fuel Operations Manual	[163] Appendix 4 Attachment 2	✓
	10.2.3.2	Verification of Accompanying Paperwork	HOM or separate Fuel Operations Manual	[163] Appendix 4 Attachment 8 TBD	✓
	10.2.3.3	Trained Operators	HOM or separate Fuel Operations Manual	[163] Par 12.5 [163] Appendix 3 Attachment 3 [163] Appendix 4 Attachment 7 [163] Appendix 4 Attachment 9	✓
10.3	**Fuel System Maintained under Planned Maintenance System**		**[161] Chapter 8, [162] Chapter 7, [163] Appendix 4. HOM or separate Fuel Operations Manual, Facility Maintenance Program**	**[163] Appendix 4.**	✓
	10.3.1	**Inspections Not Performed**			✓
	10.3.1.1	Inspections Entered Into Maintenance Management System	HOM or separate Fuel Operations Manual, Facility Maintenance Program	[163] Appendix 4 Attachment 2	✓
	10.3.1.2	Annual Inspection/Filter Changes by Helicopter Operator	HOM or separate Fuel Operations Manual, Facility Maintenance Program	[163] Appendix 4.	✓
	10.3.1.3	Due Date/Last Inspection Date Marked On Equipment	HOM or separate Fuel Operations Manual, Facility Maintenance Program	[163] Appendix 4 Attachment 1	✓
10.4	**Fuel System is Designed to HSAC RP 161, HSAC RP 162 or CAP 437 Standard**		**[161] Chapter 8, [162] Chapter 7, [163] Appendix 4. HOM, Helideck Commissioning Compliance Report, Annual Helideck Inspection Report.**	**[162] Chapter 7, [163] Appendix 4.**	✓

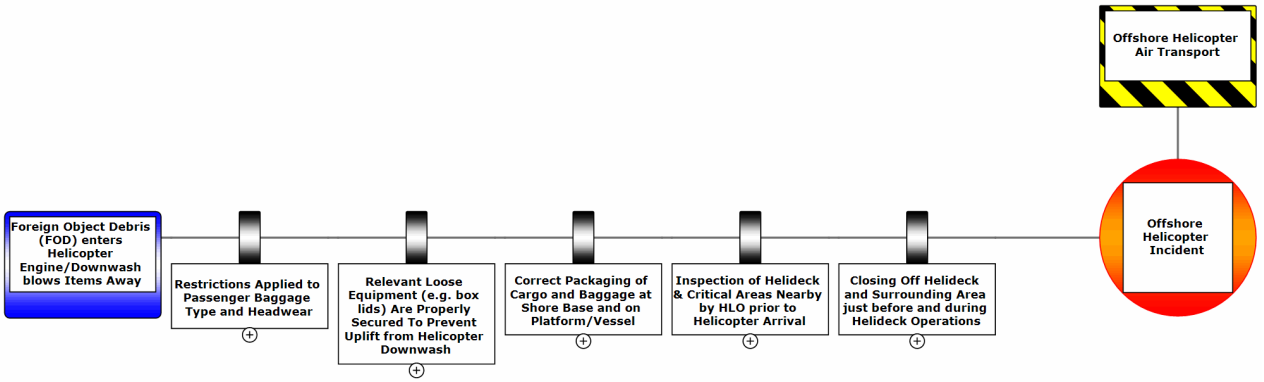


Figure 20: Threat - Foreign Object Debris (FOD) enters Helicopter Engine/Downwash blows Items Away

3.1.11. Foreign Object Debris (FOD) enters Helicopter Engine/Downwash blows Items Away

The threat of Foreign Object Debris (FOD) negatively impacting helicopter (engine) performance or posing a threat by being blown around by helicopter downwash injuring people or damaging property.

				Safety Critical Equipment	Safety Critical Task	NUI
11	**Foreign Object Debris (FOD) enters Helicopter Engine/Downwash blows Items Away**					
	11.1	**Restrictions Applied to Passenger Baggage Type and Headwear**		**N/A**	**[163] Par 7.9, [163] Par 9.12, [163] Par 12.8. [165] Par 7.1**	✓
		11.1.1	**Failure To Follow Procedures**			✓
			11.1.1.1 Onshore and Offshore Signage	[163] Par 9.12	[163] Par 9.12	✓
			11.1.1.2 Video Briefing	[163] Par 9.12 [163] Appendix 1 [163] Appendix 3 Attachment 4. HOM	[163] Par 9.12 [163] Appendix 1 [163] Appendix 3 Attachment 4	✓
			11.1.1.3 Pre-boarding Check Of Passengers By Helideck Team Member	HOM	[163] Par 7.9.2 [163] Par 9.1.1	N/A
			11.1.1.4 HLO Supervision/Intervention	HOM	[163] Par 9.1.1	N/A
	11.2	**Relevant Loose Equipment (e.g., box lids) Are Properly Secured To Prevent Uplift from Helicopter Downwash**		**HOM**	**[163] Par 7.3.6, [163] Par 8.18, [163] Par 9.1,**	✓

				[163] Appendix 3 Attachment 2, [163] Appendix 3 Attachment 4.	
	11.2.1	**Failure To Follow Procedures**			✓
		11.2.1.1	HLO Pre-Arrival Checklist	HOM	[163] Par 9.3	N/A
		11.2.1.2	Helideck Team Training	HOM	[163] Chapter 12	N/A
		11.2.1.3	Helideck Team Exercises	HOM	[163] Par 13.6 & 13.7, [163] Appendix 3 Attachment 4.	N/A
		11.2.1.4	Competency Assessment	HOM	[163] Par 12.2, [163] Appendix 3 Attachment 4.	N/A
		11.2.1.5	Annual Helideck Inspection	HOM, Annual Helideck Inspection Report	[163] Par 11.4.4, [163] Appendix 3 Attachment 4.	✓
		11.2.1.6	HLO Supervision/Intervention	HOM	[163] Par 9.1.	N/A
11.3	**Correct Packaging of Cargo and Baggage at Shore Base and on Platform/Vessel**			**[163] Par 7.9, [163] Par 9.12. HOM**	[165] Par 7	✓
	11.3.1	**Failure to Follow Procedures**				✓
		11.3.1.1	Dangerous Goods/Hazardous Materials Trained Personnel	HOM	[163] Par 12.2.2, [163] Par 12.8.	✓
		11.3.1.2	Dangerous Goods Awareness Helideck Team	HOM	[163] Par 12.2, [163] Par 12.8.	N/A
		11.3.1.3	HLO Manual	[163] Appendix 4 Attachment 3, HOM	[163] Appendix 4 Attachment 3, [163] Appendix 4 Attachment 7.	N/A
		11.3.1.4	Helideck Team Training	HOM	[163] Chapter 12	N/A
		11.3.1.5	Helideck Team Exercises	HOM	[163] Par 13.6 & 13.7, [163] Appendix 3 Attachment 4.	N/A
		11.3.1.6	Competency Assessment	HOM	[163] Par 12.2, [163] Appendix 3 Attachment 4.	N/A
		11.3.1.7	Annual Helideck Inspection	HOM, Annual Helideck Inspection Report	[163] Par 11.4.4, [163] Appendix 3 Attachment 4.	✓

11.4	**Inspection of Helideck & Critical Areas Nearby by HLO prior to Helicopter Arrival**		**HOM**	**[163] Par 9.3**	**N/A**
	11.4.1	**Failure To Follow Procedures**			N/A
		11.4.1.1 HLO Pre-Arrival Checklist	HOM	[163] Par 9.3	N/A
		11.4.1.2 Helideck Team Training	HOM	[163] Chapter 12	N/A
		11.4.1.3 Competency Assessment	HOM	[163] Par 12.2, [163] Appendix 3 Attachment 4.	N/A
		11.4.1.4 Helideck Team Exercises	HOM	[163] Par 13.6 & 13.7, [163] Appendix 3 Attachment 4.	N/A
		11.4.1.5 Annual Helideck Inspection	HOM, Annual Helideck Inspection Report	[163] Par 11.4.4, [163] Appendix 3 Attachment 4.	N/A
11.5	**Closing Off Helideck and Surrounding Area just before and during Helideck Operations**		**HOM**	**[163] Par 9.3, [163] Appendix 3 Attachment 2.**	**N/A**
	11.5.1	**Individuals Entering Helideck and Surrounding Area during Helideck Operations**			N/A
		11.5.1.1 Frangible Barriers with Warning Signs in Place During Helideck Operations	HOM	[163] Par 9.3, [163] Appendix 3 Attachment 2.	N/A
		11.5.1.2 Positive Control by Helideck Team Member of Passenger in Waiting Area	[163] Par 7.2.1 HOM	[163] Par 9.1,	N/A
		11.5.1.3 HLO Supervision On Helideck/ Intervention	HOM	[163] Par 9.1	N/A
		11.5.1.4 Annual Helideck Inspection	HOM, Annual Helideck Inspection Report	[163] Par 11.4.4, [163] Appendix 3 Attachment 4.	N/A

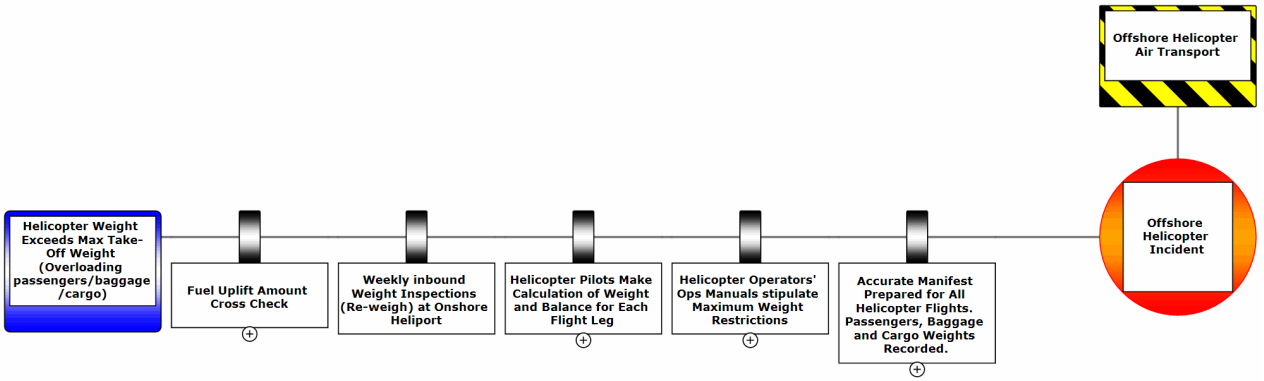


Figure 21: Threat - Helicopter Weight Exceeds Max Take-Off Weight

3.1.12. Helicopter Weight Exceeds Max Take-Off Weight

The threat of a helicopter being overloaded, meaning exceeding the specific payload capability for the environmental conditions at time of flight, or the loading of the helicopter resulting in a center of gravity (CoG) outside the flight envelope, either directly due to incorrect weight distribution or wrong/lack of securing passengers/baggage/cargo resulting in a weight shift in flight and subsequent helicopter handling problems due to shift of CoG outside limits.

				Safety Critical Equipment	Safety Critical Task	NUI
12	**Helicopter Weight Exceeds Max Take-Off Weight (Overloading passengers/baggage/cargo)**					
	12.1	**Fuel Uplift Amount Cross Check**		**HOM or separate Fuel Operations Manual**	**[165] Par 18.2.1 TBD**	✓
		12.1.1	**Requested Fuel Amount Does Not Match Uplift Amount**			✓
			12.1.1.1 Verification of Requested Fuel Amount By HLO	HOM or separate Fuel Operations Manual	TBD	N/A
			12.1.1.2 Pilot Monitoring Uplift On Gauges/FMS	HOM or separate Fuel Operations Manual	[165] Par 18.2.1	✓
			12.1.1.3 HLO Monitoring Uplift On Fuel Cabinet Gauge	HOM or separate Fuel Operations Manual	[163] Appendix 4 Attachment 9	N/A
			12.1.1.4 Communications To Shut-Off Fuel Uplift	HOM or separate Fuel Operations Manual	[165] Par 18.2.1	N/A
	12.2	**Weekly inbound Weight Inspections (Re-weigh) at Onshore Heliport**		**HOM**	[165] Par 6.2	✓

12.3	**Helicopter Pilots Make Calculation of Weight and Balance for Each Flight Leg**		**Helicopter Operator's Ops Manual**	**[165] Par 11.4**	✓
	12.3.1	**Failure To Follow Procedure**			✓
		12.3.1.1 Pilot Training and Competence	Helicopter Operator's Training Manual.	[165] Par 20.1	✓
		12.3.1.2 Procedure and Limits in Rotorcraft Flight Manual and Ops Manual	Helicopter Operator's Ops Manual	[165] Par 11.4	✓
		12.3.1.3 Use of Standardized Flight Sheets	Helicopter Operator's Ops Manual	[165] Par 8.1.3	✓
12.4	**Helicopter Operators' Ops Manuals stipulate Maximum Weight Restrictions**		**Helicopter Operator's Ops Manual**	**Helicopter Operator's Ops Manual**	✓
	12.4.1	**Failure To Follow Procedure**			✓
		12.4.1.1 Pilot Training and Competence	Helicopter Operator's Training Manual.	[165] Par 20.1	✓
		12.4.1.2 Procedure and Limits in Rotorcraft Flight Manual and Ops Manual	Helicopter Operator's Ops Manual	[165] Par 11.4	✓
		12.4.1.3 Use of Standardized Flight Sheets	Helicopter Operator's Ops Manual	[165] Par 8.1.3	✓
12.5	**Accurate Manifest Prepared for All Helicopter Flights. Passengers, Baggage and Cargo Weights Recorded.**		**HOM, Calibrated Heavy Duty Scales.**	**[163] Par 7.9 [163] Par 9.3 [163] Par 9.12 [163] Appendix 3 Attachment 1 Par 5.1**	✓
	12.5.1	**Failure to Prepare Proper Manifest**			✓
		12.5.1.1 Audit Process	HOM	[165] Par 6.1	✓
		12.5.1.2 Passengers, Baggage and Cargo Weighed On Calibrated Scales	HOM, Calibrated Heavy Duty Scales.	[163] Par 7.9 [163] Par 9.3 [163] Par 9.12 [163] Appendix 3 Attachment 1 Par 5.1 [163] Appendix 6.	✓
		12.5.1.3 HLO/Logistics Clerk Training	HOM	[163] Par 12.2 TBD	N/A
		12.5.1.4 Pilot Supervision/Verification Of Manifested Items During Loading	Helicopter Operator's Ops Manual	[165] Par 13.1.2	✓
		12.5.1.5 Pilot Cross-Check of Offshore Manifest With Onshore Data Provided Prior to Arrival	Helicopter Operator's Ops Manual	[165] Par 13.1.1	✓

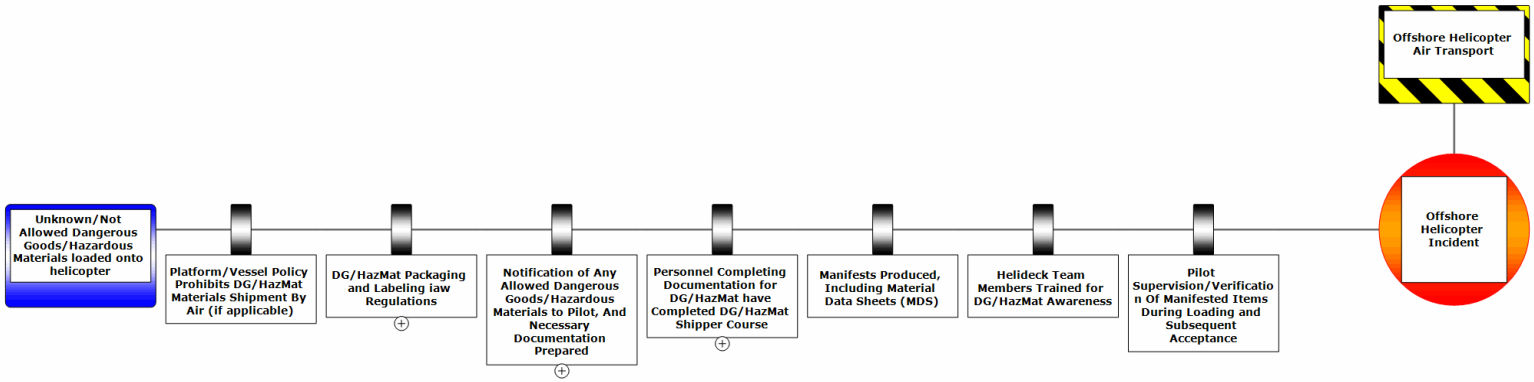


Figure 22: Threat - Unknown/Not Allowed Dangerous Goods/Hazardous Materials loaded onto helicopter.

3.1.13. Unknown/Not Allowed Dangerous Goods/Hazardous Materials loaded onto helicopter.

The threat of Dangerous Goods (DG)/Hazardous Materials (HazMat) being loaded onto the helicopter unknowingly, in quantities/weights exceeding regulations or packaged/labeled incorrectly. Also, the combination of passengers and DG/HazMat cargo can be non-compliant.

				Safety Critical Equipment	Safety Critical Task	NUI
13	**Unknown/Not Allowed Dangerous Goods/Hazardous Materials loaded onto helicopter**					
	13.1	**Platform/Vessel Policy Prohibits DG/HazMat Materials Shipment By Air (if applicable)**		**HOM**	**[165] Par 7**	✓
	13.2	**DG/HazMat Packaging and Labeling iaw Regulations**		**HOM**	**[163] Par 7.2.1, [163] 7.9, [163] Par 9.12 [163] Par 12.1 [163] Par 12.2 [163] Par 12.8**	✓
		13.2.1	**Failure to Package and Label Correctly**			✓
			13.2.1.1 All Cargo Shipments Checked for DG/HazMat by HLO	HOM	[163] Par 7.2.1, [163] Par 9.12, Add to [163] Par 9.1 [165] Par 7	N/A
			13.2.1.2 All DG/HazMat Shipments Prepared By DG/HazMat Shipper Certified Person	HOM	[165] Par 7 TBD	✓
			13.2.1.3 Hand Search or X-ray use for Baggage and Cargo Shipments	HOM	TBD	✓

13.3	**Notification of Any Allowed Dangerous Goods/Hazardous Materials to Pilot, And Necessary Documentation Prepared**		**HOM**	[163] Par 9.3 [165] Par 7	✓
	13.3.1	**Lack of Communication**			✓
		13.3.1.1 Manifesting Procedures	HOM	[163] Par 9.12 [165] Par 7	✓
		13.3.1.2 DG/HazMat Labeling of Packages	HOM	[165] Par 7 TBD	✓
		13.3.1.3 HLO Supervision/Intervention	HOM	TBD	N/A
		13.3.1.4 Pilot Supervision/Intervention	Helicopter Operator's Ops Manual	[165] Par 13.1.2	✓
13.4	**Personnel Completing Documentation for DG/HazMat have Completed DG/HazMat Shipper Course**		**HOM**	**[163] Par 9.12** **[163] Par 12**	✓
	13.4.1	**Unqualified Personnel Signing DG/HazMat Documentation**			✓
		13.4.1.1 Platform/Vessel Register of Authorized Shippers	HOM	TBD	✓
		13.4.1.2 HLO Supervision/Intervention	HOM	TBD	N/A
		13.4.1.3 Pilot Supervision/Intervention and Mandatory Reporting To Authorities	Helicopter Operator's Ops Manual	[165] Par 13.1.2	✓
		13.4.1.4 DG/HazMat Violation Penalties/Fines	HOM	TBD	✓
13.5	**Manifests Produced, Including Material Data Sheets (MDS)**		**HOM**	**[165] Par 13.1**	✓
13.6	**Helideck Team Members Trained for DG/HazMat Awareness**		**HOM**	**[163] Par 12.2.2,** **[163] Par 12.8.**	**N/A**
13.7	**Pilot Supervision/Verification Of Manifested Items During Loading and Subsequent Acceptance**		**Helicopter Operator's Ops Manual**	**[165] Par 13.1**	✓

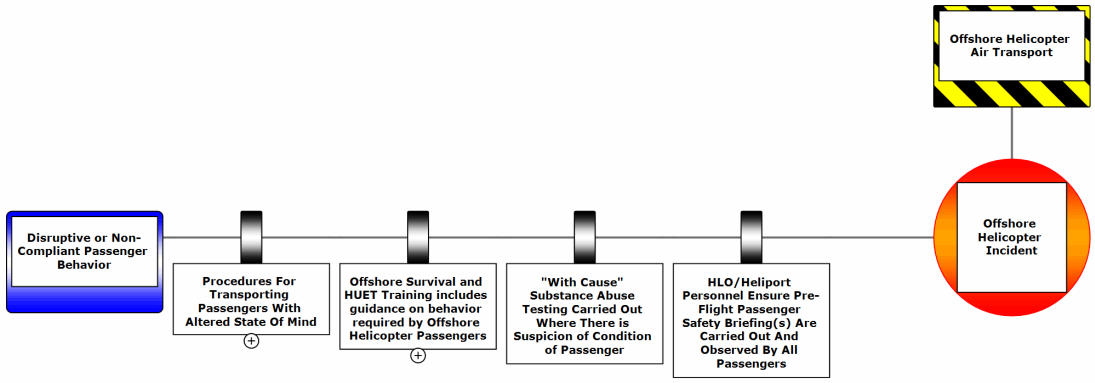


Figure 23: Threat - Disruptive or Non-Compliant Passenger Behavior

3.1.14. Disruptive or Non-Compliant Passenger Behavior

The threat of on-boarding passengers in an altered state of mind, under the influence of drugs or alcohol where it impacts safe self-egress from the helicopter in an emergency, or disruptive in any other way that could cause harm to the intended helicopter flight and/or its passengers and crew.

				Safety Critical Equipment	Safety Critical Task	NUI
14	**Disruptive or Non-Compliant Passenger Behavior**					
	14.1	**Procedures For Transporting Passengers With Altered State Of Mind**		**HOM**	**[163] Par 9.12.8 [165] Par 17.1**	✓
		14.1.1	**Failure To Follow Procedures**			✓
			14.1.1.1 Helideck Team Member To Observe Passengers During Showing of Passenger Safety Briefing Video	HOM, Pax Safety Briefing Video.	14 CFR § 135.117 - Briefing of passengers before flight	N/A
			14.1.1.2 Offshore Installation Manager/Vessel Master/Medic Has Responsibility To Report Potential Pax Issue to HLO and Pilot	HOM	[163] Par 9.12.8 TBD	✓
	14.2	**Offshore Survival and HUET Training includes guidance on behavior required by Offshore Helicopter Passengers**		**HOM**	**[163] Par 12.7**	✓
		14.2.1	**Personnel Not Trained**			✓
			14.2.1.1 HUET Training Checked Upon Check-in Before Flight	HOM	[165] Par 17.2.1 TBD	✓
			14.2.1.2 Restricted Variance Process	HOM	[165] Par 17.2.1 TBD	✓
	14.3	**"With Cause" Substance Abuse Testing Carried Out Where There is Suspicion of Condition of Passenger**		**HOM**	[165] Par 17.1	✓
	14.4	**HLO/Heliport Personnel Ensure Pre-Flight Passenger Safety Briefing(s) Are Carried Out And Observed By All Passengers**		**HOM, Pax Safety Briefing Video.**	14 CFR § 135.117 - Briefing of passengers before flight	✓

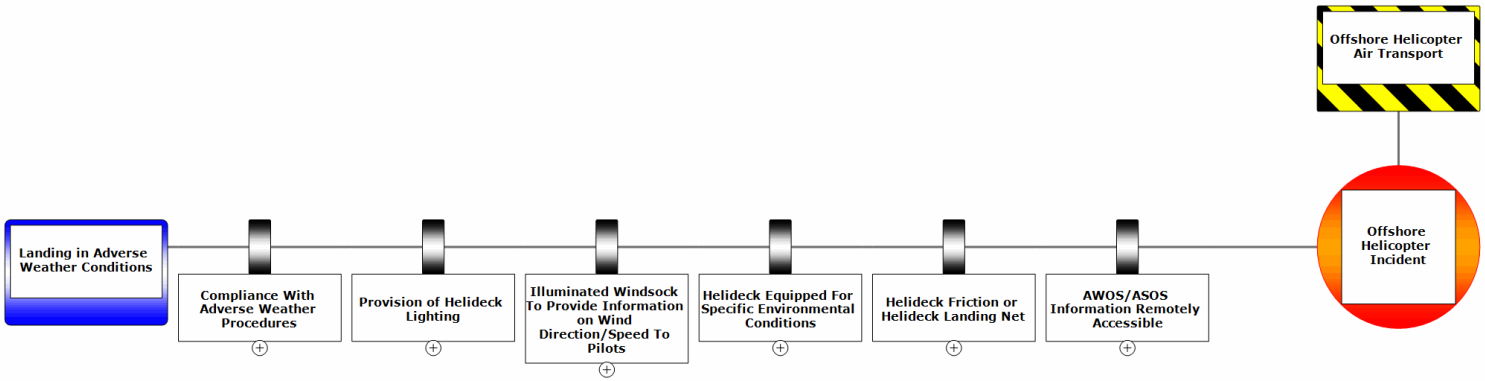


Figure 24: Threat - Landing in Adverse Weather Conditions

3.1.15. Landing in Adverse Weather Conditions

The threat of landing a helicopter in adverse weather conditions that do not meet the minimum weather requirements for the type of flight (IFR/VFR) and or Enhance Operational Control (EOC) conditions set by the helicopter operator.

				Safety Critical Equipment	Safety Critical Task	NUI
15	**Landing in Adverse Weather Conditions**					
	15.1	**Compliance With Adverse Weather Procedures**		**HOM**	**[163] Par 7.2, [163] Par 8.15, [163] Par 9.11, [163] Appendix 3 Attachment 4.**	✓
		15.1.1	**Failure To Follow Procedures**			✓
			15.1.1.1 Audit Process	HOM, Annual Helideck Inspection Report.	[163] Par 11.4.4, [163] Appendix 3 Attachment 4.	✓
			15.1.1.2 Training And Competency Of Pilots	Helicopter Operator's Training Manual	[165] Par 20.1	✓
			15.1.1.3 Training And Competency of HLO	HOM	[163] Par 12.2 TBD	N/A

	15.1.2	**Weather Situation Unknown**			✓
		15.1.2.1	Use of 'Official' Weather For Flight Planning Purposes	[161] Chapter 9, HOM, Helicopter Operator's Ops Manual, AWOS/ASOS.	[165] Par 21	✓
		15.1.2.2	Enhanced Operational Control Procedures In Place	Helicopter Operator's Ops Manual	[165] Par 21.3.3	✓
		15.1.2.3	Helicopter Operator Comms/Ops Center Monitors Flight Conditions and PIREPS	Helicopter Operator's Ops Manual	[165] Par 21.3.3	✓
		15.1.2.4	AWOS/ASOS/Weather Observer Offshore	[161] Chapter 9, HOM, Helicopter Operator's Ops Manual, AWOS/ASOS.	[163] Par 12.6, [163] Appendix 7	✓
	15.1.3	**Weather Limits Unknown**				✓
		15.1.3.1	Weather Limits in Platform/Vessel MOPO	HOM, MOPO	[163] Par 7.2 [163] Par 8.1 [163] Par 8.15 [163] Appendix 2	N/A
		15.1.3.2	Weather Limits in Air Operator's OPS Manual	Helicopter Operator's Ops Manual	[165] Par 21.3.2	✓
		15.1.3.3	Initial and Recurrent Pilot Training	Helicopter Operator's Training Manual.	[165] Par 20.1	✓
		15.1.3.4	Air Operator's Comms/OPS Center Monitoring	Helicopter Operator's Ops Manual	[165] Par 21.3.2	✓
15.2	**Provision of Helideck Lighting**			**[161] Chapter 7 [162] Chapter 5 Perimeter Lights, Helideck Status Lights, Obstruction Lights, Flood Lights, Windsock Lights, HOM, Facility Maintenance Program.**	**[163] Par 7.6, [163] Par 8.3, [163] Par 9.13, Par 11.5, Appendix 1, Appendix 3 Attachment 1 Par 3, Appendix 3 Attachment 2, Appendix 3 Attachment 4.**	✓
	15.2.1	**Short Term Electrical Failure**				✓
		15.2.1.1	Routine Inspections and Maintenance	[161] Chapter 7, [162] Chapter 5. HOM, Facility Maintenance Program.	[163] Par 7.6, [163] Par 8.3, [163] Par 9.13, [163] Par 11.5, [163] Appendix 1, [163] Appendix 3 Attachment 1 Par 3, [163] Appendix 3 Attachment 2, [163] Appendix 3 Attachment 4.	✓

	15.2.1.2	Lighting Connected To Emergency Back-up Generator / UPS	[161] Par 7.7 [162] Par 5.7 [163] Par 7.5	TBD	✓
	15.2.1.3	Helideck Status Lights (on UPS or Back-up Generator)	[161] Par 7.5 [162] Par 5.5 [163] Par 7.5	[163] Appendix 1 [163] Appendix 3 Attachment 1 Par 3.1 [165] Par 5.4 [165] Par 12.3	✓
15.2.2	**Long Term Electrical Failure**				✓
	15.2.2.1	NOTAM System	Helideck Limitations List (HLL), HIP, HOM, NOTAM System.	[163] Par 8.19	✓
	15.2.2.2	Prohibited Landing Marker For Temporary Closure Of Helideck	[163] Par 8.8	[163] Par 8.8 [163] Appendix 1 [163] Appendix 3 Attachment 1 Par 5.2 [163] Appendix 3 Attachment 3 [163] Appendix 3 Attachment 4	✓
15.2.3	**Pilots Do Not Understand Lights**				✓
	15.2.3.1	NOTAM System	Helideck Limitations List (HLL), HIP, HOM, NOTAM System.	[163] Par 8.19	✓
	15.2.3.2	Pilot Training	Helicopter Operator's Training Manual.	[165] Par 20.1	✓
	15.2.3.3	Industry Engagement (HSAC)	[165] Par 8.2	[165] Par 8.2 TBD	✓

15.3	**Illuminated Windsock To Provide Information on Wind Direction/Speed To Pilots**		**[163] Par 7.6.2 [163] Par 8.3 [163] Par 8.12 [163] Par 8.13 Windsock, Facility Maintenance Program,**	**[163] Appendix 1 [163] Appendix 3 Attachment 1 Par 2.1 & 3 [163] Appendix 3 Attachment 2 [163] Appendix 3 Attachment 4**	✓
	15.3.1	**Damaged/Not Existing Windsock**			✓
		15.3.1.1 Routine Inspections And Maintenance	[161] Chapter 7, [162] Chapter 5. HOM, Facility Maintenance Program.	[163] Appendix 1 [163] Appendix 3 Attachment 1 Par 2.1 & 3 [163] Appendix 3 Attachment 2 [163] Appendix 3 Attachment 4	✓
		15.3.1.2 HLO To Provide Wind Information From Center Of Helideck Using Handheld Anemometer	HOM, Facility Maintenance Program, Handheld Anemometer	[165] Par 5.2.5	N/A
	15.3.2	**Blocked Airflow To Windsock**			✓
		15.3.2.1 Installed Second Windsock To Assure Accurate Wind Information Can Be Obtained From All Directions	[161] Par 9.1 HOM, Facility Maintenance Program, Windsock (primary plus alternate if needed)	[163] Appendix 3 Attachment 1 Par 2.1	✓
		15.3.2.2 HLO To Provide Wind Information From Center Of Helideck Using Handheld Anemometer	HOM, Facility Maintenance Program, Handheld Anemometer	[165] Par 5.2.5	N/A
		15.3.2.3 Annual Helideck Inspection	HOM, Annual Helideck Inspection Report	[163] Par 11.4.4, [163] Appendix 3 Attachment 4.	✓
	15.3.3	**Light Failure**			✓
		15.3.3.1 Routine Inspections and Maintenance	HOM, Facility Maintenance Program.	[163] Appendix 1	✓
		15.3.3.2 Lighting Connected To Emergency Back-up Generator / UPS	[161] Par 7.7 [162] Par 5.7 [163] Par 7.5	TBD	✓
		15.3.3.3 HLO Procedure To Provide Wind Speed/Direction on 20 min/5 min call	HOM, Air Operator's Ops Manual.	[165] Par 5.2.4	N/A

15.4	**Helideck Equipped For Specific Environmental Conditions**		**[161] [162]**	**[163] Par 7.3**	✓
	15.4.1	**Emergency Night Flight Requirement**			✓
		15.4.1.1 Pilots Fly With Night Vision Goggles (NVG)	Helicopter Operator's Ops Manual, HOM,	[163] Par 7.5 BARS – Contracted Aircraft Operations – Appendix 5	✓
		15.4.1.2 Pilot Night Currency, Including Offshore Landings	Helicopter Operator's Training Manual	IOGP Report 690: 2 – Aircraft Operations Table 11-2	✓
		15.4.1.3 Use Of Helideck Illumination	[161] Chapter 7 [162] Chapter 5 HOM	TBD	✓
		15.4.1.4 Operational Risk Management Procedure	Helicopter Operator's Ops Manual	[165] Par 14.1	✓
	15.4.2	**EOC Not Properly Set**			✓
		15.4.2.1 Weather Reporting (Prior and Upon Arrival)	[161] Chapter 9, [162] Par 6, [163] Par 7.6.3, [163] Par 7.6.4, HOM, Helicopter Operator's Ops Manual	[163] Par 7.6 [163] Par 8.15	✓
		15.4.2.2 Air Operator Comms/Ops Center Monitoring	[165] Par 21.3.3	[165] Par 21.3.3	✓
		15.4.2.3 Pilot / HLO Cross Check	[165] Par 5.2.2	[165] Par 5.2.2	N/A
	15.4.3	**Unanticipated Squall-line**			✓
		15.4.3.1 Use of Chocks	[163] Par 9.13, [163] Par 11.5.5, HOM, Helicopter Operator's Ops Manual	[163] Par 9.1, [163] Par 9.3, [163] Par 9.5, [163] Par 9.10, [163] Appendix 1, [163] Appendix 3 Attachments 1 & 4.	✓
		15.4.3.2 Tie-down Aircraft	[161] Par 5.7 [161] Annex C [162] Par 3.6 [163] Par 9.13, HOM, Helicopter Operator's Ops Manual	[163] Par 9.1, [163] Appendix 1, [163] Appendix 3 Attachments 1 & 4.	✓

	15.4.3.3	Helicopter Departure Prior To Squall Arrival	HOM, Facility MOPO, Helicopter Operator's Ops Manual	[163] Par 7.2.4, [163] Par 8.1, [163] Par 8.15, [163] Appendix 2 [163] Appendix 3 Attachment 6 [163] Appendix 3 Attachment 4.	✓
15.4.4	**Foggy Conditions**				✓
	15.4.4.1	Obstruction Lighting On Platform/Vessel	[161] Par 7.6 [162] Par 5.6 [163] Par 7.5 [163] Par 8.3 Facility Maintenance Manual	[163] Par 5.2.1.4, [163] Par 7.2.7, [163] Appendix 1, [163] Appendix 3 Attachment 4.	✓
	15.4.4.2	Use of Helideck Illumination	[161] Chapter 7, [162] Chapter 5, [163] Par 7.5, [163] Par 7.5, [163] Par 9.13, Facility Maintenance Manual	[163] Par 11.5, [163] Appendix 1, [163] Appendix 3 Attachments 1 & 4.	✓
	15.4.4.3	Air Operator Weather Minima	HOM, Facility MOPO, Helicopter Operator's Ops Manual	[163] Par 8.15	✓
	15.4.4.4	Planned Alternates/Return To Base Procedures	[165] Par 11.1	[165] Par 11.1	✓
15.5	**Helideck Friction or Helideck Landing Net**		**[161] Par 5.5, [163] Par 7.3.1, [163] Par 7.3.6,**	**[163] Par 7.3.8, [163] Par 10.2, [163] Appendix 1, [163] Appendix 3 Attachments 1 & 4**	✓
15.5.1	**Inadequate Friction Coefficient On Helideck**				✓
	15.5.1.1	Annual Helideck Surface Friction Test	[161] Par 5.5, [163] Par 7.3.1, [163] Par 7.3.6, Helideck Inspection Report, HOM	[163] Par 7.3.8, [163] Par 10.2, [163] Appendix 1, [163] Appendix 3 Attachments 1 & 4	✓
	15.5.1.2	Routine Inspections And Maintenance	HOM, Facility Maintenance Program.	[163] Appendix 1, [163] Appendix 3 Attachments 1 & 4	✓

		15.5.1.3	Installation Of Helideck Landing Net	[163] Par 7.3.2, HOM, Facility Maintenance Program.	[163] Par 9.10 [163] Par 10.3 [163] Appendix 1, [163] Appendix 3 Attachments 1 & 4	✓
15.6	**AWOS/ASOS Information Remotely Accessible**			**[161] Chapter 9** **[163] Par 7.6**	**[163] Appendix 7**	✓
	15.6.1	**Inadequate Information**				✓
		15.6.1.1	Back-up Equipment For Weather Reporting	[163] Par 7.6.1.6. Facility Maintenance Manual	[163] Appendix 1,	✓
		15.6.1.2	HLO Weather Reporting Using Handheld Anemometer	[165] Par 21.4.1 TBD	[165] Par 21.4.1 TBD	N/A
		15.6.1.3	Annual Weather System Equipment Calibration	[161] Par 9.2 Facility Maintenance Manual	[163] Appendix 3 Attachments 1 [163] Appendix 7	✓
		15.6.1.4	Periodic Cleaning Of Sensors	Facility Maintenance Manual	[163] Appendix 3 Attachments 1 & 4 [163] Appendix 7	✓
		15.6.1.5	Verification Of Weather Information by HLO	[165] Par 21.4.2 TBD	[165] Par 21.4.2 TBD	N/A
	15.6.2	**Communication Problem**				✓
		15.6.2.1	Daily Check	[163] Appendix 1. HOM, VHF Radio.	[163] Appendix 3 Attachment 1 Par 4.1 & 4.2	N/A
		15.6.2.2	Alternative Reporting Procedures	HOM, VHF Radio, Telephone, Internet Connection.	[165] Par 21.1 TBD	✓
		15.6.2.3	NOTAM System	Helideck Limitations List (HLL), HIP, HOM, NOTAM System.	[163] Par 8.19	✓

3.2. Consequences

Each Control could have one or more Escalation Factors that could render the Control ineffective, to prevent this from happening, Escalation Controls are put in place. The Escalation Factors and Escalation Controls are NOT shown in the graphical depiction of the Bowtie Consequence branch, but are shown in the table below using the following color coding:

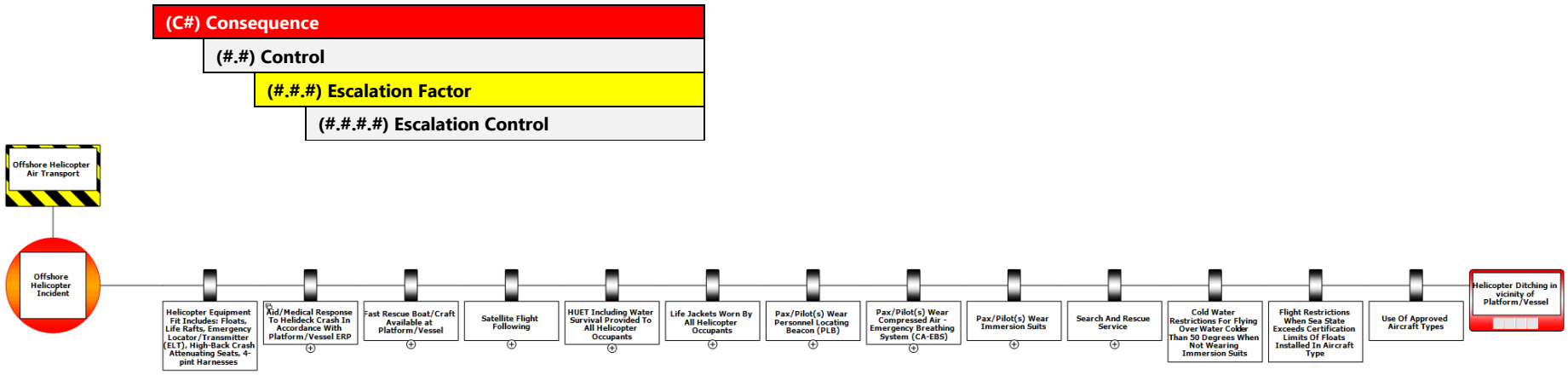


Figure 25: Consequence - Helicopter Ditching in vicinity of Platform/Vessel

3.2.1. Helicopter Ditching in vicinity of Platform/Vessel

The consequence of a ditching of a helicopter near the facility where several factors can impact the outcome. The intent is minimizing damage/injuries/casualties.

			Safety Critical Equipment	Safety Critical Task	NUI
C1	**Helicopter Ditching in vicinity of Platform/Vessel**				
	C1.1	**Helicopter Equipment Fit Includes: Floats, Life Rafts, Emergency Locator/Transmitter (ELT), High-Back Crash Attenuating Seats, 4-pint Harnesses**	**[165] Par. 4.1, HSAC RP 2004-8**	**[165] Par. 4.1, HSAC RP 2004-8**	✓
	C1.2	**Aid/Medical Response To Helideck Crash In Accordance With Platform/Vessel ERP**	**Facility Emergency Response Drills Schedule, Emergency Response Plan, HOM, Crash Box**	**[163] Par 13.2 [163] Par 13.6 [163] Appendix 1, [163] Appendix 3 Attachments 1 & 4**	✓

C1.2.1	**Failure Of Primary Comms Equipment**				✓
	C1.2.1.1	Emergency Response Drills	Facility Emergency Response Drills Schedule, Emergency Response Plan, HOM, Crash Box	[163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4	✓
	C1.2.1.2	Back-Up Comms Systems	[161] Chapter 11, [163] Par 7.7 HOM, Back-up VHF Radio.	[163] Appendix 3 Attachment 1 Par 4.1 & 4.2	N/A
	C1.2.1.3	Use CCTV Systems	TBD	TBD	✓
C1.2.2	**External Assistance Not Available Immediately**				✓
	C1.2.2.1	Tier 1 Responder	TBD	TBD	✓
	C1.2.2.2	Medics/Category 2 Site Assessment	TBD	TBD	N/A
	C1.2.2.3	Emergency Response Drills	[163] Chapter 12, Facility Emergency Response Drills Schedule, Emergency Response Plan, HOM, [163] Appendix 1	[163] Par 13.5, [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4	✓
C1.2.3	**Emergency Equipment Or Supplies Not Maintained On A Regular Basis**				N/A
	C1.2.3.1	Emergency Equipment And Supplies Maintenance Program	Facility Maintenance Manual, HOM, [163] Appendix 1	[163] Appendix 1, [163] Appendix 3 Attachments 1 & 4	N/A
C1.2.4	**Confusion During Emergency**				✓
	C1.2.4.1	Major Emergency Management Training	[163] Chapter 12 [163] Par 13.6, Response Drills Schedule, Emergency Response Plan, HOM	[163] Par 13.5 [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4	✓
	C1.2.4.2	Orientation Training	TBD	TBD	✓
	C1.2.4.3	Emergency Response Drills	[163] Chapter 12, Facility Emergency Response Drills Schedule, Emergency Response Plan, HOM, [163] Appendix 1	[163] Par 13.5, [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4	✓
	C1.2.4.4	Implementation Of Incident Command System (ICS)	TBD	TBD	N/A

	C1.2.5	**Medical Unfitness**			✓
		C1.2.5.1 Pre-Placement Medical Screening	TBD	TBD	✓
		C1.2.5.2 Fitness To Work Evaluation	TBD	TBD	✓
	C1.2.6	**Injured Personnel Not Accessible / Requires Rescue**			✓
		C1.2.6.1 Emergency Response Drills	[163] Chapter 12, Facility Emergency Response Drills Schedule, Emergency Response Plan, HOM, [163] Appendix 1	[163] Par 13.5, [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4	✓
		C1.2.6.2 Implementation Of Incident Command System (ICS)	TBD	TBD	N/A
		C1.2.6.3 Rescue Capabilities	TBD	TBD	✓
	C1.2.7	**Platform/Vessel Requires External Resources To Manage Medical Emergency**			✓
		C1.2.7.1 Medical Transportation Contracts	TBD	TBD	✓
		C1.2.7.2 Remote Medical Advisory	TBD	TBD	✓
C1.3	**Fast Rescue Boat/Craft Available at Platform/Vessel**		TBD	TBD	**N/A**
	C1.3.1	**FRB/FRC Not Available**			N/A
		C1.3.1.1 Use of Lifeboat	TBD	TBD	N/A
		C1.3.1.2 Procedures To Call-In Nearby Vessels For Assistance	TBD	TBD	N/A
C1.4	**Satellite Flight Following**		[165] Par 10.2	[165] Par 10.2	✓
	C1.4.1	**Satellite Flight Following Not Available**			✓
		C1.4.1.1 Procedure Radio Position Reporting Every 15 min	[165] Par 10.1	[165] Par 10.1	✓
C1.5	**HUET Including Water Survival Provided To All Helicopter Occupants**		**HSAC RP 2004-06**	**HSAC RP 2004-06 [163] Par 9.12 [163] Par 12.7**	✓
	C1.5.1	**No (Valid) HUET Training**			✓
		C1.5.1.1 Assign Trained Buddy Seated Next To Untrained Individual	HOM	[163] Par 9.12	✓
		C1.5.1.2 Passenger Safety Briefing Video	HOM, Passenger Safety Briefing Video	[163] Par 9.12, 14 CFR § 135.117 - Briefing of passengers before flight	✓
		C1.5.1.3 Prevent Untrained Individual To Sit Next To Emergency Egress Window	HOM, Passenger Safety Briefing Video	[163] Par 9.12, 14 CFR § 135.117 - Briefing of passengers before flight	✓

C1.6	**Life Jackets Worn By All Helicopter Occupants**		**HOM, Passenger Safety Briefing Video**	**[163] Par 9.1.1, 14 CFR § 135.117 - Briefing of passengers before flight**	✓
	C1.6.1	**Life Jacket Not Worn By Passenger**			✓
		C1.6.1.1 HLO/HDA Check	HOM	[163] Par 9.1.1	N/A
		C1.6.1.2 Pilot Check	[165] Par 16.2.3	[165] Par 16.2.3	✓
		C1.6.1.3 Peer-To-Peer Check	[165] Par 16.2.3	[165] Par 16.2.3	✓
C1.7	**Pax/Pilot(s) Wear Personnel Locating Beacon (PLB)**		**[165] Par 16.2**	**[165] Par 16.2**	✓
	C1.7.1	**PLB Unserviceable**			✓
		C1.7.1.1 Inspection and Maintenance Program	[165] Par 16.2.1	[165] Par 16.2.1	✓
		C1.7.1.2 Pre-Flight Check	[165] Par 16.2.2	[165] Par 16.2.2	✓
C1.8	**Pax/Pilot(s) Wear Compressed Air - Emergency Breathing System (CA-EBS)**		HOM, Helicopter Operations Manual	**[163] Par 9.1.1 [163] Par 9.12 [163] Par 12.7**	✓
	C1.8.1	**CA-EBS Not Serviceable**			✓
		C1.8.1.1 Inspection and Maintenance Program	[165] Par 16.2.1	[165] Par 16.2.1	✓
		C1.8.1.2 Pre-Flight Check	HOM, [165] Par 16.2.2	[163] Par 9.1.1, [165] Par 16.2.2	✓
	C1.8.2	**CA-EBS Not Worn**			✓
		C1.8.2.1 HLO/HDA Check	HOM,	[163] Par 9.1.1	N/A
		C1.8.2.2 Pilot Check	[165] Par 16.2.3	[165] Par 16.2.3	✓
		C1.8.2.3 Peer-To-Peer Check	[165] Par 16.2.3 TBD	[165] Par 16.2.3 TBD	✓
C1.9	**Pax/Pilot(s) Wear Immersion Suits**		**HOM, Helicopter Operations Manual**	**[-3[163] Par 9.1.1**	✓
	C1.9.1	**Immersion Suit Not Worn**			✓
		C1.9.1.1 Cold Water Restrictions For Flying Over Water <50F (15C)	[165] Par 21.2.1	[165] Par 21.2.1	✓
		C1.9.1.2 HLO/HDA Check	HOM,	[163] Par 9.1.1	N/A
		C1.9.1.3 Pilot Check	[165] Par 16.2.3	[165] Par 16.2.3	✓
		C1.9.1.4 Peer-To-Peer Check	[165] Par 16.2.3 TBD	[165] Par 16.2.3 TBD	✓
	C1.9.2	**Immersion Suit Not Serviceable**			✓
		C1.9.2.1 Cold Water Restrictions For Flying Over Water <50F (15C)	[165] Par 21.2.1	[165] Par 21.2.1	✓

		C1.9.2.2	Inspection and Maintenance Program	[165] Par 16.2.1	[165] Par 16.2.1	✓
		C1.9.2.3	User Check Upon Receipt	[165] Par 16.2.2 TBD	[165] Par 16.2.2 TBD	✓
		C1.9.2.4	Back-up/Reserve Suits Available	[165] Par 16.2.2	[165] Par 16.2.2	✓
C1.10	**Search And Rescue Service**			HOM,	**[163] Appendix 3 Attachment 6**	✓
	C1.10.1	**Service Not Available**				✓
		C1.10.1.1	Standby Vessel	[165] Par 9.2	[165] Par 9.2	✓
		C1.10.1.2	Flight Restrictions	[165] Par 9.1	[165] Par 9.1	✓
C1.11	**Cold Water Restrictions For Flying Over Water Colder Than 50 Degrees When Not Wearing Immersion Suits**			**[165] Par 21.2.1**	**[165] Par 21.2.1**	✓
C1.12	**Flight Restrictions When Sea State Exceeds Certification Limits Of Floats Installed In Aircraft Type**			**[165] Par 21.5**	**[165] Par 21.5**	✓
C1.13	**Use Of Approved Aircraft Types**			**[165] Par 4.1**	**[165] Par 4.1**	✓

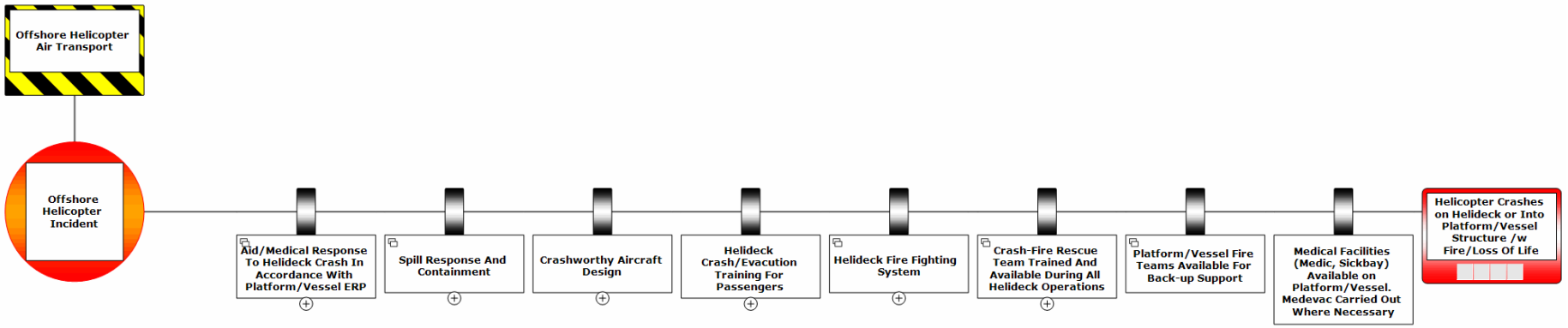


Figure 26: Consequence - Helicopter Crashes on Helideck or Into Platform/Vessel Structure /w Fire/Loss Of Life

3.2.2. Helicopter Crashes on Helideck or Into Platform/Vessel Structure /w Fire/Loss Of Life

The consequence of a helicopter crashing onto the helideck of into the facility structure with fire and/or loss of life where several factors can impact the outcome. The intent is minimizing damage/injuries/casualties.

				Safety Critical Equipment	Safety Critical Task	NUI
C2	**Helicopter Crashes on Helideck or Into Platform/Vessel Structure /w Fire/Loss Of Life**					
	C2.1	**Aid/Medical Response To Helideck Crash In Accordance With Platform/Vessel ERP**		**[163] Chapter 12, Facility Emergency Response Drills Schedule, Emergency Response Plan, HOM, [163] Appendix 1**	**[163] Par 13.5, [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4**	✓
		C2.1.1	**Failure Of Primary Comms Equipment**			✓
			C2.1.1.1 Emergency Response Drills	[163] Chapter 12, Facility Emergency Response Drills Schedule, Emergency Response Plan, HOM, [163] Appendix 1	[163] Par 13.5, [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4	✓
			C2.1.1.2 Back-Up Comms Systems	[161] Chapter 11, [163] Par 7.7.1. HOM, Back-up VHF Radio.	[163] Appendix 3 Attachment 1 Par 4.1 & 4.2	N/A

	C2.1.1.3	Use CCTV Systems	TBD	TBD	✓
C2.1.2	**External Assistance Not Available Immediately**				✓
	C2.1.2.1	Tier 1 Responder	TBD	TBD	✓
	C2.1.2.2	Medics/Category 2 Site Assessment	TBD	TBD	N/A
	C2.1.2.3	Emergency Response Drills	[163] Chapter 12, Facility Emergency Response Drills Schedule, Emergency Response Plan, HOM, [163] Appendix 1	[163] Par 13.5, [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4	✓
C2.1.3	**Emergency Equipment Or Supplies Not Maintained On A Regular Basis**				N/A
	C2.1.3.1	Emergency Equipment And Supplies Maintenance Program	Facility Maintenance Manual, HOM	[163] Appendix 1, [163] Appendix 3 Attachments 1 - 4	N/A
C2.1.4	**Confusion During Emergency**				✓
	C2.1.4.1	Major Emergency Management Training	[163] Chapter 12 [163] Par 13.6, Response Drills Schedule, Emergency Response Plan, HOM	[163] Par 13.5 [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4	✓
	C2.1.4.2	Orientation Training	TBD	TBD	✓
	C2.1.4.3	Emergency Response Drills	[163] Chapter 12, Facility Emergency Response Drills Schedule, Emergency Response Plan, HOM, [163] Appendix 1	[163] Par 13.5, [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4	✓
	C2.1.4.4	Implementation Of Incident Command System (ICS)	TBD	TBD	N/A
C2.1.5	**Medical Unfitness**				✓
	C2.1.5.1	Pre-Placement Medical Screening	TBD	TBD	✓
	C2.1.5.2	Fitness To Work Evaluation	TBD	TBD	✓

	C2.1.6	**Injured Personnel Not Accessible / Requires Rescue**			✓
		C2.1.6.1	Emergency Response Drills	[163] Chapter 12, Facility Emergency Response Drills Schedule, Emergency Response Plan, HOM, [163] Appendix 1	[163] Par 13.5, [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4	✓
		C2.1.6.2	Implementation Of Incident Command System (ICS)	TBD	TBD	N/A
		C2.1.6.3	Rescue Capabilities	TBD	TBD	✓
	C2.1.7	**Platform/Vessel Requires External Resources To Manage Medical Emergency**			✓
		C2.1.7.1	Medical Transportation Contracts	TBD	TBD	✓
		C2.1.7.2	Remote Medical Advisory	TBD	TBD	✓
C2.2	**Spill Response And Containment**			**[161] Par 4.5.3 [162] Par 3.7 [163] Par 7.3.1**	**[163] Par 13.5.4, [163] Par 13.5.9, [163] Par 13.6.**	✓
	C2.2.1	**Legacy Facilities Do Not Have Spill Containment**				✓
		C2.2.1.1	Provision Of Fuel Containment System	[161] Par 4.5.3 [162] Par 3.7 Facility Maintenance Manual, HOM	[163] Appendix 3 Attachment 1,2, 4	✓
		C2.2.1.2	Extended Spill Kit	Facility Maintenance Manual, HOM	[163] Appendix 1 [163] Appendix 3 Attachment 1,2, 4 [164] Appendix 4 Attachment 2	✓
	C2.2.2	**Response Inadequate**				✓
		C2.2.2.1	Emergency Response Drills	[163] Chapter 12, Facility Emergency Response Drills Schedule, Emergency Response Plan, HOM, [163] Appendix 1	[163] Par 13.5, [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4	✓
		C2.2.2.2	Platform/Vessel Emergency Response Plan (ERP)	Facility Emergency Response Plan, HOM	[163] Par 13.2 [163] Appendix 3 Attachments 1 & 4	N/A
		C2.2.2.3	Foam Application By Hand Line	[161] Par 13.6	[163] Appendix 1,	✓

					[163] Appendix 3 Attachments 3, [163] Appendix 5.	
		C2.2.2.4	Training Programs For Emergency Response Personnel	[163] Chapter 12 [163] Par 13.6, Response Drills Schedule, Emergency Response Plan, HOM	[163] Par 13.5 [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4	✓
C2.3	**Crashworthy Aircraft Design**			**[165] Par 4.1**	**[165] Par 4.1**	✓
	C2.3.1	**Impact Exceeds Design Limits For Helicopter**				✓
		C2.3.1.1	Platform/Vessel Emergency Response Plan (ERP)	Facility Emergency Response Plan, HOM	[163] Par 13.2 [163] Appendix 3 Attachments 1 & 4	N/A
		C2.3.1.2	Foam Application By Hand Line	[161] Par 13.6 [162] Chapter 8 HOM, Facility Maintenance Manual.	[163] Appendix 1, [163] Appendix 3 Attachments 3, [163] Appendix 5.	✓
		C2.3.1.3	Spill Response Training & Equipment	[163] Chapter 12, [163] Par 13.9, HOM, Facility Maintenance Manual.	[163] Par 7.7.3.3, [163] Par 12.4, [163] Par 13.5.4, [163] Par 13.5.9, [163] Appendix 1, [163] Appendix 5	✓
		C2.3.1.4	Complementary Fire Fighting Media	[161] Par 4.5 [162] Chapter 8	[163] Appendix 1, [163] Appendix 5.	✓
C2.4	**Helideck Crash/Evacuation Training For Passengers**			**HSAC RP 2004-06**	**HSAC RP 2004-06 [163] Par 9.12 [163] Par 12.7**	✓
	C2.4.1	**Training Ineffective**				✓
		C2.4.1.1	Fire Retardant Clothing Provides Protection For Limited Time	[165] Par 16.1 TBD	[165] Par 16.1 TBD	✓
		C2.4.1.2	Foam System to Provide Rescue Window/Blanket	[161] Annex B [162] Chapter 8, HOM, Facility Maintenance Manual.	[163] Appendix 1, [163] Appendix 3 Attachments 3, [163] Appendix 5.	✓
		C2.4.1.3	Helideck Team CFR Training	[163] Chapter 12 [163] Par 13.6,	[163] Par 13.5 [163] Par 13.6,	N/A

				Response Drills Schedule, Emergency Response Plan, HOM	[163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4	
		C2.4.1.4	Helideck Team Drills/Exercises	[163] Chapter 12, Facility Emergency Response Drills Schedule, Emergency Response Plan, HOM, [163] Appendix 1	[163] Par 13.5, [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4	N/A
		C2.4.1.5	CO_2 Extinguisher and Axe Used By CFR Team To Gain Access To Push-Out Windows From The Outside	[161] Par 4.5.5 [162] Chapter 8	TBD	N/A
	C2.4.2	**Fire And Survival Clothing Inadequate**				✓
		C2.4.2.1	Fire Retardant Clothing Provides Protection For Limited Time	[165] Par 16.1 TBD	[165] Par 16.1 TBD	✓
		C2.4.2.2	Foam System to Provide Rescue Window/Blanket	[161] Annex B [162] Chapter 8, HOM, Facility Maintenance Manual.	[163] Appendix 1, [163] Appendix 3 Attachments 3, [163] Appendix 5.	✓
		C2.4.2.3	Helideck Team CFR Training	[163] Chapter 12 [163] Par 13.6, Response Drills Schedule, Emergency Response Plan, HOM	[163] Par 13.5 [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4	N/A
		C2.4.2.4	Helideck Team Drills/Exercises	[163] Chapter 12, Facility Emergency Response Drills Schedule, Emergency Response Plan, HOM, [163] Appendix 1	[163] Par 13.5, [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4	N/A
C2.5	**Helideck Fire Fighting System**			**[161] Par 4.5 [161] Annex B [162] Chapter 8 [162] Annex A**	**[163] Appendix 1, [163] Appendix 3 Attachments 3, [163] Appendix 5.**	✓
	C2.5.1	**Fire Within Helicopter Not Accessible (Engine Compartment, Baggage, Etc.)**				✓
		C2.5.1.1	Fire Piercing Nozzle	[161] Par 4.5.5 [162] Chapter 8	[163] Par 9.1.3, [163] Par 9.4 [163] Par 13.4	N/A

	C2.5.1.2	Helideck Fire Fighting System And Equipment	[161] Par 4.5 [161] Annex B [162] Chapter 8	[163] Appendix 1, [163] Appendix 3 Attachments 3, [163] Appendix 5.	✓
	C2.5.1.3	Helideck Team Trained To Activate Fire Fighting System	[163] Chapter 12 [163] Par 13.6, Response Drills Schedule, Emergency Response Plan, HOM	[163] Par 13.5 [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4	N/A
C2.5.2	**Fire Fighting System Not Functional**				✓
	C2.5.2.1	Inspection and Maintenance Program	[161] Par 4.5 [161] Annex B [162] Chapter 8 HOM, Facility Maintenance Manual.	[163] Appendix 1, [163] Appendix 3 Attachments 3, [163] Appendix 5.	✓
	C2.5.2.2	Annual Foam Test (Certificate)	HOM, Facility Maintenance Manual, Annual Foam Test (Certificate)	[163] Par 5.2, [163] Appendix 1, [163] Appendix 3 Attachment 4 and 5	✓
	C2.5.2.3	Monthly Test of System /w Water	HOM, Facility Maintenance Manual.	[163] Appendix 1, [163] Appendix 5. TBD	N/A
	C2.5.2.4	Complementary Fire Fighting Equipment Available	[161] Par 4.5.5 [162] Chapter 8	[163] Appendix 1, [163] Appendix 5.	✓
	C2.5.2.5	100% Back-up Media Available	[161] Par 4.5.5 [162] Chapter 8	[163] Appendix 3 Attachment 4	✓
C2.5.3	**Insufficient Fire Fighting Media**				✓
	C2.5.3.1	100% Back-up Media Available	[161] Par 4.5.5 [162] Chapter 8	[163] Appendix 3 Attachment 4	✓
	C2.5.3.2	Complementary Fire Fighting Equipment Available	[161] Par 4.5.5 [161] Par 4.5.6 [162] Chapter 8	[163] Appendix 1, [163] Appendix 5.	✓
	C2.5.3.3	Inspection and Maintenance Program	[161] Par 4.5 [161] Annex B [162] Chapter 8 HOM, Facility Maintenance Manual.	[163] Appendix 1, [163] Appendix 3 Attachments 3, [163] Appendix 5.	✓

	C2.5.4	**Fire Fighting Media Can Not Reach Fire Source**			✓
		C2.5.4.1	Foam Hand lines	[161] Annex B [162] Chapter 8, HOM, Facility Maintenance Manual.	[163] Appendix 1, [163] Appendix 3 Attachments 3, [163] Appendix 5.	✓
		C2.5.4.2	Complementary Fire Fighting Equipment/Media Available	[161] Par 4.5.5 [161] Par 4.5.6 [162] Chapter 8	[163] Appendix 1, [163] Appendix 5.	✓
		C2.5.4.3	CO_2 Extinguisher /w Long Lance Available for Engine Fire	[161] Par 4.5.5 [162] Chapter 8	TBD	✓
C2.6	**Crash-Fire Rescue Team Trained And Available During All Helideck Operations**			**[163] Chapter 12 [163] Par 13.6, Response Drills Schedule, Emergency Response Plan, HOM**	**[163] Par 13.5 [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4**	✓
	C2.6.1	**CFR Team Impaired By Incident**				✓
		C2.6.1.1	Automatic Fixed Fire System	[161] Par 4.5.4 Facility Maintenance Manual	[163] Appendix 3 Attachments 1 Par 12.5.4	✓
		C2.6.1.2	Platform/Vessel Emergency Response Plan (ERP)	Facility Emergency Response Plan, HOM	[163] Par 13.2 [163] Appendix 3 Attachments 1 & 4	N/A
		C2.6.1.3	Multiple Rescue Team Members	Facility Emergency Response Plan, HOM	[163] Par 9.1 [163] Par 13.5 thru 13.9	✓
	C2.6.2	**CFR Team Unavailable At Location**				✓
		C2.6.2.1	Automatic Fixed Fire System	[161] Par 4.5.4 Facility Maintenance Manual	[163] Appendix 3 Attachments 1 Par 12.5.4	✓
		C2.6.2.2	Modern Crashworthy Aircraft Design	[165] Par 4.1	[165] Par 4.1	✓
		C2.6.2.3	Passenger Evacuation Training	HSAC RP 2004-06	HSAC RP 2004-06 [163] Par 9.12 [163] Par 12.7	✓
		C2.6.2.4	Preflight Briefing On Aircraft Evacuation	HOM, Passenger Safety Briefing Video	[163] Par 9.12.5, 14 CFR § 135.117 - Briefing of passengers before flight	✓
		C2.6.2.5	Reduce Flight Activity	[165] Par 8.1.1	[165] Par 8.1.1	✓

	C2.6.3	**CFR Equipment Failure/Unavailable**			✓
		C2.6.3.1	Monthly Crash Box Inspection/Inventory	HOM, Facility Maintenance Manual	[163] Appendix 1, [163] Appendix 3 Attachment 1	N/A
		C2.6.3.2	Inspection and Maintenance Program	[161] Par 4.5 [161] Annex B [162] Chapter 8 HOM, Facility Maintenance Manual.	[163] Appendix 1, [163] Appendix 3 Attachments 3, [163] Appendix 5.	✓
		C2.6.3.3	Annual Helideck Inspection	HOM, Annual Helideck Inspection Report	[163] Par 11.4.4, [163] Appendix 3 Attachment 4.	✓
		C2.6.3.4	Monthly Helideck Team Drills/Exercises	[163] Chapter 12, Facility Emergency Response Drills Schedule, Emergency Response Plan, HOM, [163] Appendix 1	[163] Par 13.5, [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4	N/A
C2.7	**Platform/Vessel Fire Teams Available For Back-up Support**			**TBD**	**TBD**	**N/A**
C2.8	**Medical Facilities (Medic, Sickbay) Available on Platform/Vessel. Medevac Carried Out Where Necessary**			**TBD**	**TBD**	✓

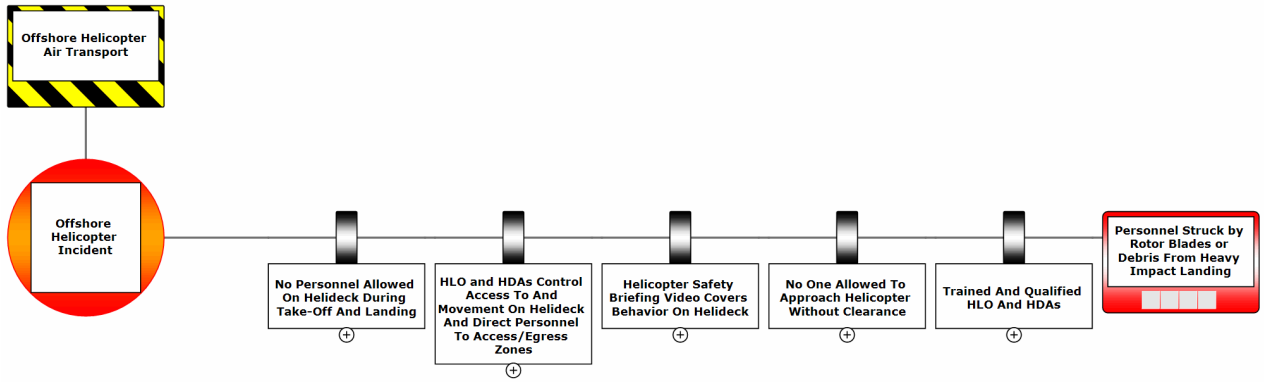


Figure 27: Consequence - Personnel Struck by Rotor Blades or Debris From Heavy Impact Landing

3.2.3. Personnel Struck by Rotor Blades or Debris From Heavy Impact Landing

The consequence of a rotor blade directly making contact with an individual or a departing tail- or main rotor blade due to heavy landing impact hitting an individual. The intent is minimizing damage/injuries/casualties.

				Safety Critical Equipment	Safety Critical Task	NUI
C3	**Personnel Struck by Rotor Blades or Debris From Heavy Impact Landing**					
	C3.1	**No Personnel Allowed On Helideck During Take-Off And Landing**		**HOM**	**[163] Par 9.1.1.**	✓
		C3.1.1	**Passenger Did Not Understand Restrictions**			✓
			C3.1.1.1 Posters/Signage In Passenger Waiting Room	Posters/Signage [163] Par 9.12.2 HOM	[163] Par 13.3, [163] Appendix 1, [163] Appendix 3 Attachment 4	✓
			C3.1.1.2 Frangible Chains With Signage At Every Helideck Access/Egress Point	Frangible Chains and Signage, [163] Par 9.12.1, HOM	[163] Par 13.3, [163] Appendix 1, [163] Appendix 3 Attachment 4	✓
	C3.2	**HLO and HDAs Control Access To And Movement On Helideck And Direct Personnel To Access/Egress Zones**		**HOM**	**[163] Par 9.1.1.**	**N/A**
		C3.2.1	**Inadequate Access Control**			✓
			C3.2.1.1 Helideck Team Training And Competency	HOM	[163] Chapter 12	N/A

		C3.2.1.2	Mandatory Helideck Manning Levels in HLO Manual	HOM	[163] Par 9.1	N/A
		C3.2.1.3	Segregation Of Passenger From Helideck Area	HOM	[163] Par 9.1.1.	✓
C3.3	**Helicopter Safety Briefing Video Covers Behavior On Helideck**			**HOM (HOM), Passenger Safety Briefing Video**	**[163] Par 9.12.5, 14 CFR § 135.117 - Briefing of passengers before flight**	✓
	C3.3.1	**Not Shown In Video**				✓
		C3.3.1.1	HLO/Pilot Pre-Flight Briefing	HOM	[163] Par 9.12.5	N/A
		C3.3.1.2	Annual Helideck Inspection	HOM, Annual Helideck Inspection Report	[163] Par 11.4.4, [163] Appendix 3 Attachment 4.	✓
C3.4	**No One Allowed To Approach Helicopter Without Clearance**			**HOM, Passenger Safety Briefing Video**	**[163] Par 9.12.5, 14 CFR § 135.117 - Briefing of passengers before flight. [165] Par 15.1**	✓
	C3.4.1	**Unknown Procedure**				✓
		C3.4.1.1	Passenger Safety Briefing Video	HOM, Passenger Safety Briefing Video	[163] Par 9.12.5, 14 CFR § 135.117 - Briefing of passengers before flight	✓
		C3.4.1.2	Helideck Team Oversight and Intervention	HOM	[163] Par 9.1.1.	N/A
C3.5	**Trained And Qualified HLO And HDAs**			**HOM**	**[163] Chapter 12**	**N/A**
	C3.5.1	**Inadequate Training**				N/A
		C3.5.1.1	Approved Helideck Team Training Courses	HOM	[163] Chapter 12	N/A
		C3.5.1.2	Helideck Team Training	HOM	[163] Chapter 12	N/A
		C3.5.1.3	Helideck Team On-The-Job-Training	HOM	[163] Chapter 12	N/A
		C3.5.1.4	Helideck Team Competency Assessment	HOM	[163] Chapter 12	N/A
		C3.5.1.5	Annual Helideck Inspection	HOM, Annual Helideck Inspection Report	[163] Par 11.4.4, [163] Appendix 3 Attachment 4.	N/A

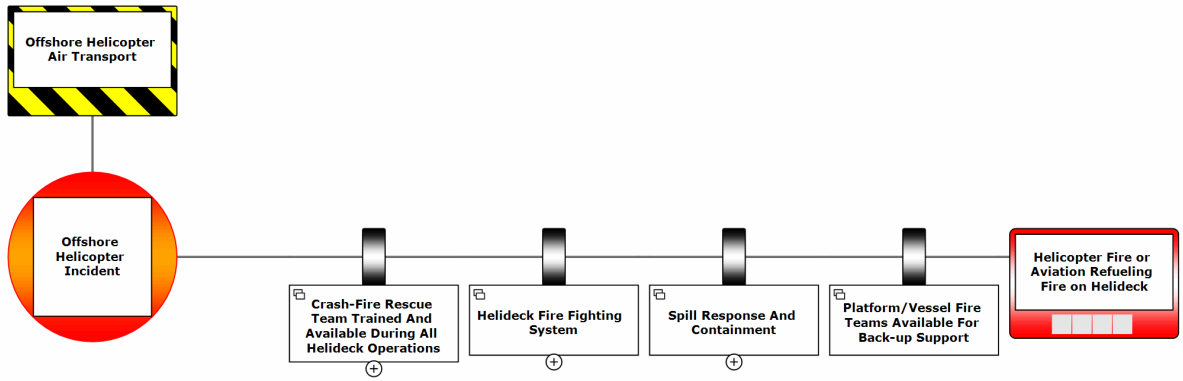


Figure 28: Consequence - Helicopter Fire or Aviation Refueling Fire on Helideck

3.2.4. Helicopter Fire or Aviation Refueling Fire on Helideck

The consequence of a fire developing due to a helicopter incident, which could either be a fire started during engine start-up, a fire started due to a roll-over, crash, or leak of the helicopter on the helideck or a fire that started during helicopter refueling. The intent is minimizing damage/injuries/casualties.

				Safety Critical Equipment	Safety Critical Task	NUI
C4	**Helicopter Fire or Aviation Refueling Fire on Helideck**					
	C4.1	**Crash-Fire Rescue Team Trained And Available During All Helideck Operations**		**[163] Chapter 12 [163] Par 13.6, Response Drills Schedule, Emergency Response Plan, HOM**	**[163] Par 13.5 [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4**	✓
		C4.1.1	**CFR Team Impaired By Incident**			✓
			C4.1.1.1 Automatic Fixed Fire System	[161] Par 4.5.4 Facility Maintenance Manual	[163] Appendix 3 Attachments 1 Par 12.5.4	✓
			C4.1.1.2 Platform/Vessel Emergency Response Plan (ERP)	Facility Emergency Response Plan, HOM	[163] Par 13.2 [163] Appendix 3 Attachments 1 & 4	N/A
			C4.1.1.3 Multiple Rescue Team Members	Facility Emergency Response Plan, HOM	[163] Par 9.1 [163] Par 13.5 thru 13.9	✓

C4.1.2	**CFR Team Unavailable At Location**				✓
	C4.1.2.1	Automatic Fixed Fire System	[161] Par 4.5.4 Facility Maintenance Manual	[163] Appendix 3 Attachments 1 Par 12.5.4	✓
	C4.1.2.2	Modern Crashworthy Aircraft Design	[165] Par 4.1	[165] Par 4.1	✓
	C4.1.2.3	Passenger Evacuation Training	HSAC RP 2004-06	HSAC RP 2004-06 [163] Par 9.12 [163] Par 12.7	✓
	C4.1.2.4	Preflight Briefing On Aircraft Evacuation	HOM, Passenger Safety Briefing Video	[163] Par 9.12.5, 14 CFR § 135.117 - Briefing of passengers before flight	✓
	C4.1.2.5	Reduce Flight Activity	[165] Par 8.1.1	[165] Par 8.1.1	✓
C4.1.3	**CFR Equipment Failure/Unavailable**				✓
	C4.1.3.1	Monthly Crash Box Inspection/Inventory	HOM, Facility Maintenance Manual	[163] Appendix 1, [163] Appendix 3 Attachment 1	N/A
	C4.1.3.2	Inspection and Maintenance Program	[161] Par 4.5 [161] Annex B [162] Chapter 8 HOM, Facility Maintenance Manual.	[163] Appendix 1, [163] Appendix 3 Attachments 3, [163] Appendix 5.	✓
	C4.1.3.3	Annual Helideck Inspection	HOM, Annual Helideck Inspection Report	[163] Par 11.4.4, [163] Appendix 3 Attachment 4.	✓
	C4.1.3.4	Monthly Helideck Team Drills/Exercises	[163] Chapter 12, Facility Emergency Response Drills Schedule, Emergency Response Plan, HOM, [163] Appendix 1	[163] Par 13.5, [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4	N/A
C4.2	**Helideck Fire Fighting System**		**[161] Par 4.5 [161] Annex B [162] Chapter 8 [162] Annex A**	**[163] Appendix 1, [163] Appendix 3 Attachments 3, [163] Appendix 5.**	✓
	C4.2.1	**Fire Within Helicopter Not Accessible (Engine Compartment, Baggage, Etc.)**			✓
	C4.2.1.1	Fire Piercing Nozzle	[161] Par 4.5.5 [162] Chapter 8	[163] Par 9.1.3, [163] Par 9.4 [163] Par 13.4	N/A

		C4.2.1.2	Helideck Fire Fighting System And Equipment	[161] Par 4.5 [161] Annex B [162] Chapter 8	[163] Appendix 1, [163] Appendix 3 Attachments 3, [163] Appendix 5.	✓
		C4.1.3	Helideck Team Trained To Activate Fire Fighting System	[163] Chapter 12 [163] Par 13.6, Response Drills Schedule, Emergency Response Plan, HOM	[163] Par 13.5 [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4	N/A
C4.3	**Spill Response And Containment**			**[161] Par 4.5 [162] Par 3.7 [163] Par 7.3.1**	**[163] Par 13.5.4, [163] Par 13.5.9, [163] Par 13.6.**	**N/A**
	C4.3.1	**Legacy Facilities Do Not Have Spill Containment**				✓
		C4.3.1.1	Provision Of Fuel Containment System	[161] Par 4.5.3 [162] Par 3.7 Facility Maintenance Manual, HOM	[163] Appendix 3 Attachment 1,2, 4	✓
	C4.3.2	**Response Inadequate**				✓
		C4.3.2.1	Emergency Response Drills	[163] Chapter 12, Facility Emergency Response Drills Schedule, Emergency Response Plan, HOM, [163] Appendix 1	[163] Par 13.5, [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4	N/A
		C4.3.2.2	Platform/Vessel Emergency Response Plan (ERP)	Facility Emergency Response Plan, HOM	[163] Par 13.2 [163] Appendix 3 Attachments 1 & 4	N/A
		C4.3.2.3	Foam Application By Hand Line	[161] Annex B	[163] Appendix 1, [163] Appendix 3 Attachments 3, [163] Appendix 5.	✓
		C4.3.2.4	Training Programs For Emergency Response Personnel	[163] Chapter 12 [163] Par 13.6, Response Drills Schedule, Emergency Response Plan, HOM	[163] Par 13.5 [163] Par 13.6, [163] Par 13.7, [163] Par 7.2.1, [163] Appendix 3 Attachments 1 & 4	✓
C4.4	**Platform/Vessel Fire Teams Available For Back-up Support**			**TBD**	**TBD**	**N/A**

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