10. TDI – Advanced Trimix Diver Course

10.1 Introduction

The TDI Advanced Trimix Course provides the training required to competently and safely utilize breathing gases containing helium for dives that require staged decompression, utilizing Nitrox and / or oxygen mixtures during decompression to a maximum depth of one hundred (100) msw / three hundred and thirty (330) fsw. The objective of this course is to train divers in the benefits, hazards and proper procedures of utilizing custom oxygen / helium / nitrogen mixtures as breathing gases.

10.2 Qualifications of Graduates

Upon successful completion of this course, graduates may engage in technical diving activities utilizing custom Trimix mixtures without direct supervision as long as:

1. The diving activities approximate those of training.
2. The area of activities approximates those of training.
3. Environmental conditions approximate those of training.

10.3 Who May Teach

Who may teach this course:

1. Any active TDI Advanced Trimix Instructor may teach this course

10.4 Student – Instructor Ratio

Academic:

1. Unlimited, so long as adequate facility, supplies and time are provided to insure comprehensive and complete training.

Confined Water (Swimming pool-like conditions):

1. N/A.

Open Water (Ocean, lake, quarry, spring, river or estuary):

1. A maximum of four (4) students per Instructor. However, it is the instructor's discretion to reduce this number as conditions dictate.

10.5 Student Pre-Requisites

The student must:

1. Be a minimum age of eighteen (18).
2. Have a minimum certification as an Extended Range Diver or Entry Level Trimix Diver (or equivalent).
3. Show proof a minimum of one hundred (100) logged dives with 25 deeper than one hundred (100) feet/ thirty (30) meters.
4. Prior logged experience w/ double cylinders and any other unfamiliar equipment. I.E. Dry suit

10.6 Course Structure and Duration

Open Water Execution:

1. Four (4) dives with a minimum accumulated bottom time of one hundred (100) minutes
2. At least two (2) dives should be deeper than fifty five (55) msw / one hundred eighty (180) fsw.

Course Structure:

1. TDI allows instructors to structure courses according to the number of students participating and their skill level.

Duration:

1. The minimum number of classroom and briefing hours is eight (8).

10.7 Administrative Requirements

The following is the administrative tasks:

1. Collect the course fees from all the students.
2. Ensure that the students have the required equipment.
3. Communicate the training schedule to the students.
4. Have the students complete the Liability Release and Medical history forms.
5. The instructor must review the liability Release and Medical Forms before starting on the course.

Upon successful completion of the course the Instructor must:

1. Complete the Student Registration Form and send the Registration Form to TDI HQ.
2. Award Card.

10.8 Training Material

Required material

1. TDI Advanced Trimix diver manual.

Optional Material

1. TDI Advanced Trimix PowerPoint.

10.9 Required Equipment

The following are required the equipment for this course:

1. TDI Trimix Manual.

The following equipment is required for each student:

1. Bottom Mix Cylinder(s)
   - A. Cylinder volume appropriate for planned dive and student gas consumption.
   - B. Dual outlet valve, double manifold or independent doubles.
   - C. Labeled in accordance with TDI Standards.
2. Travel Mix Cylinder(s)
   - A. Cylinder volume appropriate for planned dive and student gas consumption.
   - B. Labeled in accordance with TDI Standards.
3. Decompression Mix Cylinder(s)
   - A. Cylinder volume appropriate for planned dive and student gas consumption.
   - B. Labeled in accordance with TDI Standards.
4. Suit Inflation Cylinder (required for dry suit divers only).
5. Regulators
   - A. Primary and primary redundant required on all bottom mix cylinder(s).
   - B. Submersible pressure gauges are required on all primary bottom mix cylinders.
   - C. A contingency use long hose second stage should be designated and appropriately rigged to facilitate air sharing at depth if necessary.
   - D. It is strongly recommended that all four (4) required regulators be DIN or all four (4) regulators be yoke.
6. Buoyancy Compensator(s) adequate for equipment configuration.
7. Redundant Depth and Timing Devices. Air decompression computers allowed for use as depth and timing devices.
8. Redundant Light System if required by site.
9. Ascent Reel with Lift Bag/Surface Marker Buoy
   - A. Adequate for maximum planned depth.
   - B. Minimum of twenty three (23) kg / fifty (50) lb. lift bag (a dump valve highly recommended).
10. Exposure suit adequate for the open water environment.
11. Line Cutting Device.
12. Underwater Slate (for decompression / contingency tables).
13. Helium analyzer (recommended)

10.10 Required Subject Areas

The TDI Trimix Manual is mandatory for use during this course but instructors may use any additional text or materials that they feel help present these topics. The following topics must be covered during this course:

1. Physics
   - A. Pressure review.
2. Physiology
   - A. Hypoxia.
   - B. Oxygen toxicity
     - I. Whole Body (OTUs).
     - II. Central Nervous System (CNS).
   - C. Nitrogen Narcosis.
   - D. Nitrogen and Helium absorption and elimination.
   - E. Carbon Dioxide Toxicity.
   - F. Carbon Monoxide Toxicity.
   - G. Helium
     - I. HPNS.
     - II. Effects on respiration.
     - III. Effects as an insulator.
   - H. Counter Diffusion.
   - I. Hyperthermia.
   - J. Hypothermia.
3. Decompression Options
   - A. Air.
   - B. Nitrox.
   - C. Helium.
4. Equipment Considerations
   - A. Cylinder options.
   - B. Stage cylinders options.
   - C. Suit inflation options.
   - D. Regulator options.
   - E. Harness / BC options.
   - F. Computer / depth gauge bottom timer options.
   - G. Ascent and navigation reels.
   - H. Lift bags/surface marker buoys.
   - I. Lights.
   - J. Redundant mask and knife.
   - K. Jon-line.
5. Dive Tables
   - A. Computer generated tables.
   - B. DCIEM Heliox Tables and / or other published tables.
6. Dive Planning
   - A. Operational Planning
     - I. Support.
     - II. Teams.
   - B. Team Planning

I. Gas requirements.
II. Oxygen limitations.
III. Inert gas limitations.

C. Emergency Planning
I. Omitted decompression.
II. Oxygen toxicity.
III. Analysis and logging.
IV. General.

7. Procedures
A. Bottom, Travel and Decompression Gas
I. Normal operations.
II. Failure, loss or inadequate emergency procedures.
III. Analysis and logging.

10.11 Required Skill Performance and Graduation Requirements

The following open water skills must be completed by the student during open-water dives. It is recommended that all dives be conducted between fifty five (55) msw / one hundred eighty (180) fsw and one hundred (100) msw / three hundred and thirty (330) fsw.

1. Skills review from previous TDI skills requirements including all skills from entry-level mix or extended range

Land Drills

1. Demonstrate familiarity with basic and intermediate hand signals (listing to come)
2. Selection and preparation of equipment suitable for soft overhead environment with long decompression obligations
3. Conduct team oriented drills for lift bag deployment and gas switching procedure
4. Drills for buddy rescue
5. Properly analyze all gas mixtures to be used.

Pre-dive Drills

1. Use START* before every dive
2. Stress analysis and mitigation
3. Gas matching among buddy team
4. Demonstrate adequate pre-dive planning
   A. Limits based on personal and team gas consumption.
   B. Limits based on oxygen exposures at planned depths for actual mixes.
   C. Limits based on inert gas absorption at planned depths with actual mixes.

In-water Drills

1. Demonstrate buoyancy control (ability to hover at fixed position in water column without moving hands or feet)
2. Show good awareness of buddy and other team members through communications, proximity and team oriented dive practices
3. Demonstrate competence managing three stage cylinders (either three deco gas or two deco and extra bottom gas) including drop and recovery while maintaining position in the water column
4. Ability to manage multiple failures in adverse conditions

5. Complete a horizontal breath-hold swim at depth for 20 meters / 66 feet with mask off or blacked out
6. Deploy lift bag while sharing air on buddy's long hose
7. Properly execute the planned dive within all pre-determined limits.
8. Demonstrate the proper navigational techniques for the specific dive.
9. On two (2) of the dives, demonstrate an ascent with ascent reel and lift bag and perform staged decompression.
10. Demonstrate the proper procedures for switching and isolating a malfunctioning primary regulator. (This exercise should not be practiced deeper than forty (40) msw) / one hundred thirty (130) fsw

In order to complete this course, students must:

1. Satisfactorily complete the TDI Trimix Course written examination.
2. Complete all open water requirements safely and efficiently.
3. Demonstrate mature, sound judgment concerning dive planning and execution.

11. TDI – Semi-Closed Circuit Rebreather Diver Course, Unit Specific- DOLPHIN, RAY, Atlantis, SUBMATIX ST100 & AZIMUTH

11.1 Introduction

This is the entry-level certification course for recreational divers wishing to utilize one of the following Semi-closed circuit Rebreathers; Dolphin, Ray, Submatix ST100 or Azimuth. The objective of this course is to train recreational divers in the benefits, hazards and proper procedures for using SCR Rebreathers.

11.2 Qualifications of Graduates

Upon successful completion of this course, graduates may engage in no decompression diving activities utilizing the Dolphin, Ray, Submatix ST100 or Azimuth to a maximum depth of forty (40) msw / one hundred thirty (130) feet, without decompression. Utilizing nitrox mixes not exceeding their level of certification.

11.3 Who May Teach

Who may teach this course:

1. Any active TDI Rebreather Instructor may teach this course. Specific instructor certification required for each specific rebreather.

11.4 Student – Instructor Ratio

Academic:

1. Unlimited, so long as adequate facility, supplies and time are provided to insure comprehensive and complete training.

Confined Water (Swimming pool-like conditions):

1. N/A.

Open Water (Ocean, lake, quarry, spring, river or estuary):

1. A maximum of six (6) students per Instructor for the Draeger units, for the Azimuth and Submatix units a maximum of four (4) students per instructor. However, it is the instructor's discretion to reduce this number as conditions dictate.