RECOMMENDED EMERGENCY DRILLS DOCUMENT

GOM Diving Safety Work Group

RECOMMENDED EMERGENCY DRILLS DOCUMENT

OCTOBER 2016

DISCLAIMER

This US GOM DSWG document is not meant to be all inclusive, and not every rule and regulation is contained herein. The US GOM DSWG does not issue policy or create regulations. The reader should consult additional resources and subject matter experts for more detailed information as required.

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The GOM Diving Safety Workgroup is a US GOM focused, non-competitive and non-commercial group of oil and gas operators, transmission companies, commercial diving companies, supporting sub-contractors, organizations and industry stake holders. The group will provide a unified voice to promote and improve diving safety, through the following:

- identification and sharing of best practices
- identify and seek solutions to industry challenges and issues
- review and comment of existing and proposed standards and guidelines
- provide input to the regulators and industry associations

Purpose of Committee

This document has been prepared by the US GOM DSWG as guidance for:

EMERGENCY DRILLS

This document will identify different but specific drill scenarios for various diving situations and modes. Each Diving Contractor and Client should conduct an assessment to determine which drills are relevant to their specific jobs.

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The document is divided into seven sections:

- **Part 1: Executive Summary**

- **Part 2: Definition**
  - Defines the activity that is being evaluated and provides definitions from regulatory or industry groups that are associated with the activity.

- **Part 3: Regulatory and Industry Gap Analysis**
  - Identifies regulatory and industry association requirements to perform the activity or operation and provides a visual aid to determine the consistencies between these groups as it relates to the activity

- **Part 4: Past Incidents**
  - Identifies past near misses, incidents, and fatalities and provides causal factors and the root cause of the incident in order to provide supporting documentation for the hazard analysis in Part 5.

- **Part 5: Hazard Analysis**
  - Identifies the hazards of the activity or operation, Identifies the risks associated with the hazards, and provides specific mitigation considerations for each hazard to reduce or eliminate risk

- **Part 6: Drills and Preparation**
  - Provide a list of drills that should be performed to prepare the crew members for possible emergency situations

- **Part 7: Appendix**
  - Please do not alter the template in order to maintain the consistency of the documents it relates to other committees, but please add additional documentation, reports, drawings, etc. in this section that may provide more depth or relevant information to the report.

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Part 1: Executive Summary of Committee

The Emergency Drills Committee has been formed to identify recommended emergency drill scenarios to be completed by the dive team. Each Diving Contractor and Client should conduct an assessment to determine which drills and scenarios are relevant to their specific project. Each diving contractor should document and maintain a record for the performance of all emergency drills (including date/time, location, participants and assessment).

Drills should be planned and JSA's written etc. to prevent any unintended event during the process of a drill. All activities have the potential risks which could cause injury or property damage and experiencing a loss of this nature during a drill is absolutely contrary to the intent.

Drills which cannot be conducted due to other considerations (i.e. launch of HRC or SPHL) should be simulated to the best of ability and thoroughly discussed by relevant participants to ensure they know their roles and responsibilities.

It is ***not*** the intent of this document to prescribe to contractors and clients;

- Specific equipment requirements
- Specific and detailed frequency for the performance of drills
- Specific requirements for the performance or recording of drills
- Specific responsibilities for personnel involved in the performance of drills

This document ***is*** intended to;

- Identify different but specific drill scenarios for various diving situations and modes.
- Provide a list of recommended drills for contractors and clients to consider, as part of their emergency response plan.
- Identify the gaps between the different regulatory and industry organizations' recommendations for the performance of emergency drills, as well as the identification of various incidents, driving the development of the recommended list.
- Identify some known and possible hazards, description of the risk, and mitigation considerations. An appendix containing a Procedures Table and Glossary of Terms is also included.

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Part 2: Definition

The Oxford Dictionary defines the noun “drill” as:

a) *Intensive instruction or training in something, typically by means of repeated exercises.*
b) *A rehearsal of the procedure to be followed in an emergency*

The International Marine Contractors Association (IMCA), in their Membership Assessment, refers to drills as “plans for emergency response to an incident involving diving personnel”.

OGP 411, published by the Oil and Gas Producers (IOGP) does not specifically mention drills, but does contain Emergency Response in Section 6.10.2 and an “Emergency & Contingency” section in each of the Appendices. An example is Section 6.13.1 Emergency Response Guidelines states “Contingency and Response” plans, together with call out procedures, should be exercised regularly by OGP members, the diving contractor, other operators and key parties.”

The Association of Diving Contractors (ADCI) recommends that companies develop and perform the necessary emergency response drills applicable to their operations. The ADCI Consensus Standards Edition 6.1 Section 11.6 gives numerous suggested drill examples.

For clarity; the US GoM DSWG defines the drills referred to herein as*: Plans, training and preparations, followed by exercises to ensure preparedness for various diving emergency scenarios.*

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Part 3: Regulatory and industry GAP Analysis

In the table below, list the different required or recommended emergency drills / procedures from regulatory agencies and industry organizations. Where appropriate, indicate "D" for Drill or "P" for Procedure" and if necessary, insert any comments.

Item	Description of Drill or Procedure	IMCA	ADCI		USCG	OSHA	IOGP	Comments
1	Loss of Breathing Media		D					
2	Loss of Communications		D					
3	Fouled or Entrapped Diver		D					
4	Injured Diver in Water/Recovery of Unconscious Surface Diver/Recovery of Injured / Unconscious Diver	D	D				D	
5	Severance of Divers Umbilical - Gas Only		D					Diver Recovery Drill
6	Severance of Complete Umbilical		D					Diver Recovery Drill
7	Fire - Topside		D					Procedure. Part of marine fire drill.
8	Fire - Inside PVHO		P					
9	Equipment Failure - Diver in Water/Loss of Power		P					
10	Adverse Environmental Conditions		P					
11	Oxygen Toxicity in Water/ During Treatment/During Decompression	P	P					

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Item	Description of Drill or Procedure	IMCA	ADCI		USCG	OSHA	IOGP	Comments
12	Emergency Evacuation/Launch and Recovery of Emergency Evacuation System (EES)/Hyperbaric Evacuation*	D	D				D	
13	ABV/Dizzy on Ascent		P					
14	Bell to Bell Transfer*		P					
15	CO2 Build-up (in-demand type breathing rig)		P					
16	Contaminated Breathing Gas Supply		D					
17	DCS/Type 1/Type 2		D				D	
18	Diver Shocked While Underwater Welding		P					
19	Fouled Diver, Hose Change		P					
20	Mechanical, Broken Bones & Sprains		P					
21	POIS/AGE/Pneumothorax, Weakness		P					
22	POIS/Mediastinal/ pain, Cough		P					
23	Diver/Tender Heat Exhaustion		P					
24	Unconscious Penetration Diver		P					
25	Unconscious Bell Diver (In The Bell, Out of Bell)	D	D					
26	Hydrocarbons In the Bell/Contaminated Bell/Contaminated Water	D	D				D	
27	Flooded Hat	P						
28	Sick Diver at Depth	P						
29	Injured Diver at Depth/Venomous Marine Life							Procedure/ Supporting narrative needed

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Item	Description of Drill or Procedure	IMCA	ADCI		USCG	OSHA	IOGP	Comments
30	Chemical Burns	P						
31	Hot Water Burns	P						
32	Recompression Emergency*						P	
33	Omitted Decompression						P	
34	Loss of Station Keeping While Diving*							Drill (no diver in the water)
35	Vessel Encroachment (Shallow Water)							Drill
36	Secondary Recovery of Bell*							Procedure
37	Loss of Pressure (Bell/System)*							Drill
38	Thermal Emergency							Procedure
39	Remote Dive Site Emergency (no Chamber on Site)							Procedure
40	Diving from Production/Facility Drills							Fire / H_2S Response

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Part 4: Past Incidents

List some past known incident types such as Near misses, incidents, or fatalities and include a root cause if one was determined. This is a representative sample of past incidents and it will aid the committee in Part 5 of this document which identifies hazards with the task or operation associate with this document. The below list is just a snapshot of some of the different types of incidents in the offshore, inland, and international sector, from 2002-2015 that could had positive influence by the use of drills or procedures.

***Fatalities, LTIs, and Near Misses**

Item	Incident Type	Description of Event	Root Cause	Comments
1	Severed Umbilical	Salvage operation	Unknown	1 incident
2	Injured /Unconscious Diver	Burning and pipeline explosions	Unknown	8 incidents
3	Hose Entanglement	Various scenarios	Unknown	6 incidents
4	Contaminated Gas*	Wrong bailout mix, cylinder incorrectly labeled	Unknown	5 incidents
5	DCS Incident*	Various scenarios	Unknown	7 incidents
6	AGE	Lift bag and manta ray incidents	Unknown	3 incidents
7	Deep Ditch Cave-In	Underwater excavation	Unknown	3 incidents
8	Differential Pressure Entrapment*	Various scenarios (pipeline, dams, intakes)	Unknown	8 incidents
9	Unconscious Diver (sat)*	Various scenarios	Unknown	4 incidents
10	DP-Loss of Station (sat)*	Various scenarios	Unknown	9 incidents
11	First Aid (sat)*	Various scenarios (In-water Injuries/Sat. illnesses)	Unknown	7 incidents

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Part 5: Hazard Analysis

Identify some known and possible hazards to the operation, describe the risk associated with each hazard and provide specific mitigation considerations that could be implemented to reduce or eliminate each risk.

Item	Hazard Identified	Risk Associated with Hazard	Mitigation Considerations (Be Specific)
1	Hose Management	Severed umbilical, hose entanglement, trapped umbilical	Active tending, diver awareness, Risk assess task, comprehensive JSA/JHA
2	Injured or unconscious diver	Underwater burning blowback/explosion, deep ditch cave-in, various scenarios	Risk assess task, comprehensive JSA/JHA,
3	Contaminated breathing media	Wrong bailout mix, cylinder incorrectly labeled, improperly placed exhaust, environmental contamination	Risk assess task, comprehensive JSA/JHA, Quality assurance of all breathing mixtures, understanding and monitoring of the environmental conditions, deck layout of equipment
4	Decompression Incidents	Bends incidents, AGE, differential pressure, injury under pressure, uncontrolled ascent	Risk assess task, comprehensive JSA/JHA, following company policy and procedures, company emergency management scenario
5	Loss of station keeping ability	Injury to diver, hose/bell entanglement or entrapment	Risk assess task, comprehensive JSA/JHA, passive tending, robust watch keeping and monitoring of marine traffic and environmental conditions.

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Part 6: Drills and Preparation

Drill Methods

Scheduled drills (S)

Are part of a worksite's routine, they may be monthly, weekly, or at the start of every project.

Advantages – good for compliance and auditing; work crews become familiar to the routine. There tends to be minor disruption of work activities.

Disadvantages – drills may get redundant or the personnel fail to update them when new risks, hazards or equipment arise.

Unscheduled drills –

These drills are given at a date and time unknown to most participants.

Unscheduled Announced (UA)

These are given at an unknown date and time and are immediately evident to the participants that it is not a real-world occurrence. Example – a ringing of the ships bell followed by an announcement "This is a drill."

Advantages – provides a better baseline on crew readiness.

Disadvantages – may lead to a greater disruption of work activities.

Unscheduled Unannounced (UU)

These are given at an unknown date and time and it is not immediately evident to the participants that it is a drill.

Advantages – give the clearest picture of a crew's readiness.

Disadvantages – may lead to injury or incident (such as actual distress calls) or damage to property/gear as the crew reacts to the emergency.

Table Top Exercises

These are usually "big picture" exercises that may be company-wide in scope. Table tops are also good when the actual drill would entail great expense (example – hurricane evacuation.)

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Types of Drills

A company may use a number of resources to determine what types of drills they require. Industry groups such as ADCI or IMCA have a list of drills for vessels and dive crews. Regulatory bodies also have a number of drills that they require for certification and licensing.

Regardless of the resource used, every company should conduct their own risk assessments that include all possible hazards, and evaluate them as to their likelihood and potential for severity. Once the hazards or scenarios are analyzed the proper mitigations and responses may be developed.

Phases of a Drill

Planning - Planning of the drill involves the drill method, scope, place and time, and participants.

Execution – includes the alert phase/signal method and the actual procedure

Calling the Drill – This is when the objectives or a time limit is met.

Post-Drill –after action report/lesson learned.

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List of drills that should be performed to familiarize the crew of possible risks and hazards.

Item	Drill Name	Describe Drill
1	Loss of Breathing Media	Severance of Divers Umbilical - Gas Only
2	Loss of Communication	Severance of Divers Comm. Wire
3	Fouled or Entrapped Diver	Entanglement or Cave-in
4	Surface Diver Recovery	Injured Diver in Water / Unconscious Diver
5	Severed Divers Umbilical	Divers Umbilical Severed Completely
6	Emergency Evacuation*	Launch and Recovery of Emergency Evacuation System (EES) / Hyperbaric Evacuation.
7	Contaminated Breathing Gas Supply	CO / H2S / Hydrocarbon
8	Decompression Illness	Type 1 / Type 2
9	Unconscious Bell Diver	In the Bell / Out of Bell
10	Hydrocarbons in the Bell	Contaminated Bell / Contaminated Water
11	Vessel Loss of Station Keeping Ability *	Loss of DP / Anchor Dragging / Tie-off Rope Severed
12	Vessel Encroachment	Vessels in Area While Divers in Water
13	Loss of Pressure*	Saturation System on Deck / Bell in Water
14	Platform / Facility Diving	Fire / H2S Response

*Part or all of drill may not be physically possible to perform, but effort should be made where possible with consideration for personnel safety always at the forefront.

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Part 7: Appendix

Insert additional documentation, reports, drawings, etc. in this section that may provide more depth or relevant information to the report. List additional material in table and attach original to the back of this report.

Item	Appendix Item	Description of Item
1	Procedures Tables	While the committee has identified emergency drills for Part 6, contractors and operators may elect to designate certain "procedures" as "drills", based upon the specific aspects of the project.
2	Glossary of Terms	The committee identified a number of terms that may not be familiar to the lay person reviewing this document.

Appendix Item 1: Procedures Table

If a procedure to mitigate an emergency contains:

- Materials need to mitigate the emergency.
- An action by personnel to utilize the material or perform a specific task to mitigate the emergency.

Then

- The material should be verified that it is in place and viable/usable.
  e.g. *"I have verified this material is viable and in its dedicated known location."*
- The personnel that the procedure requires to mitigate the emergency know where the material is and how to use it.
  e.g. *"If this happens I am to grab X material located in Y location and I am to do Z with it."*
- If an individual is required to perform a task then that individual knows what is expected of them and how to perform said task.
  e.g. *"If this happens then my job is to do X."*

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Item	Procedure	Supporting Narrative
1	Fire - Topside	Part of marine fire drill.
2	Fire - Inside PVHO	Part of marine fire drill.
3	Equipment Failure	Diver in Water/Loss of Power
4	Adverse Environmental Conditions	Delta P / weather / currents (sea state)
5	Oxygen Toxicity	In Water/ During Treatment/During Decompression
6	ABV/Dizzy on Ascent	
7	Bell to Bell Transfer	
8	CO2 Build-up (in-demand type breathing rig)	
9	Diver Shocked	Underwater Welding/Burning
10	Fouled Diver, Hose Change	
11	Mechanical, Broken Bones & Sprains	Injured diver at depth.
12	POIS/AGE/Pneumothorax, Weakness	
13	POIS/Mediastinal/ pain, Cough	
14	Diver/Tender Heat Exhaustion	
15	Unconscious Penetration Diver	
16	Flooded Hat	
17	Sick Diver at Depth	
18	Dangerous/Venomous Marine Life	Injured diver at depth.

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Item	Procedure	Supporting Narrative
19	Chemical Burns	
20	Hot Water Burns	
21	Recompression Emergency	
22	Omitted Decompression	
23	Secondary Recovery of Bell	
24	Thermal Emergency	
25	Remote Dive Site Emergency (no Chamber on Site)	

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Appendix Item 2: Glossary of Terms

ABV	Alternobaric Vertigo (Dizzy on Ascent)
ADCI	Association of Diving Contractors International
AGE	Arterial Gas Embolism
Bell	Saturation or Surface Diving Bell
CO	Carbon Monoxide
CO_2	Carbon Dioxide
DCS	Decompression Sickness
DCS Type 1	Decompression Sickness (Pain only symptoms)
DCS Type 2	Decompression Sickness (Neurological deficits and pain symptoms)
Delta P	Differential Pressure
DP	Dynamic Position
H_2S	Hydrogen Sulfide
JHA	Job Hazard Analysis
JSA	Job Safety Analysis
IMCA	International Marine Contractors Association
IOGP	International Oil & Gas Producers
LTI	Lost Time Incident
OSHA	Occupational Safety & Health Administration
POIS	Pulmonary Over-Inflation Syndrome
PVHO	Pressure Vessel for Human Occupancy
Sat	Saturation
USCG	United States Coast Guard