

# TecRec Distinctive Advanced Wreck Specialty

Authors: Jonas Samuelsson, Chris Haslam and Dan Robinson. Team Blue Immersion. Review Committee: Tony Cooper, Aron Arngrimsson, Erik Brown, Vikki Batten. September 2013.

*This outline is designed for TecRec Distinctive Advanced Wreck Specialty Instructors while teaching Advanced Wreck Specialty Techniques to certified Wreck Divers. The outline specifies required standards that must be met during the course. Allow ample time for the student to repeat each exercise during the course to achieve mastery.*

## Table of Contents

### General Standards

- Prerequisites 2
- Paperwork and Administration 2
- Insurance Requirements 2
- Equipment Requirements 2
- Confined, Limited and Open Water Classifications 3
- Qualifications 3
- Program Sequence and Schedule 4

### Knowledge Development and Practical Application

- Knowledge Development 1-2 5
- Practical Application 1-5 5

### Training Dives

- Key Standards 7
- Training Dive One 9
- Training Dive Two 9
- Training Dive Three 10
- Training Dive Four 10
- Training Dive Five 11
- Training Dive Six 12
- Training Dive Seven 13
- Training Dive Eight 13

### Reading Materials

- Wreck Diving books 15
- Online Articles 15
- Wreck sites around the world 15

## General Standards

Prerequisites:	Instructor: TecRec 50 TMX Instructor Student: Tec50 TMX Diver or qualifying certification from other training agency
Additional Requirements:	If the student is using Sidemount Configuration he/she must also be certified Tec Sidemount Diver in addition to being TecRec 50 TMX Diver.
Instructor Supervision:	Direct Supervision (In-water supervision during all dives)
Minimum age:	18 Years
Student Ratios:	3:1
Minimum Dives:	8
Knowledge Development:	2
Practical Application:	5
Max depth:	50 meters
END:	40 meters
Max penetrations distance:	50 meters
Maximum Decompression:	30 minutes

## Paperwork and Administration

*Student divers must complete the following paperwork before beginning any in-water training.*

- Liability Release and Express Assumption of Risk for Technical Diving.
- Medical Statement. Signed and approved by a Physician from the previous 12 months.
- Tec Diver Statement of Understanding and Learning Agreement

## Insurance Requirements

When teaching the TecRec Advanced Wreck Diver Course, the instructor, must have professional liability insurance that does not exclude diving deeper than 40 meters, making planned decompression dives, or using enriched air, oxygen and helium mixes. Student divers enrolled in the TecRec Advanced Wreck Specialty Course is required to carry diver medical insurance such as the DAN Diving Accident Insurance program that provides coverage for medical care following a dive accident, including recompression and transportation, without exclusions for coverage due to depth or gases used.

## Equipment Requirements

*Each student should have, and be familiar with, all of the following required equipment.*

- Tanks/Cylinders: Students are required to use dual tanks/cylinders connected with a dual-outlet isolator manifold, which allows the use of two first-stages. This can be accomplished either in Backmount or Sidemount configuration. Divers must also have access to minimum one deco tank/cylinder.
- Regulators: Two first-stages, each supplying a single second-stage. One of the second-stages must be on a 2-meter hose (or in Sidemount minimum 1.5 meter hose). One of the first-stages must supply a pressure gauge and provide inflation for a dry suit (where applicable). One first-stage regulator for decompression gas, supplying a single second-stage and pressure gauge.

- Backplate System: Aluminium or steel backplate for backmount with a harness that support 5 d-rings. Minimalist approach is encouraged. Sidemount configuration with integrated harness/buoyancy control device is also acceptable.
- Buoyancy Compensation Device: Wing size and shape should be appropriate to the cylinder size(s) employed for training. Dual bladder is required when not using a drysuit.
- Two bottom timers displaying or one bottomtimer and one multigas computer.
- Wrist Compass
- Updated Decompression Software
- Two masks and rigid fins.
- Two cutting devices: One 'snip' (scissor) and one knife
- Wetnotes and wristslate
- One primary reel, with a minimum of 100 meters of line
- Two spools with 30 meters of line per spool
- One primary light and two reserve lights
- Exposure suit appropriate for the duration of exposure
- Surface Marker Bouy
- 3 Directional Arrows

## **Confined, Limited and Open Water classifications**

### **Definition of Confined Water**

For the purposes of this program, confined water is defined as either a swimming pool or an open water site that offers swimming-pool-like conditions with respect to calmness and depth, with a minimum depth of 2.5 meters.

### **Definition of Limited Open Water**

For the purposes of this program, limited open water is defined as an open water site, fresh or salt, no deeper than 10 meters. There should be no appreciable current and visibility sufficient to not negatively affect student comfort or skill development. Conditions should be sufficiently calm and temperature sufficiently warm that they are not significant factors. It is recommended that there is immediate access to water shallow enough in which to stand.

### **Definition of Open Water**

For the purposes of this program open water is defined as a body of water considerably larger than a swimming pool with the adequate depth and conditions for meeting the performance requirements of each training dive. These may include, but are not limited to, the ocean, lakes, springs and quarries. Student divers should be confident they can handle the demands imposed by the environment while applying and mastering the required procedures and motor skills. Special Considerations for the TecRec Advanced Wreck Diver Specialty. Due to the importance of being clear from any effects of narcosis the maximum equivalent narcotic depth for the purpose of this course is 40 meters. Maximum penetration distance is 50 meters and maximum depth for the course is 50 meters.

## **TecRec Advanced Wreck Diver qualifications**

*The TecRec Advanced Wreck Diver Course is the complete, entry-level skill set for extensive penetration wreck diving. The diver is qualified to make technical wreck penetration/decompression dives within the limits of training and equipment.*

### **A TecRec Advanced Wreck Diver is qualified to:**

- Use air, EANx, oxygen, helium (maximum HE 20% for TMX 50 Divers) for multiple stop decompression wreck dives to a maximum depth of 50 meters using standard open circuit, multiple cylinder backmount or sidemount tec diving configuration, while maintaining a maximum Equivalent Narcotic Depth of 40 meters.
- The student is upon qualification certified to penetrate wrecks at a maximum distance of 50 meters, regardless of depth. For the purpose of this course linear depth is not applied.

## **Program Sequence and Recommended Schedule**

*The TecRec Advanced Wreck Diver course consists of two knowledge development sections, six practical applications sessions and seven training dives. You will find these in the Knowledge Development, Practical Application and Training Dive subsections, each with content/presentation outlines and related standards.*

### **Part 1. Skill Practice, Theory and Practical Application 1-3. (Weekend 1)**

#### **Day 1:**

- Orientation and Administration
- Knowledge Development One
- Practical Application One (Equipment Setup and Configuration)
- Training Dive One (Skill review with focus on trim, propulsion, buoyancy)

#### **Day 2:**

- Knowledge Development Two
- Practical Application Two (Dive planning)
- Training Dive Two (Skill review with focus on emergency drills)
- Practical Application Three (Following guide line and touch contact communication)
- Training Dive Three (Following guideline and touch contact inside wreck)

### **Part 2. Wreck Penetration and Practical Application 4-5. (Weekend 2)**

#### **Day 3:**

- Practical Application Four (Deploying guideline)
- Training Dive Four (Deploying guideline and line entanglement problem solving)
- Training Dive Five (Deploying guideline inside wreck)

#### **Day 4:**

- Practical Application Five (Lost line and lost buddy)
- Training Dive Six (Lost line and lost buddy exercise)

### **Part 3. Wreck Penetration and Independent Planning/Preparation. (Weekend 3)**

#### **Day 5:**

- Independent preparation of a wreck dive including penetration and decompression
- Training Dive Eight (execution of wreck dive including penetration, decompression and emergency scenarios)

#### **Day 6:**

- Independent preparation of a wreck dive including penetration and decompression
- Training Dive Eight (execution of wreck dive including penetration and decompression)

## Knowledge Development

Published with authorization of PADI Course Director Dan Robinson (author of the Knowledge Development Section for the Advanced Wreck Course Outline)

### 1. Knowledge development (learning objectives are covered in the knowledge reviews)

*Section 1 to be completed before training dive 1*

#### a. Equipment considerations

- i. Redundancy is very important as you have learned on your tec courses so far. We will be using the technical dive rigs that you are familiar. This will be either dual tanks with manifold and an isolator valve or sidemount. DIN fittings are less prone to being dislodged in an overhead environment if accidentally knocked. Wing style BC with a double bladder for back up buoyancy. This is particularly important for wreck penetration dives as a bladder could be punctured on a sharp object. Regulators: short hose with SPG and necklace and long hose as primary and for air sharing.
- ii. On this course a spare mask is mandatory equipment, as it is theoretically possible to lose or break a primary mask on a penetration wreck dive. Without a mask it then becomes difficult to follow your planned ascent and decompression requirements, especially if separated from your team.
- iii. As you have already learned you need to carry two means of measuring both depth and time.
- iv. Lights: A large primary dive light for each diver. Lighting head with battery canister is the best option here. Also at least two back up lights per diver. The backup lights should not be rechargeable. The reason for this is that a rechargeable light goes out quickly once discharged, whereas a light with alkaline batteries will dim slowly over a long period of time, giving you at least enough light to exit or follow a guide line. Backup lights should have enough burn time to facilitate an exit from the furthest point of penetration. Hands free operation on the primary light is a good option, such as head mounted lights or a Goodman handle. This leaves the hands free for laying line, operating reels, fine tuning buoyancy, etc..
- v. Reels: Three reels need to be carried by each diver. This gives back up redundancy when working as a team. A main penetration reel (we will mark these off at the 50m maximum penetration limit for the dives on this course). A shorter safety reel used for relocating the main line or searching for a lost team member and a reel for decompression with at least a 2m long marker sausage that is easily visible at the surface.
- vi. Cutting tools: Z knives and small dive knives are most useful here, carry at least two in different places so if you cannot reach one you can reach the other if entangled. Cutting any guide lines is a last resort as other members of the team may require them.

*Knowledge Review 1 should be completed at this point by all students and then checked with the Instructor to ensure understanding of all points.*

#### b. Procedures

- i. Pre-dive check everything. Remember the ABCs: Assume nothing, Believe nobody and Check everything. Always rewind all reels before a dive. This may take time but could save your life in the event of a reel jam. [Dan's Stoney Cove CCR story.]
- ii. Pre-penetration: Orientate and tie off. Stage any cylinders that you will be using for ascent and decompression. Make sure these are secure. It is a good idea to leave a team member on the outside to babysit tanks and act as external support in case of an emergency. Alternatively, tanks may be staged slightly inside in order to reduce visibility to recreational divers outside.
- iii. Penetration: Use careful finning techniques to minimise silting. Note any alternative exit points as you progress deeper into the wreck. Use proper line laying techniques (covered in the next section).
- iv. Turn to the exit when the first diver reaches his turn around point due to time, gas supply (at least rule of thirds applies here), penetration limit or primary equipment failure.
- v. The dive plan on whether to retrieve the lines or not will be followed, lines may be left if further dives are planned on the same wreck, but bear in mind that they will deteriorate over time and could create a further entanglement hazard for other divers who may visit the wreck.
- vi. Once all the team are safely on the outside of the wreck an ascent can be started and required decompression completed as planned, at this point if deco tanks have been staged outside the wreck they should all be checked for gas content and maximum operating depth and donned prior to ascent in the correct positions.

**c. Techniques**

- i. Buoyancy control: Peak performance buoyancy is essential if planning to penetrate a wreck. We will be practicing handling reels, lines and dive lights outside a wreck first on this course to ensure you can maintain perfect positioning while completing other tasks.
- ii. Finning techniques: The frog kick is the most commonly used as this puts the thrust directly behind the diver and when performed correctly it minimises silting. A modified flutter kick, keeping the legs bent upwards slightly at the knees with a smaller stroke can also work well. The diver can also use the pull and glide technique by reaching out with one hand to a part of the wreck and gently pulling himself forwards without moving his fins. When using this technique the diver must be careful where they place their hands.
- iii. Line laying techniques: You need to be able to handle the reel line and a dive light, a hands free light is preferred by the reel diver. Remember when you are laying line that it should be possible to follow back with your eyes shut. So if you wrap a line behind an object make sure that a diver following the line will be able to maintain continuous contact with the line. We will discuss more details in a later section.

*Knowledge Review 2 should be completed at this point by all students and then checked with the Instructor to ensure understanding of all points.*

**d. Hazards of wreck diving and overhead environments**

- i. Disorientation: Very easy to get disorientated in a wreck as they are often not upright.., instead laying on their side or upside down or at some unnatural angle. Have a good look around considering this before entering a wreck.
- ii. Reduced visibility: Good finning techniques and buoyancy control can prevent this somewhat, but bubbles cannot be avoided unless CCR diving and the bubbles will cause lots of silt to form in the rooms and passageways of a wreck. We expect the visibility to be reduced to almost nothing on the exit leg of the dive. Practice touch signals with your buddy, using the Rimbach system (squeeze for stop; push for go; pull for reverse; twist for move to other side of line).
- iii. Entrapment: Entrapment can be avoided in general by not trying to squeeze into tight passageways. Always enter a small space feet first, which will allow an easier exit if you start to get stuck. Bear in mind that if you got into a space you must be able to get out unless the wreck has collapsed around you. Remain calm and slowly extricate yourself. Have a contingency plan to bring a trapped diver more gas.
- iv. Entanglement: This can be with line other than guide lines on the dive. Be careful with guide lines as other divers may need them, the best way is to remain still and have a team member untangle you. This is the reason that we have two cutting tools.
- v. Loss of gas supply: This is one of the greatest fears that a diver has and may produce stress and panic. With our kit it should just be a minor inconvenience if we follow the rules. We can turn off a free flowing regulator and switch to our secondary. We can isolate our manifold conserving gas in the none-leaking side and ultimately we can share gas with our team mates. Practise S drills following a line one behind the other with eyes closed, always complete bubble checks and do not dismiss a small leak that may become a problem later.
- vi. Line hazards: These are created by bad line laying and occur by doorways or where the line traverses an open passageway creating a trap for a swimming diver. Watch where you are going.
- vii. Separated buddy teams: Cover your own light and look for the lights of team mates. Signal by covering and uncovering your light. If you have sufficient gas (more than two thirds of your supply) use a safety reel to search from the main line to look for your buddy so you do not lose the guide line yourself. If you do not locate your buddy after a complete sweep or have less than two thirds of your supply remaining head to the exit point and wait outside the wreck. If separated buddy teams both do this they may meet up before reaching the exit.

*Knowledge Review 3 should be completed at this point by all students and then checked with the Instructor to ensure understanding of all points.*

*Section Two to be completed before training dive 3*

**a. Penetration lines**

- i. Tie off points: The line should be secured with a primary tie off outside the wreck (not onto a down line or anchor line in case they move) and again with a secondary tie off just inside the wreck.
- ii. Use the same side: It is better to keep the line to the same side. The line is secured with wraps around secure objects as the lead diver progresses into the wreck. Make sure that the line does not pass

behind something and always wrap the line back on itself so it is easier in zero visibility for a diver to follow the guide line.

- iii. Entanglement traps: Needless to say, avoid sharp objects. If, for example, the line would extend through a doorway around a point that could cause the line to be severed, it should be secured just before and after the obstruction so only a small gap will result if the line breaks, which could be overcome by the following diver. Avoid creating line traps by running the line over open spaces. Be careful around doorways and changes of direction.
- iv. Using safety reels: These are used to search for a lost team member or the main penetration line if it has been lost. The diver secures one end of the line to a secure point where they are and then sweeps the compartment or passageway to locate the guide line or their team member.

#### **b. Research and locating**

- i. Libraries and primary research: There is an amazing amount of information to be found in libraries. Much of this information can be now be found on the Internet. Primary research is essential if looking for a wreck that has not yet been discovered.
- ii. Local fishermen and sea users: Local fishermen are a great source of information and will have a good sense as to the whereabouts of things. They may have snagged a net on a wreck being searched for.
- iii. Echo sounders and magnetometers: These are very useful to finally hone in on a wreck. Even used randomly things have been located by accident.
- iv. GPS and position fixing: These are only useful once you have found what you are looking for so you can return to the exact spot.
- v. Diver search methods: Ultimately we have to send down a team of divers to have a look. An effective search method is to have a boat lead the search from the surface. Small areas can be searched effectively section-by-section by divers building up the search area over many dives. In clear waters a towed sled with a divers hanging on is an effective method of covering a large area. The skipper of the boat is responsible for the search pattern. The divers then look, each covering either left or right. If something is spotted, then the divers release the sled. This becomes immediately apparent to the boat skipper, the divers can then investigate and mark the location with a DSMB if they wish to return.

*Knowledge Review 4 should be completed at this point by all students and then checked with the Instructor to ensure understanding of all points.*

#### **c. Contingency Planning**

*A Good Diver's Main Objective Is To Live.* You should remember this from your PADI TecRec courses so far. Now let us look at how each point may apply to planning technical advanced wreck dives.

- i. Gas management: Strict adherence to at least the rule of thirds is mandatory when conducting wreck penetration dives. Be conservative with SAC rates as in a stressful situation these can increase drastically. Gas matching of team members may be a useful exercise here.
- ii. Decompression requirements: Plan here for dives with longer bottom times in case of delays reaching the exit point and remember to take these back up plans with you. Do not rely on dive computers alone.
- iii. Mission: Have a plan on what the team is trying to achieve on the dive and stick to this plan. If something tempts a deviation during the dive, plan another dive to do this (*e.g.* something deeper than planned depth, something that requires further penetration than planned or something that will take longer than planned. On this last point remember that the dive plan supersedes the mission completion. You can always return on another dive. Remember that the overriding mission is for the whole team to return unharmed.
- iv. Oxygen: Be conservative with the partial pressure of oxygen at the planned depth, for example plan a dive with a maximum of 1.2 ata oxygen instead of 1.4.
- v. Inert gas narcosis: On a wreck penetration dive it is particularly important to be alert, so at depths over 30m you may use trimix to reduce narcosis. If you trained in trimix diving (Tec Trimix 45, 50, 65, 90 or equivalent) we can use trimix on this course appropriate for the dives. If certified use trimix on dives that are shallower than you would use trimix for on open water dives.
- vi. Thermal exposure and abrasion protection: The latter is an important consideration when penetrating wrecks even in tropical waters. Wrecks are made of rusty metal and sea water is full of organisms, plus even small wounds heal slowly in the tropics. Full suits, gloves and hoods are recommended on all dives. (Warm water softens the skin.) Have sufficient back up buoyancy in case of a dry suit puncture; this diver will need team support and be watched carefully for signs of hypothermia on the ascent and decompression.
- vii. Logistics and emergency planning: Arrange for a support team on the surface to have a good knowledge of what you are doing, what your expected run times are and when you will be expected at

certain depths for decompression. Have extra decompression gas available at the surface and a means of getting it to decompressing divers. If diving a wreck in tidal areas calculate this into your run times so you do not get caught in a strong current and plan for drift hangs as standard.

- viii. Local regulations: Penetration of wrecks is often limited to qualified wreck divers. Gloves may be discouraged in order to protect our beautiful underwater world, but they should be used to protect the hands of respectful divers. Usually, no removal of any artefact or any marine life is permitted. No solo diving may be permitted.
- ix. Project AWARE—responsible wreck diving: Local regulations, examples of which we have just discussed, encourage responsible wreck diving. A good rule of thumb is to leave the wreck as you would like to find it. This usually means as you found it, with the possible exception of removing entanglement hazards, e.g. loose lines. In coral reef environments, corals should not be damaged. Excessive silting can also damage corals and other marine life. Depending on where you are, there may be potential hazardous marine life to be avoided, say *balistoides viridescens*, *pterois sp.*, etc..

*Knowledge Review 5 should be completed at this point by all students and then checked with the Instructor to ensure understanding of all points.*

### **Knowledge Review 1**

- I. Why is the use of a long hose particularly useful for wreck penetration dives?
- II. Why are DIN fittings preferred for wreck penetration dives?
- III. What type of buoyancy control device should we be using for technical advanced wreck diving?
- IV. Why is having redundant buoyancy more important on wreck dives?
- V. What is the rationale for carrying a spare mask?
- VI. What is the best way to carry your primary light when wreck diving?
- VII. Why is it recommended that back up lights are not rechargeable?
- VIII. Define how many reels the diver should carry and what each is used for.
- IX. What is the maximum penetration linear distance permitted in this course and how do you ensure that this is not exceeded?
- X. Why should you stow your cutting tools in different places?

### **Knowledge Review 2**

- I. What are the ABCs of preparation?
- II. Where and how should you stage deco cylinders?
- III. List three things you should be doing when you start penetrating a wreck.
- IV. List three turn around points that must be adhered to.
- V. Describe why you should retrieve any penetration lines from a wreck and list circumstances when the lines should be left in place.
- VI. When should the team start an ascent from the wreck?
- VII. Which skill should be second nature when penetrating a wreck so you can concentrate on other tasks?
- VIII. List three propulsion methods you can use inside a wreck to minimise silting.



- IX. When using a pull and glide technique to move through a wreck, what do you need to be extra careful of?
- X. When laying a line, give the reason you should not lay the line behind an object to keep it taut and out of the way.

### **Knowledge Review 3**

- I. Name one technique to avoid disorientation when navigating inside a wreck.
- II. How can you reduce silting caused by bubbles when navigating inside a wreck?
- III. How do you signal your team mate in zero visibility?
- IV. If you wish to enter a small passageway, which part of your body should go first and why?
- V. What is the optimum way to behave when tangled in line in order to become untangled?
- VI. What do you do when the regulator you are breathing from is free flowing?
- VII. You have a manifold leak from the burst disc on your left post regulator. What actions do you take?
- VIII. Describe the position you should adopt while sharing air with a long hose from your team mate in a small passage.
- IX. Describe a common guide line hazard and how you avoid getting tangled in it.
- X. What actions should you take if separated from your team mate or buddy?

### **Knowledge Review 4**

- I. Describe how you would tie off your line at the start of a wreck penetration.
- II. Why should you not tie your penetration line to a boat anchor line in low visibility so you can find your way back to the boat easily after exiting the wreck?
- III. When laying a line why should you keep it on the same side of the passageway?
- IV. How do you ensure that a diver can follow your line all the way back in zero visibility?
- V. Describe how you would lay a line around an obstruction that may cut through the line if the line is moved too much, such as a narrower doorway in a passage?
- VI. Describe how to use your safety reel when you have lost the main penetration reel.
- VII. Name four useful sources of information when researching for wrecks in your area.
- VIII. Describe how you would use an echo sounder and magnetometer.
- IX. Describe how you would use a GPS system.
- X. What diver search method is especially effective in good visibility?

### **Knowledge Review 5**

- I. What extra considerations do you need to take in the gas management phase of planning technical advanced wreck dives?
- II. What extra considerations do you need to take in the decompression planning phase of technical advanced wreck dives?
- III. What extra considerations do you need to take in the mission planning phase of technical advanced wreck dives?

- IV. What extra considerations do you need to take in the oxygen management phase of planning technical advanced wreck dives?
- V. What extra considerations do you need to take in the inert gas narcosis management phase of planning technical advanced wreck dives?
- VI. What extra considerations do you need to take in the thermal and exposure protection phase of planning technical advanced wreck dives?
- VII. What extra considerations do you need to take in the logistics phase of planning technical advanced wreck dives?
- VIII. Which piece of wreck diving equipment is not allowed in some locations? Describe what extra care is needed without this equipment.
- IX. In responsible wreck diving what are you allowed to take back from the wrecks you visit?

## **Practical Application One (Part 1 and 2)**

### **Part 1 Equipment Configuration**

1. Assign the students to work as a team
2. Review proper rigging with a set up kit or kits, including deco cylinder with markings, mask, fins, gauges, exposure suit, lights, slates, wetnotes etc. The kit or kits should be in the configuration(s) that students will be using. Emphasize equipment matching and the importance of a balanced rig during the review.
3. Tell the class that, working as teams, they're to set up their equipment in an appropriate configuration modeled on your example and what they've prepared.
4. Be available to answer questions and assist with configuration challenges.
5. When complete, students present their kits as teams for you to assess. Note any discrepancies and have the team correct them and then present their rigs again as a team.

### **Part 2 Propulsion techniques and proper body position**

1. Lay on the ground wearing fins to demonstrate propulsion techniques like frogkick, modified frogkick, flutter kick and back finning. Emphasize on proper body position in trim with arched back, head tilted backwards, squeeze the 'bum' and arms in front like you were driving a motor cycle. Also demonstrate the importance of not 'spreading' the legs while kicking. These are skills that need to be build with muscle memory, give ample of time to practice on land and underwater.
2. Have the students to practice while laying down in 'trim' position. Give tips and hints how to improve.

## **Practical Application Two**

### **Dive planning using decompression software**

1. Assign the students to work as a team
2. Demonstrate one or more types of desk top decompression software, showing students how to launch the program, enter settings and plan a wreck decompression penetration dive similar to what they will be making during the course.
3. Assign the team to plan one of the dives during the course using desk top decompression software and accounting for all steps of the a 'Good Diver's Main Objective Is To Live' dive planning steps based on information you provide. Emphasize on gas management.
4. As part of the planning process, think backwards through the dive from the furthest point imagining realistic problems that could come between the team and surfacing safely, and formulating realistic solutions for each, and making them part of the dive plan. Have students provide you with a list of problems and solutions.

## **Practical Application Three**

### **Use of touch contact**

1. Assign the students to work in teams of two
2. Demonstrate the proper use of guidelines using primary tie-off, secondary tie-off and tie-offs. Review to how to avoid line-traps. Demonstrate techniques for touch contact.
3. Assign the buddy teams to simulate out of air situations using touch contact to find their way out of the 'wreck'. Do both where students have visual and while being blind folded.

## **Practical Application Four (Part 1 and Part 2)**

### **Part 1. Students each play leader and lay guideline**

1. Assign the students to work in a team
2. Repeat, from Practical Application 3, demonstration of the proper use of guidelines using primary tie-off, secondary tie-off and tie-offs. Review to how to avoid line-traps.
3. Have each student to be the 'leader' to lay the guideline including primary, secondary tie-offs. Repeat touch contact after line is laid.

### **Part 2. Entanglement**

1. Demonstrate correct procedures if entangled in the line. Show techniques how to cut line and repair it again.
2. Have each students use their "snips" to cut the line while being entangle and show proper techniques how to repair line, using directional arrows, after detangle themselves.

## **Practical Application Five (Part 1 and Part 2)**

### **Part 1. Lost line**

1. Assign the students to work in teams of two
2. Demonstrate the proper techniques to find a lost line using spools to search the 'room'. Show how to attach the spool to an object simulated being inside a wreck and doing sweeps. Emphasize the importance of attaching the spool line to the guideline after its been located.

3. Have each student to practice using a spool to attach it to an object and doing sweeps to find the missing line.

## **Part 2. Missing Diver**

1. Assign the students to work in teams of two

2. Demonstrate the proper techniques to find a missing diver by first go to the highest point of the room, holding the lights against your body and see if you get a visual. Also show how to use the spider net method to find a missing diver.

3. Have each student to practice both the technique of getting a visual from a 'vantage point' and using the spider net method to find a missing diver.

## **Key Standards: Training Dives 1-7**

### **Skill Practice Dives:**

#### **Training Dive One**

- Environment: Confined water or limited open water
- Minimum Depth: 2.5 meters
- Maximum Depth: 10 meters
- Decompression: No stop only
- Gases: Air, EANx up to EANx50
- Ratios: 3:1

#### **Training Dive Two**

- Environment: Confined water or limited open water
- Minimum Depth: 2.5 meters
- Maximum Depth: 10 meters
- Decompression: No stop only
- Gases: Air, EANx up to EANx50
- Ratios: 3:1

### **Introductory Wreck dives**

#### **Training Dive Three**

- Environment: Open Water
- Minimum Depth: 10 meters
- Maximum Depth: 18 meters
- Penetration: 10 meters, Stay within the light zone of the exit
- Decompression: No stop only
- Gases: EANx with one decompression gas
- Ratios: 3:1

#### **Training Dive Four**

- Environment: Open Water
- Depths: Minimum: 10 meters
- Maximum 18 meters
- Penetration: 20 meters, Stay within the light zone of the exit
- Decompression: No stop only
- Gases: EANx with one decompression gas
- Ratios: 3:1

### **Training Dive Five**

- Environment: Open Water
- Depths: Minimum: 18 meters
- Maximum 30 meters
- Penetration: 20 meters, Stay within the light zone of the exit
- Decompression: No stop only
- Gases: EANx with one or more decompression gases
- Ratios: 3:1

### **Wreck dives beyond the light zone of the Wreck**

#### **Training Dive Six**

- Environment: Open Water
- Minimum Depth: 18 meters
- Maximum Depth: 30 meters
- 30 meters maximum penetration, allowed to penetrate beyond the light zone of the exit
- Decompression: Max 20 minutes decompression.
- Gases: EANx with one or more decompression gases
- Ratios: 3:1

#### **Training Dive Seven**

- Environment: Open Water
- Minimum Depth: 24 meters
- Maximum Depth: 50 meters
- 50 meters maximum penetration, allowed to penetrate beyond the light zone of the exit
- Equivalent Narcotic Depth: 40 meters
- Decompression: Max 30 minutes decompression.
- Gases: Trimix or EANx with one of more decompression gases
- Ratios: 3:1

#### **Training Dive Eight**

- Environment: Open Water
- Minimum Depth: 24 meters
- Maximum Depth: 50 meters
- 50 meters maximum penetration, allowed to penetrate beyond the light zone of the exit
- Equivalent Narcotic Depth: 40 meters
- Decompression: Maximum 30 minutes Decompression
- Gases: Trimix or EANx with one of more decompression gases
- Ratios: 3:1

## **Training Dives 1-7 Performance Requirements and Suggested Techniques**

### **Skill Training Dives**

#### **Training Dive One**

- Environment: Confined water or limited open water
- Minimum Depth: 2.5 meters
- Maximum Depth: 10 meters
- Decompression: No stop only
- Gases: Air, EANx up to EANx50
- Ratios: 3:1

#### **To successfully complete this training dive, the student must be able to:**

1. Demonstrate Pre-dive check with team member on land.
2. Being able to perform Bubble Check, Equipment Matching and Long hose check before descending
3. Being able to perform bubble check/descent check at 5 meters during descent
4. Demonstrate efficient propulsion techniques by using: Frog kicks, Flutter kicks, Helicopter turns and Back finning.
5. Ability to stay in Trim Position without deviate more than 30cm up or down and without use of fins.
6. Demonstrate proper weighting before and after the dive. Using both full and used deco cylinders
7. Demonstrate 10 Hand and Light signals related to overhead environment diving.

#### **Suggested Procedures:**

Have each buddy team check each others equipment after gearing up. Also demonstrate the Bubble check, Equipment Matching and Long hose check before descending for skill practice. Make sure students equipment are matched in order to react faster to emergency scenarios later in the course. Perform a bubble/descent check at five meters while staying without deviating from depth more than one meter. Conduct the trim and propulsion exercises in 5 meters of water or shallower. Make sure the student arch their backs and squeeze their 'bums' during the trim exercise and have their arms in front of them in a position similar to driving a motorcycle. Emphasize the importance of not spreading the legs during the propulsion exercise. Have the student demonstrate minimum 10 hand and light signals related to technical diving.

#### **Training Dive Two**

- Environment: Confined water or limited open water
- Minimum Depth: 2.5 meters
- Maximum Depth: 10 meters
- Decompression: No stop only
- Gases: Air, EANx up to EANx50
- Ratios: 3:1

#### **To successfully complete this training dive, the student must be able to:**

1. Demonstrate Pre-dive check with team member on land.
2. Being able to perform Bubble Check, Equipment Matching and Long hose check before descending
3. Being able to perform bubble check/descent check at 5 meters during descent
4. Remove and Replace mask in trim position without deviating from current depth
5. Perform Air Sharing with team member while swimming 20 meters
6. Perform Air Sharing during ascent. Stops at 9 meters for 2 min, 6 meters for 2 min, 3 meters for 2 min.

7. Perform Air Sharing in contact with a guideline while both donor and receiver wearing black-out masks
8. Demonstrate correct procedures for primary light failure
9. Staging of tanks on guideline

### **Suggested Procedures:**

Have the students at a depth of 5 meters facing each other, in trim position and without deviating from that depth with more than 50 cm, while show the ability to remove primary mask and replace with back up mask found in right pocket. Ask the students to simulate primary light failure by storing the light by attaching it to the right top D-ring and by preparing the use of one of the backup torches attached to the harness. Have the students in buddy teams to perform air sharing exercises where they simulate being inside a wreck and swimming out of it for a distance of 20 meters. Then simulate exiting the wreck and prepare for an air sharing ascent where the teams stay at 9 meters for 2 minutes, 6 meters for 2 minutes and 3 meters for 2 minutes while continuously performing air sharing. Set up a guideline at 10 meters and have the students to practice air-sharing where both the donor and receiver use black-out masks. Emphasize the importance of having contact with the line at all time and the use of touch contact to move forward, stop and backwards.

### **Training Dive Three**

- Environment: Open Water
- Minimum Depth: 10 meters
- Maximum Depth: 18 meters
- Penetration: 10 meters, Stay within the light zone of the exit
- Decompression: No stop only
- Gases: EANx with one decompression gas
- Ratios: 3:1

### **To successfully complete this training dive, the student must be able to:**

1. Demonstrate Pre-dive check with team member on land.
2. Being able to perform Bubble Check, Equipment Matching and Long hose check before descending
3. Being able to perform bubble check/descent check at 5 meters during descent
4. Demonstrate deployment of guideline outside the wreck using both primary and secondary tie-offs.
5. Demonstrate proper hand and light signals.
6. Able to dive the outside of the wreck without silting and staying in trim during the complete dive.
7. Staging deco cylinders on the guideline

### **Suggested Procedures:**

Students each demonstrate how to lay guidelines using both primary, secondary tie-offs and tie-offs. This dive is a non-penetration dive. Have the student dive around the outside of the wreck to demonstrate the ability of proper trim and propulsion. The students show the ability to communicate with hand and light signals. Have the students to stage their deco cylinders on the guideline. Remember to attach each deco cylinder using both clips for extra security. The student complete the dive by ascending doing simulated decompression by stopping at 12 meters for 3 minutes, 9 meters for 3 minutes, 6 meters for 3 minutes and 3 meters for 3 minutes. Conduct an ascent from 3 meter to the surface not faster than 1 meter/minute.

## **Introductory Wreck Dives**

### **Training Dive Four**

- Environment: Open Water
- Depths: Minimum: 10 meters
- Maximum 18 meters

- Penetration: 20 meters, Stay within the light zone of the exit
- Decompression: No stop only
- Gases: EANx with one decompression gas
- Ratios: 3:1

**To successfully complete this training dive, the student must be able to:**

1. Demonstrate Pre-dive check with team member on land.
2. Being able to perform Bubble Check, Equipment Matching and Long hose check before descending
3. Being able to perform bubble check/descent check at 5 meters during descent
4. Perform a no-stop wreck penetration dive in proper trip and use of effective propulsion technique
5. Follow a guideline(visually)
6. Follow the guideline with no mask/blacked out mask
7. Students deploy guideline outside and inside the wreck.
8. Demonstrate proper entry and exit in the wreck
9. Use of hand and light signals
10. Outside the wreck perform problem solving skills when entangle in line or net by using 'snips' to cut line or fishing net.
11. Perform a simulated decompression during ascent stopping at 12 meters

**Suggested Procedures:**

Have the students to prepare a no-stop wreck penetration dive using V-Planner to plan the dive. Have each student to wear the main plan on a wrist slate and back up plans in their wet notes. Descent to the wreck and have the students in team deploying a guideline with primary and secondary tie-offs and penetrate the wreck for a maximum distance of 20 meters. The students should at all times keep contact with the guideline. One student is the "Reel-diver" and lead the dive in and reel the line back to the exit. Students should maintain trim and proper propulsion techniques during the complete dive. The use of hand and light communication should be encouraged throughout the dive. During the dive have the students to show the ability of following the guideline visually first and secondly be able to follow the guideline with no mask/blacked out mask. Upon exiting the wreck have the student practicing problem solving when being entangle. Practice entanglement in guideline/fishnet and have the student to cutting them self free using their 'snips'. End the dive by performing a simulated decompression with stops at 12 meters for 5 minutes, 9 meters for 5 minutes, 6 meter for 5 minutes and 3 meters for 5 minutes (total decompression time 20 minutes). Student should ascent during the last 3 meters to the surface with a maximum ascent rate of 1m/minute.

**Training Dive Five**

- Environment: Open Water
- Depths: Minimum: 18 meters
- Maximum 30 meters
- Penetration: 20 meters, Stay within the light zone of the exit
- Decompression: No stop only
- Gases: EANx with one or more decompression gases
- Ratios: 3:1

**To successfully complete this training dive, the student must be able to:**

1. Demonstrate Pre-dive check with team member on land.
2. Being able to perform Bubble Check, Equipment Matching and Long hose check before descending
3. Being able to perform bubble check/descent check at 5 meters
4. Perform a no-stop wreck penetration dive in proper trip and use of effective propulsion technique
5. Students deploy guideline outside and inside the wreck.



6. Students should perform air sharing exercise with touch contact.
7. Removal and Replacement of mask while being in contact with the guideline during the complete exercise
8. Air-sharing exercise through a restriction with mask on.
9. Simulated decompression during the ascent

### **Suggested Procedures:**

Prepare a no-stop decompression wreck penetration dive using desktop software, like V-planner. Use slate and wet notes like previous dives. Conduct all safety checks during equipment setup and before descent. Make sure students perform bubble check / descent check again at 5 meters. Descent to the wreck and have the student to deploy a guideline with primary and secondary tie-offs. Assign one student to be the "Reel Diver" to lay the line inside the wreck, maximum distance 20 meters. After the line is laid have the students to remove and replace their masks while being in contact with the guideline during the complete exercise. Have the students in buddy teams to perform air sharing exercise to the exit while performing touch contact. Close to the exit have the students also perform an air sharing exercise in buddy teams, with their mask on, through a restriction using touch contact. Perform simulated decompression during the ascent with stops at 18 meters for 3 minutes, 15 meters for 3 minutes, 12 meters for 3 minutes, 9 meters for 3 minutes, 6 meters for 3 minutes and 3 meters for 3 minutes. Use 1 meter/minute ascent rate during the last 3 meters to the surface.

## **Wreck dives beyond the light zone of the Wreck**

### **Training Dive Six**

- Environment: Open Water
- Minimum Depth: 18 meters
- Maximum Depth: 30 meters
- 30 meters maximum penetration, allowed to penetrate beyond the light zone of the exit
- Decompression: Max 20 minutes decompression.
- Gases: EANx with one or more decompression gases
- Ratios: 3:1

### **To successfully complete this training dive, the student must be able to:**

1. Demonstrate Pre-dive check with team member.
2. Being able to perform Bubble Check, Equipment Matching and Long hose check before descending
3. Being able to perform bubble check/descent check at 5 meters
4. Perform a wreck penetration dive with maximum 20 minutes decompression time, in proper trip and use of effective propulsion technique
5. Students deploy guideline outside and inside the wreck.
6. Students alternate to be the leader to deploy guideline including primary, secondary tie-offs, tie-offs and placements.
7. Simulate Primary Light failure and exit the wreck on a back up light.
8. Staging of one or more deco tanks to the guideline.
9. Gas sharing exit following the line visually
10. Gas sharing exit through restriction with blacked out mask
11. To be able to find a lost guideline in overhead environment
12. To be able to find a missing diver in overhead environment

### **Suggested Procedures:**

1. Have the students to plan the dive using decompression software. Emphasize the importance of gas management and turn points. Carry two deco cylinders per diver. Perform pre-dive checks on land during the equipment setup. Make sure all tanks are properly marked with Maximum Operating Depth. Have students independently perform the three surface checks before descending. (Equipment matching, Bubble check, Long hose check). Students do bubble check and

descent check at 5 meters. Descent to the wreck and have the students to work in team to deploy guideline including primary and secondary tie-offs. Assign the "Reel-diver" to lay the line into the wreck for a maximum distance of 30 meters. Inside the wreck have the students to perform lost line drill inside the wreck. Assign one student to be blind folded, that same student use his/her spool to attach it to a fixed point in the wreck and then make a sweep following the ceiling of the wreck, following the wall and 'fish' for the lost line. When guideline is found attach the spool to the guideline and exercise is completed. Alternate roles. Also have the students to demonstrate ability to find a missing diver inside a wreck. The one diver goes missing and the other is searching by holding the light towards the body and try to get visual. If diving in a large wreck ascent to the ceiling of the wreck and look to get a visual of light. If missing divers light not seen at this point conduct a 'spidernet' search. Attach the spool to the guideline and do sweeps from there to a wall along the wreck, attach the line to the wall and swim back to the guideline, attach the spool to the guideline again and continue until you have a 'spidernet' of line. If the missing diver is lost he/she is likely to swim into the line and can follow it back to the guideline in the case that the 'searching diver 'have not already find him/her. Have the students to simulate primary light failure and exit the wreck using the back-up light. During this dive the student should also perform a Gas sharing exit following the line visually and Gas sharing exit through restriction with blacked out mask. Upon exiting the wreck complete the decompression phase of the dive.

### **Training Dive Seven**

- Environment: Open Water
- Minimum Depth: 24 meters
- Maximum Depth: 50 meters
- 50 meters maximum penetration, allowed to penetrate beyond the light zone of the exit
- Equivalent Narcotic Depth: 30 meters
- Decompression: Max 30 minutes decompression.
- Gases: Trimix or EANx with one of more decompression gases
- Ratios: 3:1

### **To successfully complete this training dive, the student must be able to:**

1. Demonstrate Pre-dive check with team member.
2. Being able to perform Bubble Check, Equipment Matching and Long hose check before descending
3. Being able to perform bubble check/descent check at 5 meters
4. Perform a wreck penetration dive with maximum 20 minutes decompression time, in proper trip and use of effective propulsion technique
5. Independently prepare and execute a wreck penetration dive with decompression obligation
6. Students deploy guideline outside and inside the wreck.
7. Students alternate to be the leader to deploy guideline including primary, secondary tie-offs, tie-offs and placements.
8. Staging of one or more deco tanks to the guideline.
9. To be able to find a lost guideline in overhead environment
10. To be able to find a missing diver in overhead environment

### **Suggested Procedures:**

The students work in teams to plan and execute the complete dive independently (under the direct, but passive, supervision of the instructor). Instructor is supervising all the steps and should be available for consultation and be prepared to step in if safety requires it. Ensure during the planning and execution that all students stay within the limits of the dive in terms of bottom depth, END, penetration distance and total decompression time.

Tell the students to prepare for any events like entanglement, missing diver, lost line, equipment failure. Add one or maximum two scenarios unknown to the students at the beginning of the dive. Examples could be an air-sharing exercise using touch contact to the exit of the wreck or missing diver scenario. The students work as teams to solve all problems during the scenarios.

## **Training Dive Eight**

- Environment: Open Water
- Minimum Depth: 24 meters
- Maximum Depth: 50 meters
- 50 meters maximum penetration, allowed to penetrate beyond the light zone of the exit
- Equivalent Narcotic Depth: 30 meters
- Decompression: Max 30 minutes decompression.
- Gases: Trimix or EANx with one of more decompression gases
- Ratios: 3:1

### **To successfully complete this training dive, the student must be able:**

1. Demonstrate Pre-dive check with team member.
2. Being able to perform Bubble Check, Equipment Matching and Long hose check before descending
3. Being able to perform bubble check/descent check at 5 meters
4. Perform a wreck penetration dive with maximum 20 minutes decompression time, in proper trip and use of effective propulsion technique
5. Independently prepare and execute a wreck penetration dive with decompression obligation
6. Simulated silt out plus out of gas - Blacked out, touch contact, out of gas exit

### **Suggested Procedures:**

The students work in teams to plan and execute the complete dive independently (under the direct, but passive, supervision of the instructor). Instructor is supervising all the steps and should be available for consultation and be prepared to step in if safety requires it. Ensure during the planning and execution that all students stay within the limits of the dive in terms of bottom depth, END, penetration distance and total decompression time. The dive is ended with Simulated silt out plus out of gas - Blacked out, touch contact, out of gas exit – one of the team is out of gas, everyone makes contact with the line (okays the line), no re-ordering of the team due to the risk of losing the line in a silt out, touch contact exit. Suggest this skill is done in small chunks e.g. simulate silt out first (have divers disable any computer displays that are constantly lit up then put their torch onto their SPGs so the instructor can see them glowing during the exercise and monitor gas, then turn off lights) so all divers make contact with the line and start to exit. Once all comfortable and starting to swim the instructor indicates that one of the divers is out of gas. Out of gas diver remains in contact with line with one hand and runs the other hand along the line to find their team member. Once they locate the team member's hand they run their hand up their arm, over the shoulder to the head of other team member to find the reg in their mouth, gently takes donor's reg from mouth, removes his own reg and breathes from donated reg, donor keeps one hand on line and uses other hand to assist with putting backup reg in mouth (if required). Donor should not change orientation on the line, no matter whether out of gas diver is in front or behind. If out of gas diver must turn to diver behind them to get gas they must remain in contact with the lines at all times and take care not to kick the donor when they turn back towards the exit. Touch contact resumed and team continues with exit. Upon exiting the wreck conduct decompression phase of the dive.

## Reading Materials

- Books:** Advanced wreck diving guide, by Gary Gentile  
Wreck Diving Specialty Manual, by PADI
- Online Articles:** <http://www.advanceddiver magazine.com/articles/wreck.html>
- Forums:** <http://www.scubaboard.com/forums/wreck-diving/>
- International Protection Laws:** <http://www.mcdonald.cam.ac.uk/projects/iarc/culturewithoutcontext/issue16/papa-sokal.htm>  
[http://en.wikipedia.org/wiki/Shipwreck#Shipwrecks and the law](http://en.wikipedia.org/wiki/Shipwreck#Shipwrecks_and_the_law)
- Environmental Organizations:** <http://www.projectaware.org>
- Interesting Ship Wrecks:** [http://www.divetime.com/articles/Scuba\\_Diving\\_Trivia/The\\_World\\_s\\_Best\\_Wreck\\_Dives\\_249.html](http://www.divetime.com/articles/Scuba_Diving_Trivia/The_World_s_Best_Wreck_Dives_249.html)  
<http://www.adventuresportsholidays.com/blog/2010/03/12/top-10-wreck-dives-worldwide/>  
[http://en.wikipedia.org/wiki/List\\_of\\_wreck\\_diving\\_sites](http://en.wikipedia.org/wiki/List_of_wreck_diving_sites)
- Wreck Diving Magazine:** <http://www.wreckdivingmag.com/Home.html>
- Articles on technical diving: <http://blue-immersion.org/prepare-prior-to-your-tec-course/>

Projects to get involved in:

<http://blue-immersion.org/technical-diving-expeditions-cave-wrecks-iceland-mexico-thailand-2011/koh-tao/>