

## **2. Confined Space Ops**

### **2.1 Introduction**

The ERDI Confined Space Ops Component is designed to develop the knowledge and skills necessary for limited confined space operations in emergency response conditions. This course complies with NFPA 1006 and 1670, OSHA, and FEMA for water rescue.

### **2.2 Student Prerequisites**

The following standards must be met and documented prior to the commencement of any training.

1. Minimum age, 18.
2. Provide proof of current CPR, first aid and oxygen administration certification.
3. Certified as an ERD II or equivalent.
4. An active member of a recognized Emergency Service or team conducting Public Safety Diving and/or Rescue activities.

### **2.3 Qualifications of Graduates**

Upon successful completion of the ERDI Confined Space Ops component, graduates may engage in limited confined space operations without direct supervision of an instructor provided:

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

### **2.4 Who May Teach**

An active ERDI Confined Space Ops Instructor.

### **2.5 Administrative Requirements**

#### **Administrative Tasks:**

1. Collect the course fees from all the students.
2. Ensure that the students have the required equipment.

3. Communicate the schedule to the students.
4. Have the students complete the:
  - a. *ERDI Liability Release and Express Assumption of Risk Form*.
  - b. *ERDI Medical Statement Form*.

Upon successful completion of an ERDI course the instructor must issue the appropriate ERDI certification and submit the registration form to ERDI:

1. Complete and submit the appropriate registration form to ERDI Headquarters.
2. Operations and Technical levels will receive a certification card and wall certificate. Awareness level will receive a certificate upon completion if the online course was taken or a certificate can be requested if a traditional course was taken.

## **2.6 Training Materials**

### **Optional materials:**

1. *SDI Wreck, Boat and Drift Diving Student Manual* or eLearning.
2. *SDI Rescue Diver Slate* with five-minute neurological exam.
3. *ERDI Standards and Procedures Manual*.
4. *TDI Advanced Wreck Diving Diver Manual*.

## **2.7 Student to Instructor Ratio**

### **Academic:**

1. Unlimited, so long as adequate facilities, supplies and time are provided to ensure comprehensive and complete training of subject matter.

### **Confined Water (swimming pool-like conditions):**

1. A maximum of 2 dive teams, 6 divers and 6 surface tenders per ERD Instructor.
2. ERD Instructors have the option of adding 2 more divers and 2 more surface tenders with the assistance of an active ERD Supervisor.
3. The maximum number of divers an ERD Instructor may have in confined water is 8 with the assistance of a qualified ERD Supervisor.

### **Open Water (ocean, lake, quarry, spring, river, or estuary):**

1. A maximum of 4 divers and 4 surface tenders per ERD Instructor.
2. It is the instructor's discretion to reduce this number as conditions dictate.
3. No more than 2 divers can penetrate the confined space environment at a time.

## **2.8 Course Structure and Duration**

### **Course Structure:**

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

### **In accordance with various guidelines, ERD Instructors can structure the course in the following three manners.**

1. Awareness Level—participant completes the academic portion of the course and may audit the practical portion. This participant has no “hands-on” experience with the course. This level can be taught to both divers and non-divers. Awareness Level participants recognize the dangers of confined space environments.
2. Operational Level—participant completes the academic portion of the course and any non-penetration portions. Operational Level participants are able to assist in a confined space diving operation without becoming a liability. Any member of a team who may end up tending a diver at the incident should be trained to this level.
3. Technician Level—participant completes the academic portion of the course as well as all practical elements of the course. This level is taught to divers with the ability and skills to complete confined space diving. Divers should have a basic understanding of the hazards and operations of the confined space diving environment.

### **Duration:**

1. Classroom and briefing: Approximately 4 hours.
2. Confined water training: Approximately 4 hours; to include simulated penetration/confined space dives, blackout penetration on a tether, exterior safety for the penetrating diver, and rescue/assist of the penetrating diver.
3. Open water operations: Four dives total, with a minimum of 2 penetration/confined space dives and 2 dives as the exterior safety diver, including one rescue/assist.

## **2.9 Required Equipment**

### **The following equipment is required for each student:**

1. Same equipment requirement as for ERD II Diver.
2. Secondary regulator for the bailout cylinder appropriate for the diving environment.
3. Bailout cylinder (stage bottle; recommended minimum 5.6 litres/40 cubic Feet).
4. Light Systems:
  - a. Primary light.
  - b. Backup light.

5. Underwater slate.
6. Reels/Tethers:
  - a. Primary tether line for all divers.
  - b. Secondary safety reel/spool.

## **2.10 *Approved Outline***

### **The following land drills must be covered during this course:**

1. Emergency Procedures:
  - a. Following a tether to rescue/assist.
  - b. Use of a safety reel/spool to search for a lost buddy.
  - c. Use of a safety reel/spool to search for a lost exit/tether.
2. Communications:
  - a. Proper techniques for using hand signals.
  - b. Proper techniques for using line signals.
  - c. Proper FFM communications.
3. Confined Space Land Drills:
  - a. Blackout or eyes closed.
  - b. Maze navigation simulating movement through a car or actual car interior navigation.
  - c. Recovery of object or mannequin in maze or car simulation.
4. Decontamination Procedures:
  - a. Discuss and demonstrate initial rinse-off with water at the water's edge.
  - b. Discuss and demonstrate secondary decontamination of chemical and/or biological agents.
  - c. Discuss and demonstrate tertiary decontamination and equipment removal.

### **The following topics must be covered during this course. Instructors may use any text or materials that they feel best present these topics.**

1. History of ERDI and International Training.
2. Equipment Considerations:
  - a. Redundant scuba.
  - b. Lights.

- c. Reels.
- d. Tools.
- 3. Procedures:
  - a. Pre-dive.
  - b. Pre-penetration.
  - c. Penetration.
  - d. Exiting the wreck.
- 4. Search techniques:
  - a. Cars.
  - b. Boats.
  - c. Aircraft.
- 5. Search and extraction consideration:
  - a. Window/door sizes.
  - b. Jammed openings.
  - c. Car seats.
- 6. Hazards of confined space diving:
  - a. Disorientations.
  - b. Reduced Visibility.
  - c. Entrapment.
  - d. Entanglement.
  - e. Environmental.
  - f. Loss of gas supply.
  - g. Line traps.
  - h. Tether entanglement.
- 7. Penetration Lines:
  - a. Types.
  - b. Proper use.
  - c. Tether Line.
- 8. Potential Hazards:
  - a. Contaminates on surface:
    - i. Fuels.

- ii. Oils.
- b. Contaminates inside wreck:
  - i. Fuels.
  - ii. Oils.
  - iii. Battery acids.
- c. Glass windows/doors.
- d. Wreck moving/unsettled.
- 9. Contingency Planning:
  - a. Chamber locations.
  - b. Communications.
  - c. Emergency gases.
  - d. Emergency procedures.

## ***2.11 Required Skill Performance and Graduation Requirements***

**The student must complete the following skills during the confined space dives. All dives should be conducted with a maximum linear penetration of 18 Metres/60 Feet from the surface. Penetration is also limited to 1/3 of a single diving cylinder (not to include redundant gas supply).**

### **Land Drills:**

- 1. Emergency Procedures:
  - a. Following a tether to rescue/assist.
  - b. Use of a safety reel/spool to search for a lost buddy.
  - c. Use of a safety reel/spool to search for a lost exit/tether.
- 2. Communications:
  - a. Proper technique for touch contact signals.
  - b. Proper technique for line signals.
  - c. Proper FFM communications.
- 3. Confined Space Land Drills:
  - a. Blackout or eyes closed.
  - b. Maze navigation simulating movement through a car or actual car interior navigation.

- c. Recovery of object or mannequin in maze or car simulation.
- 4. Decontamination Procedures:
  - a. Discuss and demonstrate initial rinse-off with water at the water's edge.
  - b. Discuss and demonstrate secondary decontamination of chemical and/or biological agents.
  - c. Discuss and demonstrate tertiary decontamination and equipment removal.
- 5. Demonstrate adequate pre-dive planning:
  - a. Limits based on personal and team gas consumption.
  - b. Limits based on nitrogen absorption at planned depths for actual gas used.

**The following confined water skills must be covered during this course:**

- 1. Simulated confined space diving using PVC or other material.
- 2. Use of cutting tools within a confined area, cutting options include:
  - a. Seat belt material.
  - b. Heavy rope and/or cordage.
  - c. Possible diver entanglement.
- 3. Safety diver positioning.
- 4. Safety diver assisting primary diver.
- 5. Practice various types of communication, including:
  - a. Hand signals.
  - b. Rope Pull signals.
  - c. FFM communications.

**Pre-dive Drills:**

- 1. Site and Safety Briefing Before all Operations.
- 2. Buddy check (TDI's START\* drill is a good buddy check option) before every dive.
- 3. Stress analysis and mitigation.

**\*START is S-drill (OOA drill and Bubble Check), Team (buddy equipment checks, Air (gas management), Route (entry/exit and planned path underwater), Tables (depth, duration, waypoints, and schedule).**

**In-water Drills:**

1. Demonstrate proper planning for potential contamination(s) on surface.
2. Demonstrate specialized propulsion techniques for an overhead Environment.
3. Follow tether, eyes open and eyes closed, or blacked out mask, out of the confined space.
4. Demonstrate simulated glass breakage and clearing for entry into wreck.
5. Switch to redundant air supply while exiting confined space, eyes open and eyes closed, or blacked out mask.
6. Demonstrate light and hand communications with team members.
7. Demonstrate touch contact with team members.
8. Demonstrate correct techniques for staging contingency gas outside wreck.
9. Perform search pattern locating planted search object and extracting from wreck.
10. Properly execute the planned dive within all pre-determined limits.
11. Demonstrate out of air, pony bottle hand-off prior to exiting the wreck.
12. Silt-out procedures.
13. Safety diver follows tether line to locate primary diver.
14. All divers/tenders perform simulated post dive decontamination.

**Recommended Sequence:**

**Dive #1:** One diver remains on the outside of the confined space as the safety diver while the second diver penetrates for an initial exploration. Diver is limited to one compartment for progressive penetration. The first diver exits and becomes the safety diver while the second diver makes their initial penetration.

**Dive #2:** One diver remains on the outside of the confined space as the safety diver while the second diver penetrates for a second time. The penetrating diver simulates an emergency situation during the dive and the safety diver must follow the tether line and deal with the emergency (possible emergencies include, but are not limited to out of air, entanglement, entrapment/stuck).

**Dive #3:** Divers one and two switch roles as penetrator and safety divers and Dive #2 above is repeated.

**Dive #4:** (Optional) Divers can simulate an extrication of evidence or make a recovery from the penetration.

**In order to complete the course, the students must:**

1. Complete all field exercises and confined and open water requirements safely and efficiently.
2. Demonstrate mature, sound judgment concerning dive planning and execution.
3. Minimum score of 80 percent on the ERDI Confined Space Course written examination, with 100 percent remediation.