CLOSED CIRCUIT REBREATHER (CCR) DECOMPRESSION DIVING REQUEST

PROJECT TITLE	
DIVER SUBMITTING REQUEST	DATE
E-MAIL ADDRESS	PHONE NUMBER

For **Decompression** or **Mixed Gas** dives complete entire form and submit to NDCSB through LODO/SODO
Air Diluent, No Decompression CCR Dives should use the standard dive plan (NOAA Form 57-03-20) and submit to ndp.diveplans@noaa.gov.

1.0 QUALIFICATIONS

1.1	Certification and Authorization	Yes	No
A.	Will all divers be trained and certified by an accredited diving association (e.g. TDI, IANTD) recognized by NOAA for the equipment, depth and gas mixtures to be used on this project?	☐	☐
B.	Will all divers be currently authorized to dive by the NOAA Diving Program (NDP) or another NOAA-approved reciprocity partner?	☐	☐
C.	Are all training certifications for NOAA divers on file at the NOAA Diving Center (NDC) and have reciprocity partner Letters of Reciprocity (LORs) been reviewed and approved by the UDS?	☐	☐

1.2	Proficiency Requirements	Yes	No
A.	Will all divers have logged a minimum of 12 dives within a six month period prior to the project start date?	☐	☐
B.	Will all divers log a minimum of one (1) dive within the previous 30-day period prior to the project start date in the equipment configuration to be used (e.g. perform work-up dives)?	☐	☐

2.0 EQUIPMENT

2.1	General	Yes	No
A.	In addition to a mask and fins, will all divers carry or wear the following equipment:	☐	☐
	1. Exposure suit?	☐	☐
	2. Buoyancy Compensator Device (BCD) (e.g. dual bladder wings or single bladder and dry suit)?	☐	☐
	3. Redundant lift bags and line reels?	☐	☐
	4. Sufficient bailout gases to complete decompression?	☐	☐
	5. Redundant NOAA-approved decompression computers using the Buhlmann 16 or the ZHL-16 GF algorithm?	☐	☐
	6. Cutting Devices?	☐	☐
	7. Signaling Devices?	☐	☐

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3.0 BREATHING GASES and GAS MANAGEMENT

3.1	Breathing Gases and Gas Management	Yes	No
A.	Will all breathing gases used be medical (USP) or aviator's grade?	☐	☐
B.	Will all breathing mixtures to be used for diving be analyzed for oxygen and helium content using a mixed gas analyzer?	☐	☐
C.	Is it understood that all breathing gases must test within acceptable parameters as specified in the dive tables or computers used?	☐	☐
D.	Will all divers confirm the following information prior to commencing dive operations?		
	1. FO_2 of his/her SCUBA cylinder(s).	☐	☐
	2. PO_2 cut off depth (MOD) and appropriate gas mixture(s) to be used for each phase of the dive.	☐	☐
	3. Planned maximum depth and bottom time for the dive.	☐	☐
	4. Availability of adequate volumes of bailout gas as calculated by using the diver's independent Respiratory Minute Volume (RMV) rate and by review of cylinder pressures.	☐	☐
E.	Will the diver's primary bailout cylinder contain a gas that can be breathed at any depth for the planned dive?	☐	☐
F.	Will all divers calculate and carry the required volume of breathing gases needed for each phase of the dive, plus reserves?	☐	☐
G.	Will all gas systems, components, and storage containers used with oxygen mixtures above 40% by volume, be formally cleaned in accordance with the NOAA Diving Manual (most current Edition)?	☐	☐
H.	Will compressed air used with oxygen concentrations greater than 40% or when used in the preparation of nitrox breathing mixtures with greater than 40% oxygen as the enriching agent, meet or exceed CGA Grade E standards?	☐	☐

4.0 MANNING REQUIREMENTS

4.1	Bottom Divers	Yes	No
A.	Will there be a minimum of two (2) divers functioning as a buddy team?	☐	☐
B.	If any members of the dive buddy team are open circuit divers, will they be trained how to respond to emergency procedures which include at a minimum how to read the CCR diver's PO2 (handsets and HUD), location and operation of O2 and diluent tank valves, location of pressure gauges, locations and operation of isolator valves, how to perform an open loop diluent flush, how to open/close the DSV, how to open the ORV and how to recover an unconscious CCR diver?	☐	☐
C.	Will divers remain in such proximity to each other to render immediate assistance if necessary at all times during the dive - and if separated, initiate the standard separated buddy procedure?	☐	☐
D.	Is it understood that the best practice is for two CCR divers to be paired together whenever possible and that if a CCR diver pairs with an open-circuit diver, the OC diver will at a minimum know how to read the CCR divers PO2 (on handsets and HUD), know how to perform an Open Loop Diluent Flush, how to recover an unconscious CCR diver and how to pipe in offboard gases?	☐	☐

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5.0	CCR SPECIFIC CONSIDERATIONS		
5.1	**CCR Specific Considerations**	**Yes**	**No**
A.	Will all divers complete a new pre-dive checklist with two signatures in the following situations?		
	1. Prior to diving after any time that the unit has been disassembled.	☐	☐
	2. Prior to diving any time after the sorbent, batteries or O2 cells have been changed.	☐	☐
	3. Prior to all mixed gas or decompression dives	☐	☐
	4. Any time it is suspected that the system integrity of the unit has been compromised.	☐	☐
B.	Is it understood that a post-dive checklist will be completed in the following situations?		
	1. Any time the unit is to be disassembled.	☐	☐
	2. When the sorbent is expired and needs to be changed.	☐	☐
	3. After all mixed gas or decompression dives.	☐	☐
C.	Is it understood that if a pre-dive checklist was not completed (in the case of multiple no-decompression dives on the same day) prior to diving the diver will at a minimum conduct a positive/negative pressure test of the loop and a positive pressure check of the BCD?	☐	☐
D.	Is it understood that the diver will turn the gases on before they put the unit on and that they will turn the gases off prior to taking it off?	☐	☐
E.	Is it understood that the diver will pre-breathe the unit for at least five minutes on the surface with their mask on/nose plugged prior to entering the water?	☐	☐
F.	Is it understood that the diver will complete a “deck check” checklist prior to entering the water if a Diving Supervisor is not present to conduct final checks?	☐	☐

6.0	DECOMPRESSION or MIXED GAS DIVING		
6.1	**Science Support Divers**	**Yes**	**No**
A.	Will Science Support divers be on site to support operations?	☐	☐
B.	Will all Science Support divers be trained on how to respond to a CCR diver in an emergency and how to pipe gases into the CCR diver's rig?	☐	☐
C.	Will the Science Support buddy team carry at least one cylinder of all bail out bottles being carried by the CCR divers?	☐	☐
6.2	**Bailout Cylinders**	**Yes**	**No**
A.	Will all bailout bottles carried by the Science Support divers be configured with an open circuit regulator which has an isolation valve on the LP hose next to the second stage and which has a LP ORV on the first stage?	☐	☐
B.	Will all first stages be configured with an LP inflator hose which can be attached to either the mixed gas bypass valve or the O2 manual addition valve?	☐	☐

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6.3	Operational Considerations	Yes	No
A.	Will there be a chase boat with a qualified coxswain onboard who is current in CPR, First Aid, Oxygen Administration and AED (when applicable)?	☐	☐
B.	Will all operations be conducted within two hours of a chamber if there is not a chamber or Hyperlite on site?	☐	☐
C.	Does the hyperbaric chamber meet American Society of Mechanical Engineers (ASME), American Bureau of Shipping (ABS), or equivalent standards?	☐	☐
D.	If a portable hyperbaric stretcher will be used, will evacuation scenarios be demonstrated/practiced with a local Emergency Medical System (EMS)?	☐	☐
E.	Will there be two standby divers, each of which is capable of reaching the bottom or one dedicated safety diver in the water?	☐	☐
F.	Will all divers required to dive to the bottom for decompression dives be appropriately trained, experienced and outfitted to perform such dives?	☐	☐
G.	Is it understood that the maximum depth for decompression using AIR diluent is 150 fsw?	☐	☐
H.	Is it understood that the use of dive computers and/or computer-based decompression generating software program must be approved by the NDP?	☐	☐
I.	Will all bailout gases used while performing in-water decompression contain the same or greater oxygen content than the bottom bailout mix?	☐	☐
J.	Is it understood that at no time will the diver “stage” or otherwise remove their bailout bottles from their harness during a dive except in an emergency?	☐	☐
6.4	**Topside Considerations**	**Yes**	**No**
A.	Is it understood that the on-site Diving Supervisor will determine the procedure for descending to the bottom (i.e., use of down-line versus 'free dropping')?	☐	☐
B.	Will the Diving Supervisor remain at the surface at all times during diving operations?	☐	☐
C.	Will the vessel/boat captain remain on the vessel/boat at all times during decompression operations?	☐	☐
D.	Is it understood that the vessel/boat captain must concur with the Diving Supervisor on the commencement of diving operations and can terminate diving due to weather, vessel-related operational problems, or any other factors that may affect safety?	☐	☐
E.	Is it understood that the Diving Supervisor and the Vessel Captain shall assess current and predicted weather conditions, sea state and current speed and direction and decide whether or not diving can be safely initiated?	☐	☐
F.	Is it understood that the Diving Supervisor must approve any repetitive dives?	☐	☐
G.	Is it understood that the procedures involved with ascending to the surface, i.e., use of ascent-line versus “drift decompression,” must be approved by the Diving Supervisor?	☐	☐
6.5	**Diver Considerations**	**Yes**	**No**
A.	Is it understood that should any member of the bottom team get separated during descent and cannot locate each other within five (5) minutes of reaching the bottom, he/she will terminate the dive and begin ascent/ decompression?	☐	☐
B.	Will all bottom divers be able to signal topside personnel at all times during the dive?	☐	☐

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6.5	Diver Considerations (continued)	Yes	No
C.	Will there be a signaling protocol established that allows the differentiation between routine and emergency situations?	☐	☐
D.	Is it understood that no additional dives will be made until all members of the dive team have completed their in-water decompression and have been on the surface for a minimum of 30-minutes?	☐	☐

7.0 EXPLANATIONS

7.1 Explain all 'No' responses indicated above on this request.

7.2 Provide a brief overview of the diving activities to be conducted.

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7.3 What are the goals, objectives, and tasks to be completed?

7.4 Provide the location and a description of where the dives will be conducted.

7.5 Provide names, affiliations, roles/responsibilities, and qualifications of participants.

7.6 What are the scheduled dates for the operation?

7.7 Provide the name and contact information for the primary and secondary hyperbaric chambers to be indicated on the DEAP.

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8.0 APPROVALS and ENDORSEMENTS

UNIT DIVING SUPERVISOR NAME	UNIT DIVING SUPERVISOR SIGNATURE	DATE
LINE OFFICE DIVING OFFICER NAME	LINE OFFICE DIVING OFFICER SIGNATURE	DATE

9.0 CLOSED CIRCUIT REBREATHER / TECHNICAL DIVER CONTINGENCY PROTOCOLS

9.1 Out of Gas, Onboard diluent cylinder

Bail out to depth-appropriate off-board gas or pipe in off-board gas from the depth-appropriate bailout cylinder. Notify buddy (ies), abort the dive, adjust dive computers to account for gas or diving mode changes (CCR vs OC), and begin ascent conducting all decompression stops (if a decompression obligation has been incurred) while monitoring the gas supply of the bailout.

9.2 Out of Gas, Onboard oxygen cylinder

If conducting no-decompression dives and the onboard supply of oxygen is lost, bail out to off-board gas. If conducting decompression operations, pipe in the off-board oxygen bailout, manually add O_2 and monitor the PO_2. Notify buddy(ies), adjust dive computers to account for gas or diving mode changes (CCR vs OC), abort the dive and begin the ascent conducting all necessary decompression stops while monitoring the gas supply of the bailout.

9.3 Out of Gas, Lost bailout

The CCR diver should go to an on-bottom safety diver (for decompression operations) or a buddy with bailout gas properly configured for CCR response. Any failure from a diver's onboard oxygen supply would require a safety diver or properly configured CCR diver (decompression operations) to transfer an oxygen cylinder for attachment on the diver's harness and remain as a gas source during completion of decompression or until such time as additional bailout can be delivered. Any further bailout gas failure would warrant gas sharing of bailout mix through the offboard connector of a CCR buddy's bailout. If below the depth where support divers are present, an emergency lift bag or surface marker buoy should be launched with a message describing the problem so a support diver can descend with additional cylinders. If during the phase of the dive where support divers are present, divers shall communicate problem to an in-water support diver who shall acquire and deliver spare bailout to diver.

9.4 Gas Failure, Source of problem obvious (BOOM scenario - diluent oxygen)

If the diver can see where the leak is occurring, secure the flow of the affected gas supply by either isolating the ADV, or disconnecting the hose to the manual addition valve or the BC inflator. If the problem is not resolved, the diver will close the valve on the affected side. Either bail out or pipe in appropriate off-board gas (unless the problem is that valve). Immediately perform an open loop diluent flush if the PO_2 spikes. Notify buddy(ies) of problem and abort the dive.

9.5 Gas Failure, Source of problem not obvious (BOOM scenario - diluent oxygen)

If the diver cannot see where the leak is occurring, turn off both the diluent and oxygen valves. Immediately look at both pressure gauges and note on which gauge the pressure is falling. Leave the affected side closed and open the unaffected side, and check the handset for the PO_2. If the gas loss occurred on the diluent side, pipe in off-board gas or bail out. If the gas loss occurred on the oxygen side, bail out immediately as hypoxia will ensue. In either case, notify buddy(ies) of problem and abort the dive. If there is concern over the amount of bailout gas available to reach the surface including decompression, pipe in oxygen from the diver's or the CCR buddy's oxygen bottle to the offboard connector or the oxygen manual addition valve.

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9.0 CLOSED CIRCUIT REBREATHER / TECHNICAL DIVER CONTINGENCY PROTOCOLS (continued)

9.6 Oxygen solenoid stuck open

If the oxygen solenoid is stuck open, as evidenced by the sound of oxygen being continuously injected into the head, immediately close the oxygen valve, and follow with an open loop diluent flush to bring down the PO_2 then check the handset for the PO_2 level. Feather (slowly open and close just enough to add oxygen to the breathing loop) the oxygen valve to maintain an appropriate PO_2. If an offboard cylinder of oxygen is available, it can be piped in via the offboard connector to the offboard valve, or the oxygen manual addition valve and oxygen can be manually added to the loop. If an appropriate PO_2 cannot be maintained, bail out to an appropriate offboard gas. In either case, notify buddy(ies) of the problem and abort the dive. A slow oxygen leak past the solenoid may not be heard, instead, the leak may show up as increased buoyancy and slow PO_2 increase.

9.7 Oxygen solenoid stuck closed

If the oxygen solenoid is stuck closed, as evidenced by no sound of oxygen being injected into the head, first ensure that the oxygen valve on the tank is indeed open. If it is, leave the oxygen valve open and manually add oxygen to maintain an appropriate PO_2. If the oxygen valve is not open, turn it at least one (1) full turn and check to see if the solenoid is properly injecting oxygen. If an offboard cylinder of oxygen is available, it can be piped in via the oxygen manual addition valve or the offboard connector to the off-board valve and oxygen can be manually added to the loop. If an appropriate PO_2 cannot be maintained, bail out to an appropriate offboard gas. In either case, notify buddy(ies) of the problem and abort the dive. In cold water, the solenoid may not be heard at all due to a thick hood and/or ambient noise. A solenoid stuck in the closed position may show up as a slow decrease in buoyancy and a falling PO_2 reading.

9.8 Partially flooded loop

If the Dive Surface Valve (DSV) is removed from the mouth while in the open position, the loop may partially flood. If this happens, either grab the loop overhead with a hand or use both hands to find the loop from the “T” pieces. Once located, put the DSV in the mouth and conduct a loop recovery maneuver. Open the Over-Pressurization Relief Valve (ORV) on the exhalation counterlung, blow into the DSV and simultaneously perform a diluent flush but do not breathe out through the nose. If this does not resolve the problem, bail out to an appropriate offboard gas, notify buddy(ies) and abort the dive.

9.9 Totally flooded loop

A totally flooded loop is non-recoverable and if the diver continues to attempt to breathe off the loop they risk a “caustic cocktail.” Anytime a gurgling sound is heard coming from the inhalation side of the loop, the diver tastes or smells carbon dioxide absorbent, experiences sudden increased breathing resistance, or experiences a sudden loss of buoyancy, suspect a flooded scrubber canister. If any of these scenarios occurs, immediately bail out to an appropriate offboard gas, notify buddy (ies) and abort the dive.

9.10 Total electronics failure

While a total failure of electronics is possible it is not very likely. In the event that a diver experiences total electronics failure of a CCR, immediately bail out, switch the dive computer to open circuit, notify buddy(ies), abort the dive and ascend following the appropriate decompression schedule.

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9.0 CLOSED CIRCUIT REBREATHER / TECHNICAL DIVER CONTINGENCY PROTOCOLS (continued)

9.11 Hypoxia

Hypoxia can occur at a PO_2 of < 0.21 ATA. **If the diver notices the PO_2 is low, DO NOT ASCEND until the situation has been corrected or unconsciousness can occur.** Immediately perform a Diluent Flush maneuver. Check the handsets and the oxygen cylinder pressure and ensure that the oxygen valve is open. Consider the possibility that the solenoid may be stuck in the closed position and attempt to add oxygen manually. Consider also that the wrong gas may be in the oxygen cylinder, or that the cylinders are mounted reversed. If the problem is correctable continue in CCR mode, otherwise bail out, notify buddy(ies) and abort the dive.

9.12 Hyperoxia

Hyperoxia can occur at a PO_2 of > 1.4 ATA. **If the diver notices the PO_2 is too high, do not descend any further until the situation is corrected or unconsciousness can occur.** Immediately perform a Diluent Flush to reduce the PO_2. Check the handsets and if the PO_2 continues to climb, consider that the solenoid may be stuck in the open position, the oxygen manual addition valve may be stuck or the internal fittings may be loose and bleeding into the rebreather head; if the oxygen manual addition valve is stuck, remove the low pressure hose from the valve. If the source of increased oxygen is a stuck solenoid or internal fitting leak, close the oxygen valve and turn it on and off (feathering) to maintain a PO_2 of 1.3. If a constant PO_2 cannot be maintained, bail out to the appropriate gas, notify buddy(ies) and abort the dive. Hyperoxic oxygen convulsions will present themselves in two (2) phases. Phase 1 will place the diver in a state of convulsions, with no respiration, and the diver is likely to clinch their teeth which may serve to keep the DSV in the diver's mouth. In Phase 2 the diver will be relaxed and will start to hyperventilate (breathe fast). The second phase poses a significant risk of drowning if the DSV is allowed to fall out of their mouth.

9.13 Hypercapnia

Hypercapnia can occur if the carbon dioxide is not being properly scrubbed (breakthrough or pushing sorbent past its capacity to remove carbon dioxide), or if there is no scrubber canister in the rebreather. If the diver notices that they “do not feel right,” carbon dioxide may be too high and, if the situation is not corrected, unconsciousness will occur. Immediately bail out to an appropriate gas and do not go back on the loop. Notify buddy(ies) and abort the dive.

9.14 Unconscious CCR diver

A CCR diver should constantly be moving; if not, it could be an indication they are unconscious and may have succumbed to hypercapnia, hyperoxia or hypoxia. If you suspect the diver is unconscious, shake the diver to check. If no response is seen, approach the diver from the back, reach around with the right hand and keep the DSV in the mouth. Check the PO_2 to see what partial pressure is currently being displayed. If possible, perform a vigorous Diluent Flush. Get the diver to the surface as soon as safely possible. Once on the surface, close the DSV or the diver will immediately lose buoyancy if water enters the loop. If the diver regains consciousness, and a decompression obligation exists, consider lowering the setpoint and extending decompression time. If the DSV is not in the diver's mouth, close the DSV and get the diver to the surface as fast as is safely possible. If the diver is unconscious, and a decompression obligation exists, get the diver to the surface and return to the last missed stop and continue decompression with a buddy. Follow omitted decompression procedures by extending all stops shallower than 30 fsw by 1.5 times the originally scheduled time.

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9.0 CLOSED CIRCUIT REBREATHER / TECHNICAL DIVER CONTINGENCY PROTOCOLS (continued)

9.15 "Caustic cocktail"

While some CCRs can tolerate a small amount of water in the system, depending on the location of the leak, the water-trapping capacity of the system may become overwhelmed. Signs of a flood include: gurgling in the inhalation hose, carbon dioxide absorbent smell or taste, increased breathing resistance, drop in temperature of inhaled gas, and loss of buoyancy. If any of these signs are present, immediately bail out to an appropriate gas, notify buddy(ies) and abort the dive. If the caustic cocktail entered mouth, rinse the mouth with surrounding water immediately. If the caustic cocktail was swallowed, drink fresh water, DO NOT attempt to neutralize with vinegar or other acids. If a caustic cocktail has been inhaled and/or burns are present, consider supplemental oxygen, and seek immediate medical treatment. If a caustic cocktail is not present, but the diver suspects some water has entered the loop (gurgling on exhalation) the diver can follow the procedures for a partially flooded loop.

9.16 Over-pressurization Relief Valve failure (OPRV)

If the ORV fails and will not vent gas from the counterlungs on ascent, vent excess gas through the mouth around the mouthpiece or through the nose.

9.17 Omitted decompression

If a bottom diver is asymptomatic, the diver must repeat all stops deeper than and including the 40 FSW stop. The diver shall multiply the 30 FSW, 20 FSW, and 10 FSW stop times by 1.5. The bottom diver shall maximize PO_2 by using the most hyperoxic gas appropriate for the depth without exceeding a PO_2 of 1.6 ATA. If a bottom diver is symptomatic, the diver must be placed on oxygen, hydrated, and evacuated to the nearest recompression facility.

9.18 Dive team unable to reach down-line

If a down-line is used and dive team is unable to reach the down-line during deployment, the divers shall abort the dive and return to the surface. The divers shall then be recovered to the primary support vessel and may elect to make a second drop.

9.19 Dive team separated during deployment

If a dive team finds themselves separated from their buddy(ies) during deployment, the divers should abort the dive after searching for team members for five (5) minutes and return to the surface. Divers will deploy a lift bag to signal to the surface support team and dive vessel(s). The divers shall be recovered to the primary support vessel and may elect to make a second drop.

9.20 Dive team separated on dive site

The Research (bottom) Divers will remain in constant contact (visual range and close enough to render immediate assistance) at all times during the dive. At no time during the dive (regardless of visibility), will the Bottom Divers be separated by more than fifteen (15) feet. Separated divers will perform a visual search for each other for one minute before returning to the base of the down-line or rendezvous point if a down-line is not used. Once at the down-line or rendezvous point, separated divers will allow no more than four minutes to reunite. If the divers have not found one another within five (5) minutes they will abort the dive and head to the surface using appropriate ascent techniques and decompression procedures.

9.21 Dive team separated, swept off dive site

Upon separation and is unable to locate each other, the divers should independently shoot a bag to the surface and commence their own decompression. Divers shall exercise normal decompression procedures, and expect to see Support Diver in the water above them.

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9.0 CLOSED CIRCUIT REBREATHER / TECHNICAL DIVER CONTINGENCY PROTOCOLS (continued)

9.22 Dive team swept off dive site

Divers stay together; attempt to regain position on dive site and abort if necessary. If unable to return to the dive site, abort the dive and commence ascent under an inflated lift bag. Exercise appropriate decompression procedures.

9.23 Diver entanglement on bottom

Divers shall carry at least two knives and an additional cutting tool, either EMT scissors or a seatbelt cutter. If entangled, notify other diver(s) of problem. Evaluate the nature of entanglement and attempt to free self or signal buddy(ies) for assistance. If using the standby diver mode, separated from buddy(ies) and entangled without remedy, inflate bag to surface with penciled distress message on slate attached by snap hook to the bag. The standby diver from primary support vessel shall then enter the water and search for the entangled diver. The other diver, if separated and successfully decompressing on a lift bag, shall be accompanied by the Small Boat. Both vessels will maintain radio contact with each other, but the primary support vessel will remain with the entangled diver and the designated Diving Supervisor will monitor the situation topside. If using the on-bottom safety diver mode, given this contingency or similar difficulties in which a pair of divers will need to assist the expedition team at the bottom, the second dive team of the day (if available) will deploy to assist the entangled diver.

9.24 Dive team unable to locate ascent-line

Remain mindful of bottom time (BT). Divers can either shoot a lift bag on a reel to the surface and begin decompression ascent on the bag line, or, if adequate gas supply is available, take an additional five (5) minutes to search and extend to the next bottom time group. Divers must be on a line beginning ascent by five (5) minutes past original plan. Divers shall carry hard copies of planned decompression schedules and contingencies. Decompress according to the appropriate schedule or according to the dive computer. If divers come up on the bag line, surface support will shift to the divers' location, be they drifting or stationary. In the event of loss of ascent-line, divers will shoot a lift bag and commence a drifting ascent under the bag.

9.25 Buoy or down-line breakaway

Divers shall shoot a bag to the surface on a line reel then decompress on the line in the same manner as if unable to locate the down-line.

9.26 Dive team reaches surface, but dive support vessel is gone

Research (bottom) divers stay together upon reaching surface. Use appropriate signaling device to signal surface craft.

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9.27 Change of environmental conditions during dive

In the time interval between the beginning of a dive and the completion of decompression, it is possible for environmental conditions to change sufficiently to require adjustment to the dive plan.

A. Current Strength - A significant increase in current strength during a dive will make it more difficult for the divers to decompress if they are using a fixed down-line, subjecting the decompressing divers to the full strength of the current. Divers should consider “drift decompression” to be the preferred method in strong currents.

B. Surface Waves or Swell Height - A significant deterioration of sea conditions will make it more difficult for the divers to decompress because the ascent-line (either a hard line anchored to the bottom or a drifting line suspended from a buoy) will rise and fall, sometimes violently, as the dive vessel strains on the line, if at anchor. Therefore, decompressing divers must take care not to hold to the ascent-line too tightly, especially on the shallower stops where the effect is most pronounced. In instances where there is significant movement of the ascent-line, divers should employ one or more lengths of "Jon line" to dampen the motion. One end of the Jon line is looped around the ascent-line and the other is clipped to the diver's "scooter ring." Otherwise the dive team should choose to use drift decompression.

C. Visibility - A significant decrease in visibility on the bottom will make it more difficult for the divers to work, but also might decrease the safety of the divers. Therefore, if the visibility decreases to less than ten (10) feet, the divers should consider terminating the dive.

D. Water Temperature - A decrease in water temperature, due to a deep-layer thermocline or to an alteration of current patterns, will affect diver comfort and, if significant, could affect safety. Divers should wear adequate thermal protection-a well-fitting wet suit and hood, or a dry suit. If water temperature decreases significantly, the dive should be terminated.

9.28 Initiation of subsequent dives

If any emergency arises while one team is in the water, a second team will not commence operations until the problem has been resolved and it has been deemed appropriate to make the second dive.