Introduction to Guideline Procedures - Part 2: Methods

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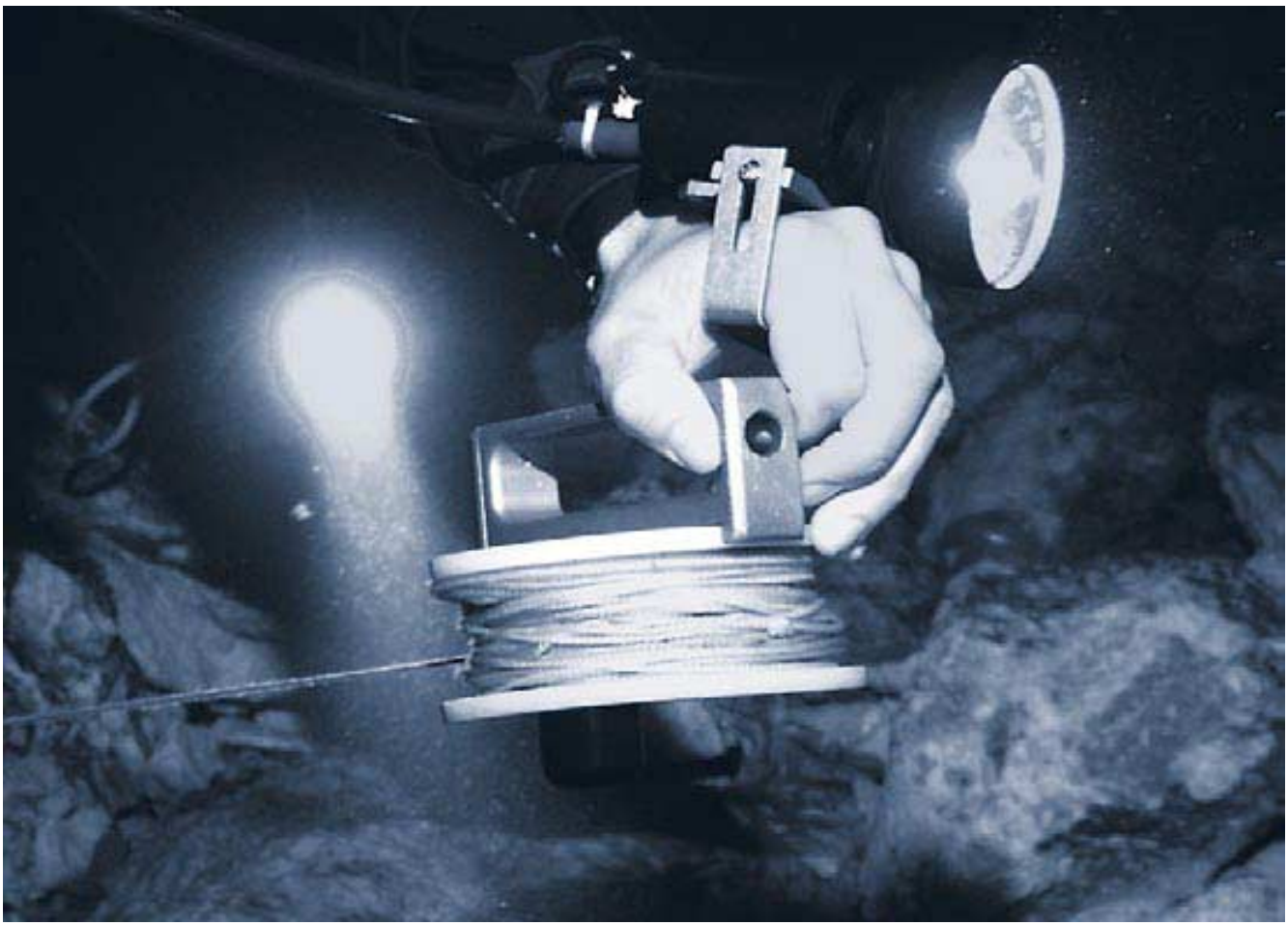


The following article is aimed at providing an introduction to guideline procedures. The information presented should in no way take the place of formal training, practice and experience.

Certain dives require the use of a guideline. Among these are cavern and cave dives, wreck-penetration dives, and also open-water dives on sites that pose special navigational challenges, such as limited visibility. A guideline can help a diver navigate back from a dive but can also hinder their return if not used properly. It is not enough to make use of a guideline; it is critical that *proper* use of a guideline is ensured.

REEL OPERATION

When installing or retrieving line, divers should use the left hand to hold both the reel (or finger spool) and the light. This leaves the right hand free to add gas to the wings and dry suit, to equalize our ears, and in some cases, to operate a scooter. It is very important not to make the

mistake of trying to use one hand for the reel and the other for the light, as you will find yourself either inadvertently flashing your light or becoming entangled in the line as you descend and need to add air to your wings.

As line is unwinding from the reel or finger spool, it is important to keep tension on the "spool" to avoid excess slack in the line. As you do so, the best position to hold the reel or finger spool is with the arm extended, perpendicular to the body. This keeps the line away from the your body, fins and other equipment, and thereby prevents entanglement. If the reel has a bolt snap that can be removed it is a good practice to do so, leaving one less place where the line might become snagged.

As the line is retrieved, constant tension needs to be maintained either with the help of a team member or by matching reeling speed with swimming speed. Without the requisite tension, the line can unwind off the spool and possibly cause entanglement.

INSTALLING A LINE

Zero Visibility

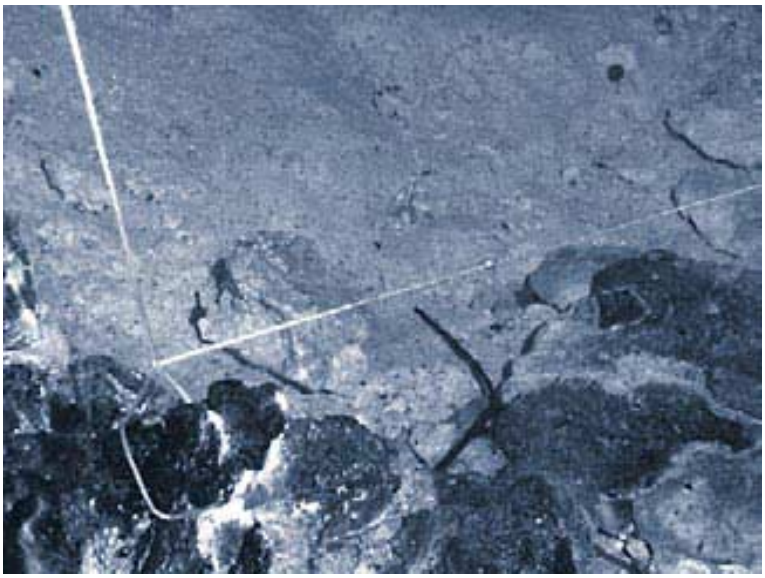
When placing guidelines we must always assume a worst-case scenario, which would have us following that guideline in zero visibility while sharing gas. How we place a line then is critical in ensuring an efficient and safe return.

Line Traps

If a guideline is placed or pulled into an area that divers cannot easily pass through in zero visibility conditions, it is referred to as a *line trap*. It is critical that lines be installed in a manner that minimizes the potential for line traps.

Stations

A ***station*** refers to a location where a line comes into contact with the environment we are diving in; in the cave environment it occurs when the passage makes a distinct change in depth or direction. A station will either be in the form of a ***placement*** or a ***tie-off.***



Wrap and lock

- A *placement* exists where the line passively rests on the wall, floor or ceiling of a passage. A placement may need to be used when there are no outcroppings or areas that can provide an effective attachment point. If used appropriately, in non-critical areas, placements can be navigated more quickly than tie-offs, although its use is often limited. The disadvantage of a placement is that with no anchoring point it can be pulled from its location, possibly creating either a loose line or forcing the line into a trap.

- A *tie-off* exists where the line is actively attached to an object in the passage. Tie-offs must be used in more critical areas to ensure that the line circumvents line-traps or places difficult to pass, which may slow down an exiting dive team. A proper tie-off is made by first wrapping the line once or twice around an object, then "locking" it in place by looping the reel over or under the line and pulling it tight. A wrap helps to keep the line in place and a lock brings the exit and entrance sides of the line

together. For this reason, whenever a *wrap* is used, a *lock* should also be used. After some practice, a locking wrap can be fashioned before placing it by twisting the line in the hand. This can be done as the line is being installed, making the process smoother, cleaner and faster.

Diver helps by keeping tension on the line

Line Tension

Imagine following these guidelines in the dark. Line "A" is loosely draped along the floor, like a piece of wet spaghetti. Line "B", on the other hand, has tension, keeping it taught between stations. Without sufficient tension, lines can easily be pulled in different directions, and result in line traps. Furthermore, loose lines can very easily become entangled in equipment.

Number of Stations

It is important that the number of stations is minimized when installing a guideline. Imagine following these guidelines in the dark. Think about which line would be easiest to navigate in zero visibility. Line "A" would require an enormous amount of time navigating each station, whereas line "B" offers a direct route with no changes in direction, or stations to navigate

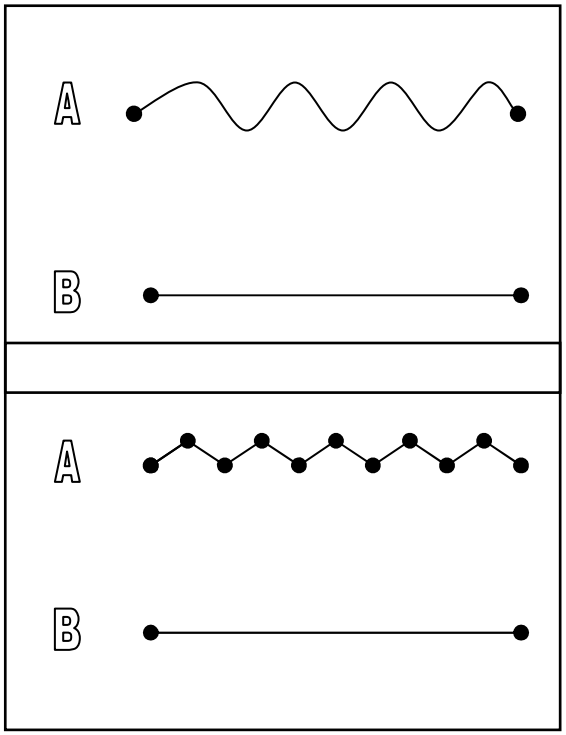
Line Routing

There are many things to consider when deciding where to route a guideline, especially as each passage poses its own unique set of challenges. Understanding the general advantages and disadvantages of line routing will help one to foresee and avoid potential problems.

The floor is often the easiest place to find tie-off points. Nonetheless, be aware that on the floor the line can become buried in sediment. Also, swimming near the floor may cause light sediment to be disturbed and as a result, destroy visibility.

Lines placed along walls can be difficult to follow, especially over long distances. During zero visibility, exiting divers would be forced to one side of the line, constantly bumping into the wall, thereby slowing their exit.

Lines routed along ceilings are nearly impossible to follow properly. The ceiling is the most difficult place to monitor while swimming horizontally, and lines on the ceiling can easily be lost, even during good visibility. In zero visibility one would be forced into a very



inefficient vertical position in order to maintain physical contact with the line. Tanks would constantly be hitting the ceiling, causing unnecessary damage to the environment and stress to tank valves. Contact with the ceiling could roll a tank valve hand-wheel, either jamming it in the open position or shutting it off.

More aggressive contact could damage the valve and regulator or even sheer off a hand-wheel. When following a line on a ceiling there is also more potential for entanglement in the tank valve/manifold area, which is a difficult place to get untangled from.

When diving in a conduit, it is normally easiest for divers to pass through the middle of the passage. Therefore, typically, the best place to run a guideline is slightly below the center of a passage. This allows one to swim horizontally over the line with good visual or physical contact and avoids diver contact with the floor or ceiling.

COMMUNICATION

As the line is being installed it is important to keep track of everyone in the team. Using a primary light will make this task easier, as it will be an invaluable aid in helping with the team's passive communication. As stated previously, the line should be secured every time the passage changes depth or direction. A good practice to ensure that the team is okay is by looking and confirming with an "OK" light signal (circle with the light) on the newly made tie-off. This will serve two purposes: making sure the team is okay and that all agree on the routing of the line up to that point.

SEQUENCE

Team Duties

While a reel is employed each team member has specific duties.

Diver reeling out

Entering

Guidelines are always installed by the first person entering an overhead environment. Careful study of the area should first be made not only to pick out the best place to route the line and prevent line traps, but also to notice if other lines are present. As a spot is picked for a tie-off, it is also important to anticipate what direction the team will be heading next, so as to know from what direction the object picked should be approached. The responsibility of the second diver is to assist with illumination, to scrutinize line routing and to double check that tie-offs have been made properly and are secure. Sightings toward the exit should frequently be made to ensure the line has not been routed into a trap. The responsibilities of any additional team members are similar to the second person's duties: provide additional analysis and ensure proper guideline procedures.

Exiting

As the team returns from their dive, the last person exiting will be responsible for removing the reel, and must ensure that all other team members are on the "exit" side of the reel. The person in front of the one with the reel will be releasing the tie-off points, if the selected objects are open at the top. Every tie-off point will create an angle on the line; as a result, when the line is released care must be taken to position oneself on the exit side of the angle, to prevent the line from trapping us. The person leading the team out will pay special attention to the area where decompression stops will be made and will communicate to the rest of the team once a desired depth is reached. While stops are executed, it is good practice to make sure the reel is locked, in case it is accidentally dropped.

TYPES OF LINE

Temporary Guidelines

Temporary Guidelines are normally installed and removed on the same dive. They are used in areas where permanent guidelines don't already exist, such as in sites that are rarely visited. Alternatively they can be installed to bridge any gap between the dive team and a point that offers direct, open-water access to the surface.

Permanent Guidelines
In some specific areas that are visited regularly, guidelines exist on a permanent basis. Initial explorers of wrecks or caves will need to install their own guideline and will often leave lines installed for subsequent exploration, survey or pleasure dives. Great care must be taken to ensure that all permanent lines are properly installed as others may make use of them in the future.

For subsequent dive teams the work of installing the line will have been done, but many responsibilities remain. A permanent guideline must be carefully inspected by each diver to ensure it has been properly installed and remains safe to use. All must be confident that the line they are following will provide an efficient exit for their dive team during a worst-case scenario.

At times, permanent guidelines are brought all the way to open water to facilitate easier navigation. This has advantages and disadvantages. Among the *advantages* are that the environment where these lines exist will see less damage from multiple teams, as each team will not need to install their own line. Furthermore, by being brought all the way to open water these lines create a safer route to follow and less task loading. Among the *disadvantages* are that these lines may encourage someone with limited or no training to enter an overhead environment. Obviously this creates the possibility of non-trained divers being "lured" into areas where they don't belong. Another disadvantage is that it promotes skill erosion, by not forcing divers to install a line. In the case of water-filled caves, we are seeing more and more that lines are being brought closer to the entrance. There seems to be mixed feelings in this respect among cave divers.

When a permanent line is present and the line does not begin in an area that would enable us to have a direct ascent to the surface, a line must be used to breach the gap to the beginning of the permanent line.

PROCEDURES

Primary Tie-Off
During dives requiring the use of a guideline, it is critical to ensure that teams can navigate back to a point that allows a direct ascent to the surface. In order to secure the line, a fixed object located in open water must be picked. There the line is wrapped, creating a "primary tie-off" for our penetration or primary reel. The characteristics of this tie-off are that it requires two wraps around the object with our line, needs to have direct access to open water and whenever possible be sufficiently deep, to keep curious swimmers from pulling it loose.

Secondary Tie-off
As soon as we enter the overhead environment a "secondary tie-off" should be placed. The purpose of this second tie-off is to provide a back up in case the primary one gets loosened, broken or removed. Keeping this in mind, this tie-off should not be too far inside the overhead environment. After these initial two tie-offs, the line should then be routed in the areas to be visited.

Connecting to a Permanent Guideline
Once the permanent line is found, the reel should be locked and the line from our reel wrapped twice around the permanent line before it is clipped back onto itself. It is important to note that the best way to secure our line to the existing one is to approach it in a perpendicular angle, as this will prevent the line from traveling to either side. When we attach our reel, whenever possible, allow enough room for one or two more reels to fit between our reel and the end of the permanent guideline.

PROTOCOL
Whenever the environment calls for a guideline, certain protocols should be followed to promote understanding and avoid confusion during dives. This particular form of etiquette enables cave divers to know how to behave with respect to the presence of other lines and to know how to act when other teams or lines are present.

Multiple Teams
Unless previous arrangements have been made, and the skill level of respective teams well known, each team should install their own temporary lines. Keep in mind that the way a line is laid should ensure an efficient and uneventful exit in case the visibility would drop or be lost completely. When a team is encountered inside the overhead environment, the exiting team has the right of way. Avoid shining your light at approaching divers.

Multiple Lines
Among things to consider when there are multiple lines are: 1) the first team's line should be identified in order to gain a general sense of where their line might be going; 2) try to pick an area for a primary tie-off away from the other team's line. If the object chosen by the initial team is the only one available, it can be shared by placing the second line on a lower spot. This is the only place where a tie-off should be shared. And 3) try to run your line on the opposite side of the passage, being mindful that another team may follow with their own line. For example, if the first team chooses the right side of the tunnel, the second team can pick the left side, leaving the middle area clear for yet another team.

CONCLUSION
Many accidents have occurred as a result of divers who ignored the need to install a guideline. From previous experience we know that such decisions usually stem from inadequate training or not having spent enough time practicing these basic skills. With proper knowledge, equipment and experience, installing a guideline should be as easy and enjoyable as swimming.