

PROPOSED
Public Safety Diving
Consensus Standards



PSDiver National Standards Committee

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Introduction

This guide is intended to be a consensus standard for those engaged in Public Safety Diving. It is intended to be a beginning, not an all-encompassing guide.

What follows is a document that was created over time by a number of professionals in the field of Public Safety Diving. There was no monetary compensation given nor any preference given to any particular company or training agency. These consensus standards were written BY Public Safety Divers FOR Public Safety Divers.

The term "Public Safety Diving" is a generic term used to describe the type of diving typically conducted by law enforcement, fire rescue, and search & rescue/recovery dive teams. Because the nature of their work involves evidence recovery, these divers should be considered the underwater extension of a land based criminal investigation team.

OSHA offers these teams an exception to the 29 CFR 1910, Subpart T—Commercial Diving:

Federal OSHA received a number of comments from people engaged in diving incidental to police and public safety functions, and the agency concluded that an exclusion from 29 CFR 1910, Subpart T—Commercial Diving was appropriate for such applications. The purpose of the "by or under the control of a governmental agency" language is to make the exclusion applicable to all divers whose purpose is to provide search, rescue or public safety diving services under the direction and control of a governmental agency (such as local, state or federal government) regardless of whether such divers are, strictly speaking, government employees. In excluding these search and rescue operations, OSHA determined that safety and health regulation of the police and related functions are best carried out by the individual states or their political subdivisions. It is pointed out that this exclusion does not apply when work other than search, rescue and related public safety diving is performed (such as divers repairing a pier). Diving contractors who occasionally perform emergency services, and who are not under the control of a governmental agency engaging their services, do not come under this exclusion. Such divers may, however, be covered by the provision concerning application of the standard in an emergency.

(29 CFR 1910.401(b)).

The exemption is not all inclusive and relates only to the potential to save life or limb. While it is argued that the wording of the exclusion is applicable to all divers whose purpose is to provide search, rescue or public safety diving services under the direction and control of a governmental agency, etc., nowhere within the wording does it allow an exemption for recovery. Recovery, in general, should also be considered salvage and as such falls back into the commercial diving standards. Therefore, the test of the exclusion shall simply be:

IF we have the ability to save life or limb, we are exempt.

If any other condition exists that prevents this, we are not exempt from 29 CFR 1910, Subpart T—Commercial Diving.

It shall be assumed that the material provided below will apply to ALL zero and low visibility waters. When conditions exist that offer visibility underwater, the methods and standards below should be adapted as necessary to fit the conditions of the dive. However, this is not a general permission to adapt the material below for any condition that is or will become zero or low visibility conditions during the dive.

Public Safety Diver

PREREQUISITE:

To be classified as an Entry Level / Operations Level Public Safety Diver, individuals must meet the following **MINIMUM** criteria:

- Be certified as an Open Water Scuba Diver from a recognized National Scuba Training Agency
- Once certified, have logged a minimum of 12 hours of bottom time.
- Logged a minimum of 3 hours in zero or low visibility water while working with a PSD Team.
- Be current CPR / First Aid / O2 / AED certified
- **RECOMMENDED:** Recreational Rescue Diver or Equivalent
- **RECOMMENDED:** Full Face Mask and Dry Suit Specialties
- Documented Haz-Mat Awareness Level Training
- Documented completion of NIM's ICS 100, 200, 700, 800

Highly Recommended: Completion of a PSD Basic Training Specialty or Program offered by or through a recognized national training agency.

Qualifications of Dive Team

General

Each dive team member should have the experience or training necessary to perform assigned tasks in a safely, efficiently and effectively.

Each diver should be trained, qualified and certified for the dive at hand.

Each diver should have experience and training in the following:

- The use of the instruments and equipment appropriate to the diving activity to be conducted and associated conditions;
- Dive planning and emergency procedures and guidelines;
- Diver rescue techniques: Self-Rescue and Other Divers
- The ability and knowledge to recognize pressure-related injuries.
- CPR, O2 Administration and Basic First Aid

At a minimum, a dive team should consist of at least four qualified team members. Of the four, **three MUST be able and capable divers**. These will become the Primary Diver, the Backup Diver and the Safety Diver.

Five members with three being able and capable divers as a qualified team **is highly recommended**.

ALL DIVES IN LIMITED OR ZERO VISIBILITY WATER MUST BE CONDUCTED BY TENDED DIVERS.

Assignments

Each dive team member should be assigned tasks in accordance with their experience and training. Limited tasks may be assigned by the Dive Supervisor to provisional team members provided they have the knowledge and ability to perform the task without direct supervision.

Primary Diver

The Primary Diver must be a qualified diver able and capable of performing underwater activities relating to the dive mission.

Backup Diver

The Backup Diver should be fully dressed and ready to assist the Primary Diver.

Safety Diver

A qualified diver with the level of experience and training to assist in the event of a diver emergency and work as a primary diver when necessary. The safety diver should be mostly dressed and have their equipment at hand.

Dive Tender

The Dive Tender will be the surface support person responsible for handling a single diver's tether and for maintaining communications with the Primary Diver through either voice communications or line signals.

Dive Supervisor

The Dive Supervisor should be an appropriately qualified diver with a full understanding of dive team operations. The Dive Supervisor is responsible for the dive operation at hand. The position is not necessarily a permanent position rather a function of an individual dive mission. When circumstances require it, the Dive Supervisor can function as the Line Tender or depending on circumstances and safety measures in place, allow the Safety Diver to line tend the Primary Diver.

The Dive Supervisor has the responsibility for the divers, the dive operation and all associated functions related to their mission. The Dive Supervisor has dive / no dive authority. **The Dive Supervisor will either be or answer to the Incident Commander.**

Planning and Hazard Assessment

Planning of a diving operation should include an assessment of the suitability, service, condition, and safety and health aspects of the following:

- A. Assessment of diver fitness may include an on-site pre-dive medical screening for blood pressure, EKG strip and pulse.
- B. Repetitive dive designation or residual inert gas status of dive team members;
- C. Diving mode;
 - a. Rescue
 - b. Recovery
 - i. Crime Scene Investigation
 - 1. Body
 - 2. Property or
 - 3. Suspected to be Both
- D. Identify necessary assignments
- E. Determine required manpower
 - a. **No less than 3 able and capable divers plus one other team member.**
 - b. **Minimum of 5 people is recommended** with **no less than 3** being able and capable divers.
- F. Breathing air supply (including reserves);
- G. Diving and necessary support equipment.
 - a. Necessary and functioning equipment to field a full team of divers.
- H. Determine the required or allowed level of PPE for thermal and environmental protection;
- I. Identify surface and underwater conditions and hazards including:
 - a. Water speed;
 - b. Water clarity/visibility
 - c. Entry and Exit points
 - d. Visible hazards.
 - e. Potential hazards—In environments where there is a high probability of encountering a hazard not initially present (i.e., floating debris or entanglement hazards), someone should be assigned to scan the upstream area for potential hazards flowing into the worksite.
 - f. Known hazards—In locations where previous dives have been made and the hazards are known or suspected.
- J. Emergency procedures including:
 - a. Decompression and treatment procedures (including altitude corrections);
 - b. ALS unit onsite or reroute and BLS personnel onsite.
 - c. Method(s) to assist an injured diver from the water if necessary.
 - d. Emergency evacuation of an injured diver if necessary.
- K. When diving from shore or in shallow water in areas of vessel traffic, at least one “diver down” flag is a minimum requirement and should be prominently displayed. Teams must follow USCG and State laws regarding dive flags.

Dive Team Briefing

The Dive Supervisor should conduct a briefing of dive team members prior to each dive. The briefing should include:

- A.** The reason for the call and the tasks to be undertaken;
- B.** the diving mode;
- C.** Diver Assignments (Prior to making individual dive team member assignments, divers must report if they are **Able AND Capable** of performing a dive.)
- D.** Non Diver Assignments
- E.** Entry and Exit Points
- F.** Safety procedures
- G.** Any unusual hazards or environmental conditions likely to affect the safety of the diving operation; and
- H.** Any modifications of existing standards or operational guidelines
- I.** Any emergency procedures necessitated by the specific diving operation.
- J.** Method(s) to assist an injured diver from the water if necessary.
- K.** Emergency evacuation of an injured diver if necessary.

Procedures During Dive

General

- Diving operations should be conducted with at least two qualified fully suited ready-to-dive divers and one partially dressed diver with equipment at the ready.
- Mixed-gas diving should not be used.
- Nitrox is not recommended
- Hookah diving should not be performed for diving and related support operations.
- Divers should be provided with a means of entering and exiting the water where necessary.
- In zero or low visibility water divers must be line-tended from the surface. One tended line may be used for two divers if the divers remain in continuous contact with each other and are both attached to the tended line.
- Each diver should be continuously hard tethered and tendered while in the water.
- An operational, two-way surface communication system should be available at the dive location to obtain emergency assistance.
- All personnel within 10' of the water's edge must wear an approved PFD an operationally necessary PE.

Communication between Diver and Surface

The tender must be able to communicate with the diver at all times.

Two-way voice communication systems are preferred **as part** of a dive team's standard equipment.

Line signals along the search line are recommended to be the primary means of **BASIC** communication with a voice system as a backup.

Decompression, repetitive, and no-decompression tables (as appropriate) should be used at the dive location and consulted in the plan. No standard table applies (i.e., commercial, Navy, recreational); however, the team should work from one table, not multiples.

A depth-time profile must be maintained for each diver during the dive.

It is recommended that one person be designated as a recorder and responsible for recording dive profiles and scene information.

Termination a Dive

If conditions or an incident occurs that may jeopardize the health or safety of a diver, diving operations should be stopped and the diver(s) should immediately exit the water.

A dive should be terminated when:

- A. A diver repeatedly fails to respond correctly to communications or signals from a dive team member;
- B. Communications are lost and cannot be quickly re-established between the diver and the tender,
- C. A diver begins to use diver-carried reserve breathing air or the dive-location reserve breathing air;
- D. A breach of personal protective equipment; or
- E. Diving conditions degrade, e.g., thunderstorms.
- F. Shore conditions degrade significantly affecting the capability of the shore support to function safely.
- G. ANY diver has the right to refuse to dive without penalty.

Post dive Procedures

General

The divers and team should comply with the following requirements, which are applicable after each diving operation.

Precautions

After the completion of any dive, the divers:

- A. Should undergo an assessment of physical condition that may include an on-site medical screening for blood pressure, EKG strip and pulse.
- B. After the completion of a dive, each diver shall report any physical problems, symptoms of decompression sickness, or equipment malfunctions.
- C. For any dive outside the no-decompression limits, or deeper than 100 feet, the diver will remain out of the water for a minimum of 24 hours and should be monitored and remain awake for no less for at least one hour after the dive.
- D. After the completion of a dive, each diver should perform an equipment check and report any problems or malfunctions to the diving supervisor. Any defective equipment should be tagged and removed from service until repaired and tested by a qualified person.
- E. Divers should have a minimum surface interval of 12 hours before ascending to altitude (greater than 1000 feet elevation). This includes ascent to altitude while flying or driving over mountain passes.

Record the Dive(s)

Keep in mind that the documentation created is evidence that can and will be used in a courtroom when necessary.

Team Log

The following information should be recorded and maintained for each dive operation:

- A.** Name and assignments of dive team members;
- B.** Date, time and location;
- C.** Diving modes used;
- D.** General nature of work performed;
- E.** Approximate underwater and surface conditions (visibility, water temperature and current); and
- F.** Maximum depth and bottom time for each diver, including repetitive dives.
- G.** For ANY dive outside the no-decompression limits deeper than 100 feet, the following additional information should be recorded and maintained:
 - a.** Depth time and breathing gas profiles;
 - b.** Decompression table designation (including modification); and
 - c.** Elapsed time since last pressure exposure if less than 24 hours or repetitive dive designation for each diver.
- H.** For each dive in which decompression sickness is suspected or symptoms are evident, the following additional information should be recorded and maintained:
 - a.** Description of decompression sickness symptoms (including depth and time of onset) and
 - b.** Description and results of treatment.

Personal Dive Log

Each diver shall log every dive made under the auspices of the sponsoring body and is encouraged to log all other dives. The personal diving log shall be retained by the diver and will include at least the following:

- Name of diver, buddy, and Lead Diver
- Date, time, and location
- Diving modes used
- Diving gas used
- General nature of diving activities
- Approximate surface and underwater conditions
- Maximum depths, bottom time, and surface interval time
- Diving tables or computers used
- Detailed report of any near or actual incidents

ALL PSDivers are encouraged to write and keep a personal written account of the dive call, detailing as much as is remembered.

Injury and Illness Assessment

If a team member is exposed to suspected hazards in the water or while on land, an exposure form must be filled out and filed according to their operational guidelines.

Each exposure, injury or illness incident should be investigated, evaluated and reported on.

Appropriate corrective action should be taken to prevent future recurrence.

Decontamination and Equipment Inspection

When the pre dive planning indicates a necessity for decontamination, the diver should be decontaminated after exiting the water and prior to removal of any equipment.

Decontaminating diver

A proper decontamination solution should be used that is relevant to the contaminants encountered during the dive.

The diver's equipment should be cleaned and decontaminated following the manufacturer's specifications and recommendations.

All equipment should be inspected following a dive and before being put back into response ready status.

Equipment Inspection

The breathing air supply system and all diving equipment should be inspected and documented prior to each dive. A checklist should be developed and used to ensure all items are covered.

Public Safety Scuba Diving

General Limits

- A.** It is recommended that Public Safety Diving Limits be placed at 60'. However, it is recognized that some teams have waters with greater depths. Diving at depths greater than 60 requires additional training, experience and equipment.
- B.** Public Safety Diving should be conducted within the no-decompression limits.
- C.** It is recommended that the depth limit be 60'.
- D.** Public Safety Diving should not purposefully be conducted outside the no-decompression limits;
- E.** Public Safety Diving should not be conducted against currents exceeding 1.5 knots.

Procedures

A Backup Diver should be available to respond immediately while a diver is in the water. If additional divers are needed, appropriate safety measures must be put into place that allow for instant response to a divers signal for help.

An operational two-way voice communication system should be used between the diver and the dive team tender whenever possible.

Line signal communications should be used between the diver and the tender as a primary means of communications.

An emergency air supply capable of being transported to a diver underwater must be available to the Backup and Safety Divers if needed.

RECOMMENDED: A diver-carried reserve breathing air supply should be provided for each diver consisting of:

- A Pony Cylinder minimum size cylinder of 13 cubic feet (19cf is recommended as the minimum size); and / or
- An independent reserve cylinder connected to the underwater breathing apparatus by a gas switch block.

RESERVE AIR SUPPLY VALVE

The valves of the reserve breathing air supplies should be in the **OPEN position prior to the dive.**

Surface-Supplied Air Diving

General

Surface-supplied air diving refers to divers using equipment supplied with air using a diver's umbilical from the surface, either from the shore or from a diving support vessel. The umbilical generally consists of a gas supply hose, strength member, pneumofathometer hose, and a communication line. The umbilical supplies a helmet or full-face mask and is managed by a surface tender. At a minimum the umbilical should consist of a gas supply hose and strength member unless the gas supply hose is manufactured and rated to double as the strength member.

Surface-supplied air diving Diver tender

Public Safety Diver teams engaged in surface-supplied air diving should comply with the following requirements.

Limits

It is recommended that depth limits for Public Safety Diving Limits be 60'. However, it is recognized that some teams have waters with greater depths. Diving at depths greater than 60 requires additional training, experience and equipment.

Any Surface-supplied air diving should be conducted within the no-decompression limits.

Procedures

Unless all on-site divers are specifically trained; and with the approval of the Dive Supervisor, no dives should be conducted in confined spaces.

Each diving operation should have a primary breathing air supply sufficient to support divers for the duration of the planned dive, including potential decompression.

Where physical space does not prohibit, a diver-carried reserve breathing air supply should be provided and worn by the diver(s).

Each surface-supplied diver should be hose tended by a separate dive team member.

Divers using the surface-supplied mode should maintain appropriate communications with the surface tender.

Equipment - Individual

General

All equipment should meet standards as determined by the diving safety officer. Equipment should be used in accordance with safe diving practices and within the manufacturers' specifications.

Diving equipment

All team members should ensure that the appropriate protective clothing and equipment is provided and properly worn to protect personnel from hazards to which they are exposed or could be exposed.

Such protective clothing and equipment should be appropriate to the tasks that are expected to be performed during diving operations.

All diving equipment should be maintained in a safe and fully functional condition.

Any damaged or defective equipment should be removed from service immediately and clearly identified in order to preclude its use.

Each equipment modification, repair, test, calibration or maintenance service should be documented and the work performed by a certified technician.

All equipment should be inspected at least monthly by a qualified person and a record maintained. *Equipment subjected to extreme use or adverse conditions may require more frequent testing and maintenance.*

Buoyancy Control

Each diver should have the capability of achieving and maintaining positive buoyancy through the use of a Buoyancy Control Device - An inflatable flotation device capable of maintaining the diver at the surface, having a manually activated inflation source independent of the breathing supply, an oral inflation device, and an exhaust valve should be used for scuba diving.

Personal flotation systems, buoyancy compensators, dry suits or other variable volume buoyancy compensation devices should be equipped with an exhaust valve. These devices should be functionally inspected and tested at least monthly.

A dry suit or other buoyancy-changing equipment not directly connected to the helmet or mask should be equipped with an exhaust valve.

Weight systems should have a quick release device designed to permit jettisoning with a single motion from either hand.

When using integrated weights, alternate weighting systems should be included.
The loss of a single weight pocket should not result in an uncontrolled ascent.

Regulators

It is recommended that PSD teams use regulators that are environmentally sealed.

Regulators should be inspected and tested by the diver and tender prior to use.

Regulators should be inspected and tested by a certified technician at least once a year or less if subjected to heavy use.

Regulators must be decontaminated after each dive mission or session before being placed back into service.

Gauges and Timekeeping Devices

Gauges indicating diver maximum depth should be used for all dives.

A timekeeping device should be used at each dive location to record and maintain dive times and diver surface intervals.

Gauges should be inspected and tested by the diver and tender prior to use.

Weights and Harnesses

Divers should be equipped with a weight belt or assembly capable of quick one hand release.

When a safety harness is worn in diving, it should be equipped with:

- A.** A positive buckling device; and
- B.** An attachment point for the umbilical to prevent strain on the mask or helmet; and
- C.** A lifting point to distribute the pull force of the line over the diver's body.

Cutting Tools

Each diver should have **at least three different cutting tools** secured in different locations. Tools notated with * should be required and additional tools can include:

• *knife(s)	• Wire Saw
• *EMT scissors	• Seatbelt Cutters
• wire cutters	• Wire Snips
• Cutting shears	• Other
• Limb saw	•

Equipment - Team

Dive Flags/Markers

Assorted dive flags and buoy markers are needed to mark dive location and divers that are down.

Air compressor

An air certified compressor is recommended. If a team does not have access to one, your local dive shop should have. Air samples should be sent in from the air compressor every 3 months to a certified testing facility.

Boat

The boat that your team chooses should be for the diving environment that it will be used most.

Cylinders / Tanks

80 cubic foot cylinders / tanks or larger that are in current VIP, hydro tested and filled to service pressure and well as Pony tanks 13 to 19 cubic foot and a 80 cubic foot contingency cylinders. Where alternate cylinders may be used, the minimum combination must provide no less than 80 cubic feet of air at normal surface pressure. When multiple cylinders are used, the primary air sources must be no less than 80 cubic feet when filled to service pressure.

Medical Equipment

A well-stocked first aid kit including a mask for CPR, an AED that has current pads and a charged battery plus a charged spare battery. Oxygen tanks that are in current hydro and filled to service pressure with high flow mask and nasal cannulas.

Miscellaneous

Ropes, throw bags, evidence containers, weights, and lift bags. Ropes should be chosen on the type of environment they are to be used in. They must be washed and decontaminated after each use. Throw bags as well. Evidence containers can zip lock bags, trash bags, even body bags.

Weights - either shot bags and/or solid lead should be in abundant supply. Lift bags with the capacity of at least 10 to 50 lbs. should be immediately available.

RECOMMENDATIONS / OPINIONS

Training INDIVIDUAL

Prerequisite hours should be obtainable for entry level Public Safety Diver classification, even by newly formed or forming teams.

12 hours of LOGGED bottom time past those obtained during entry level training will require dedicated training time. It is reasonable to assume that the individual may dive recreationally and those LOGGED dives should count towards the minimum time. However, the three hours of required zero visibility diving **MUST** be done either in sanctioned team training or as part of a certification class.

Logged dive time should be the criteria instead of recognition of recreation certifications. Hours should be maintained by the individual and possibly by the team training officer or record keeper.

Zero visibility training should be the hard focus, not logged open water hours. Training is required. If zero visibility is simulated, the time logged should count toward the 12 hour minimum but not necessarily the zero visibility requirement. Simulating zero visibility does not offer the same experience. It is difficult to mandate this as a consensus standard and the final decision should be with the Dive Supervisor or administrative members of the dive team.

To be classified as an Entry Level / Operations Level Public Safety Diver, individuals should meet the following **MINIMUM** criteria:

- Be certified as an Open Water Scuba Diver from a recognized National Scuba Training Agency
- Once certified, have logged a minimum of 12 hours of bottom time.
- Logged a minimum of 3 hours in zero or low visibility water while working with a PSD Team.
- Be current CPR / First Aid / O2 / AED certified
- **RECOMMENDED:** Recreational Rescue Diver or Equivalent
- **RECOMMENDED:** Full Face Mask and Dry Suit Specialties
- Documented Haz-Mat Awareness Level Training
- Documented completion of NIM's ICS 100, 200, 700, 800

Highly Recommended: Completion of a PSD Basic Training Specialty or Program offered by or through a recognized national training agency.

Training - Team

Team training should be conducted by a certified PSD training officer or coordinator. When unavailable, training should be conducted that is applicable, relevant and within the capabilities of the divers and individual participating.

It is recommended that new divers be introduced to simulated zero visibility conditions in controlled water. (Pools of clear open water with depths under 20 feet).

In all training evolutions, an emphasis on safety must be made.

It is essential that accurate records are being keep at all times of training and certifications. Below are some of the suggested minimum ANNUAL qualifications for Team Training.

- *Logged Open Water (10 hours)*
- *Zero Vis/ Low Vis (where applicable) (3 hours)*

Zero visibility training should be a continued focus, not logged as open water hours.

ANNUAL REVIEW - TOP WATER MASTERY SKILLS

Mask, Fins and Snorkel

To be performed continuously until complete.

_____ - 800 yard Mask, Fins and Snorkel swim. **Completed in under 17 minutes**

_____ - 300 yard inert Victim Tow (Life jackets must be used by at least one) using Mask, Fins and Snorkel. Victim should be face up and able to breath at all times.
Completed in under 12 minutes

_____ - 500 yard continuous forward stroke swim – no swim aids – no time limit - **TO COMPLETION**

_____ - 45 minute survival tread. **Participant will maintain their head above water at all times.**

Skills -

_____ - On a single breath of air, in 8' – 15' of clear water using Mask, Fins, Snorkel and at least a 5 lb. weight belt, the participant will tread water, release and hold the weight belt out to the side with arm extended.

When participant is at roughly a 45 degree angle, they will drop their weight belt.

The participant will free dive to the bottom, recover and don the weight belt, fully flood their mask once, **(twice is preferred)** clear it and ascend. At the surface the participant will clear their snorkel without lifting their head out of the water.

REPEAT 5 times

_____ - On a single breath of air, in 8' – 15' of clear water using Mask, Fins, Snorkel and at least a 5 lb. weight belt, the participant will submerge at least 5' and clear a fully flooded mask no less than 4 times **(6 is preferable)** and ascend and at the surface the participant will clear their snorkel without lifting their head out of the water.

REPEAT 5 Times or as necessary to complete skill a minimum of 3 times.

None of the above is intended to be a pass / fail.

The skills are intended to set a mark of achievement that can measure Mastery of those particular skills.

ANNUAL REVIEW – BASIC SCUBA SKILLS

Basic Scuba Equipment and Depth less than 30 feet.

To be performed *continuously* until complete.

Controlled descent.

Establish and HOLD neutral buoyancy near the bottom. (The expectation is to stay neutral). When applicable, underwater skills should be conducted while maintaining neutral buoyancy

No mask breath from regulator for no less than two minutes.

Regulator Recovery – perform no less than two different techniques

Alternate Air buddy breath and swim horizontally the length of the pool and back or at least 25 yards. To be done both as donor and recipient.

Slipped Tank - Tank band will be loosened. Diver must remove gear, correct the problem and don gear underwater.

Lost fin swim – While underwater, participants will remove one fin and swim the length of the pool and back or at least 25 yards.

Simulated free flowing regulator for no less than 30 seconds. (To facilitate this drill, a separate cylinder and regulator may be used for all participants.)

Controlled ascent and manually inflate BCD at the surface.

ON THE SURFACE - Remove BCD and fix loosened tank band. Don BCD at the surface.

ON THE SURFACE - Remove and replace weight belt or weight pockets.

DIVING OPERATIONS

Surface Supply Diving

Teams using SSA should undertake appropriate certification level training.

Dives with SSA should be performed within the limits of this guideline for scuba diving operations.

Tethered Public Safety Diving

Tethered scuba diving is a tended diving method where one diver in the water is line tended by surface personnel and directed to perform a variety of underwater tasks, which could include light work or scientific tasks. OSHA also requires that standby divers for working dives be line tended. For our purposes, we will consider a Backup Diver or Safety Diver to be tended if they are physically attached via a contingency strap or line to the Primary Divers' tended line.

This method is much like that of surface supplied diving in many ways other than the virtually unlimited air supply. Typical tethered diving equipment, personnel, and procedure is described below.

Equipment

Tethered scuba diving equipment nominally includes standard diver dress, e.g., wetsuit/drysuit, fins, and weight belt, as well as equipment particular to tethered diving needs. These other items can include a full face mask with voice communications, strength member with quick release snap shackle tether, hardwired or wireless communications, and an appropriate safety harness rated for lifting the diver from the water.

Personal Equipment Recommendations

Dive Lights

When or if diving at night or low light conditions that will degrade each diver should have a functional underwater light. A backup light is recommended.

An activated personal strobe attached to the tank valve is **highly recommended**.

Mask

Full Face mask with communications is preferred. This will allow for Diver to Diver communications as well as Diver to Boat or tender. Full Face Masks are preferred in contaminated water. If Full Face mask is used, a redundant recreational mask must be in place as a backup. ANY mask used must be rated for and suitable for the job.

Fins / Boots

Fins suitable for the dive with booties or boots with a hard sole appropriate for the dive operation.

Cylinders / Tanks

Divers should have as part of their personal equipment at least one cylinder rated no less than 80 cubic foot when filled to its service pressure. Cylinders must be within current hydro dates and have a current visual inspection sticker. Cylinders used in multiples must contain no less than 80 cubic feet of air as the primary air supply.

It is **HIGHLY RECOMMEND** that divers carry a redundant Pony Cylinder no less than 13 cubic feet at all times with a secondary regulator. A detachable tank is preferred. Cylinders must be within current hydro dates and have a current visual inspection sticker.

Exposure Protection

The choice of what type of exposure protection is one of the biggest mistakes PSD's make. The diving environment will dictate your choice. Wet suits will offer abrasion, UV and thermal protection as will a dry suit.

The dry suit, however, will offer the most protection in chemical, pathological and biological contaminated environments as it encapsulates the diver. Dry suits with attached gloves and hoods should always be included to provide encapsulation protection for the diver.

Full dry suit is the recommended exposure protection.

Definition of Terms

Able, Capable Diver – A certified diver with the ability to descend to depth and perform a task specific job(s).

ACFM: Actual cubic feet per minute.

Air sharing: The sharing of an air supply between divers.

ASME Code or equivalent: ASME (American Society of Mechanical Engineers) Boiler and Pressure Vessel Code, Section VIII, or an equivalent code that the employer can demonstrate to be equally effective.

ATA: Atmosphere absolute.

Boat operator: The person controlling a vessel during boating operations.

Bottom time: The total elapsed time measured in minutes from the time when the diver leaves the surface in descent to the time that the diver breaks the surface.

Bounce dive: A dive to a maximum depth with an immediate return to the surface.

Buddy Line / Contingency Strap / Tag Line– A short piece of strapping or line with a method of securing a diver on one end and a search line on the other. The device is intended to be used to physically connect the user to another object or diver.

Buoyant ascent: An ascent made using some form of positive buoyancy.

Buoyancy control device (BCD): An inflatable flotation device capable of maintaining the diver at the surface, having a manually activated inflation source independent of the breathing supply, an oral inflation device, and an exhaust valve should be used for scuba diving. A flotation type vest that will allow the diver to establish neutral buoyancy in the water column.

Burst disk: Part of the valve, this safety device releases air from a cylinder if it becomes over pressurized.

Bursting pressure: The pressure at which a pressure containment device would fail structurally.

CERCLA: Comprehensive Environmental Response, Compensation and Liability Act. Commonly known as Superfund Act, was enacted by Congress on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. Over five years, \$1.6 billion was collected and the tax went to a trust fund for cleaning up abandoned or uncontrolled hazardous waste sites. CERCLA was amended by the **Superfund Amendments and Reauthorization Act** (SARA) on October 17, 1986.

Certified dive equipment technician: A person capable of inspecting, repairing, and overhauling diving equipment and is skilled and trained to the manufacturer's specifications.

Closed circuit diving: Diving in which the breathing air is recirculated, scrubbed and rebreathed.

Confined space entry or dive: This is **not** recognized as a Public Safety Dive and **if** performed, must be performed by certified divers with the training and experience to perform the job(s).

Contingency Strap / Tag Line / Buddy Line – A short piece of strapping or line with a method of securing a diver on one end and a search line on the other. The device is intended to be used to physically connect the user to another object or diver.

Controlled ascent: A method used by divers to return to the surface. In zero visibility, this is usually performed following a search line back to the tender. In clear water with the ability to see overhead, this is usually performed vertically. Controlled also implies the diver has the ability to change position in the water either by stopping or pausing, descending or moving horizontally at will.

Cutting tool: A handheld cutting device; may include, but is not limited to, a dive knife, wire cutters, seatbelt cutters, or shears.

Cylinder: A pressure vessel for the storage of air.

Decompression chamber: A surface pressure vessel for human occupancy used to treat pressure related injuries. To be used by divers it MUST have passenger and patient occupancy and capability AND qualified staff to operate it.

Decompression sickness: A condition with a variety of symptoms that may result from gas or bubbles in the tissues of divers after exiting the water or moving to a lesser depth.

Decompression table: Used to calculate repetitive diver and theoretical gas absorption using a square dive profile using the deepest depth attained and bottom time and subsequent surface intervals.

Dive: A descent under water utilizing compressed air, ascent and return to the surface. Repetitive dives with less than a 10 minute surface interval are considered a single dive.

Dive briefing: A quick description of the events that led to the team mission. It can include a risk assessment, special notices, special instructions and delegation of responsibilities enabling the team members to prepare for the task at hand.

Dive computer: A device that computes a diver's theoretical gas absorption and decompression status, in real time.

Dive plan: A prearranged sequence of underwater events constituting the anticipated dive. The dive plan must incorporate emergency planning.

Dive site: the area where a diving operation is conducted.

Dive tables: See "Decompression table."

Dive team: Divers and support team members involved in a diving operation, including the designated person-in-charge.

Dive designated person-in-charge: This can be a team leader; team supervisor, dive officer or whomever is on scene and has the ability, experience and training to conduct the diving operation. **For the purposes of THIS document the term Dive Supervisor will be used.**

Diving mode: Usually refers to either Rescue Mode or Recovery Mode.

Probationary diver: A diver in training; an individual gaining experience and training in additional diving activities under the direct supervision of a dive team member experienced in those activities.

Dive to Diver Communication: Two comparably equipped scuba divers in the water in constant communication. IE, hand signals, hand squeezes, voice communication, line tugs or any other agreed upon communication system that can relay at least the following: I am OK, I am in trouble, I am out of air, stop, go, go up.

Emergency ascent: An ascent made under emergency conditions where the diver exceeds the recommended normal ascent rate of 60' per minute.

FFW: Feet of freshwater

FSW: Feet of seawater

Gas switch block: A switch block allows a diver to change between two separate air tanks without having to remove his or her full face mask.

Harness: A diver harness is worn by a diver and it allows the diver a secure connection to the tether / search line. Buoyancy compensation device (BCD) D-rings are inadequate* strength members for this task, as they cannot support the diver's entire weight and dynamic load when the tender needs to quickly retrieve the diver.

* Buoyancy compensation device (BCD) D-rings are inadequate strength members for this task, and may not be able to support the diver's entire weight and dynamic load.

Hazardous substance: Any substance designated or listed under A through D of this definition, exposure to which results or may result in adverse effects on the health or safety of employees:

- A. Any substance defined under section 101(14) of CERCLA;
- B. Any biologic agent or other disease-causing agent that after release into the environment and upon exposure,
 - A. ingestion, inhalation or assimilation into any person, either directly from the environment or indirectly by ingestion
 - B. through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities,
 - C. cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations
 - D. in such individuals or their offspring;
- C. Any substance listed by the U.S. Department of Transportation as hazardous materials under 49 CFR 172.101 and
- E. appendixes; and
- D. Hazardous waste as herein defined.

Hazardous waste:

- A. A waste or combination of wastes as defined in 40 CFR 261.3, or
- B. Those substances defined as hazardous wastes in 49 CFR 171.8.

Health hazard: A chemical, mixture of chemicals or a biological pathogen for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals that are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, and neurotoxins, agents that act on the hematopoietic system, and agents that damage the lungs, skin, eyes or mucous membranes. It also includes bacterial, viral or other human or animal exposure where contact with exposed skin, wounds, ingestion, inhalation, absorption or other contact could infect the diver as well as stress due to temperature extremes. Further definition of the terms used above can be found in Appendix A to 29 CFR §1910.1200.

Hookah diving: A type of shallow water surface-supplied diving where the diver uses the second stage of a scuba regulator and hose connected to a surface air source. Not necessarily recommended for Public Safety Diving.

Incident Commander: The individual responsible for the overall management of the scene.

In-water staging: Usually refers to additional cylinders of breathing gas being suspended at various depths for use when diving beyond no decompression limits. This type of diving is NOT recommended for Public Safety Diving and requires much additional training.

Lift bag: An airtight bag with straps used to lift heavy objects underwater by means of increasing the bag's buoyancy using compressed air.

Line-tended: The diver is physically connected to the search line or umbilical and directed by a line tender.

Maximum working pressure: The maximum pressure to which a pressure vessel may be exposed under standard operating conditions.

NIOSH: National Institute for Occupational Safety and Health.

No-decompression limits: The theoretical depth-time limits of a dive, specified by a table or model, from which a diver can return directly to the surface at a control rate without being required to spend time at shallower depths to allow excess nitrogen gas to be eliminated from the body.

Normal ascent: An ascent made with an adequate air supply at a rate of 60 feet per minute or less.

Open circuit scuba: Standard scuba equipment and no portion of the breathing air is rebreathed.

Permissible exposure limit: The exposure, inhalation or dermal permissible exposure limit specified in 29 CFR Part 1910, Subparts G (Occupational Health and Environmental Control) and Z (Toxic and Hazardous Substances).

Pony Cylinder: A small independently filled diving cylinder which forms an extended scuba set and is fitted with its own independent regulator. In an emergency, such as depletion of the diver's main air supply, it can be used as an alternate air source or bailout bottle to allow a normal ascent in place of a controlled emergency swimming ascent. The key attribute of a pony bottle is that it provides a totally independent and redundant source of breathing gas for the diver.

Pressure-related injury: Any injury obtained as the result of hyperbaric exposure such as decompression sickness, pneumothorax, mediastinal emphysema, air embolism or subcutaneous emphysema.

Primary diver: A qualified diver performing initial underwater activities relating to the dive request.

Psi: Pounds per square inch

Public Safety Diver: A person performing diving operations solely for underwater search, rescue, recovery, investigation or related public safety purposes by or under the control of a governmental agency.

Public safety diving: A diving operation performed solely for search, rescue, recovery, investigation or related public safety purposes conducted by divers working for or under the control of a governmental agency.

Qualified person: A person who by possession of a recognized degree, certificate or professional standing or who by extensive knowledge, training and experience has successfully demonstrated his or her ability to solve or resolve problems relating to the subject matter, the work or the project.

Repetitive dive: Any dive made within six hours of a previous dive.

Rescue diver: A fully suited diver ready on the surface able and capable of immediately responding to the rescue of a working diver.

Safety diver: A fully equipped diver at the dive location capable of rendering assistance to a diver performing assigned tasks.

Scuba diving: A diving mode independent of surface supply in which the diver uses open circuit self-contained underwater breathing apparatus.

Scuba certified diver: A diver who holds a recognized and valid recreational scuba certification from a recognized certifying recreational scuba training agency.

Superfund Amendments and Reauthorization Act (SARA): amended the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) on October 17, 1986. SARA reflected EPA's experience in administering the complex Superfund program during its first six years and made several important changes and additions to the program. SARA:

- stressed the importance of permanent remedies and innovative treatment technologies in cleaning up hazardous waste sites;
- required Superfund actions to consider the standards and requirements found in other State and Federal environmental laws and regulations;
- provided new enforcement authorities and settlement tools;
- increased State involvement in every phase of the Superfund program;
- increased the focus on human health problems posed by hazardous waste sites;
- encouraged greater citizen participation in making decisions on how sites should be cleaned up

Surface-supplied air diving: A diving mode in which the diver in the water is supplied from the dive location with compressed air for breathing through an umbilical air hose.

Tag Line / Contingency Strap / Buddy Line – A short piece of strapping or line with a method of securing a diver on one end and a search line on the other. The device is intended to be used to physically connect the user to another object or diver.

Tender: A surface support person responsible for handling a diver’s umbilical and for maintaining voice or standard line signal communications.

Tether: A physically connected line attached to the diver that connects the diver to a tender on the surface.

Time keeping: A method to document the duration of a diver beginning at the descent to arrival back on the surface where the diver begins to breathe atmospheric air through normal means. This documentation will include depth, time and amount of air consumed during the dive.

Two-way communication: Communication between the diver(s) and the topside support personnel by either a hardwired or wireless system. Can also be accomplished using pull or tug signals over a tethered search line.

Umbilical: The composite hose bundle between a dive location and a diver that supplies the diver with breathing air, communications, power or heat as appropriate to the diving mode or conditions and includes a safety line between the diver and the dive tender.

Working pressure: The maximum pressure to which a pressure containment device may be exposed under standard operating conditions.

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Mark Phillips
Editor / Publisher
PSDiver.com

This guide is dedicated to all the men and women that gave their lives as Public Safety Divers supporting local, state and federal law enforcement agencies as well as families of drowning victims.