NOAA Line Tended Standby Diver Course
Transcript

1.
Introduction

NOAA Diving Program
[underwater exhalation]
- You're going to send your diver to the bow of...the survey boat.
- Roger.
- Team 9, you're going to send yours underneath the stern.
[Title: Line Tended Standby Diver]
- Team 8, you're going to try and get yours to that ladder right there.
-The ladder all the way over there?
- yeah, in the middle of the pier...

Hi, my name is Bill Gordon. I'm one of the instructors at the NOAA Diving Center in Seattle, Washington. In this training video, you will learn how and when to deploy a line tended standby diver, both as a line tender and a line-tended diver.

OSHA-subject dives always require standby divers to be present in case of an emergency.

Either a buddy team or a single line tended diver must be used. Launching a buddy team requires a total of 3 topside personnel: a Divemaster and two divers working together as a buddy team.

If a diving operation has a limited number of people available, OSHA also allows for the use of two topside personnel: a Divemaster that is also the line tender and a line-tended standby diver.

What is a line tended standby diver?

A line tended standby diver is tied to a tending line that is tended by a topside support personnel who will remain on the surface throughout all diving operations.

The line tended standby diver must be dressed in, pre-dive checked and tied in before you launch any divers into the water to do any work.

In this video you will learn about the various aspects that are necessary to use a line-tended standby diver safely, including any specific NOAA requirements.

After reviewing the equipment and the basic line pull signals, we will demonstrate how to set up your dive site, how to set up the diver, and how line pull signals should be given and answered.

We will also show you rescue procedures during a mock emergency scenario, and finally, we will review any special considerations and the Key Points.

2.
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Knowledge Check: OSHA Requirements

Do I Need a Line Tended Standby Diver?
At NOAA, a line tended standby diver can only be used as a safety diver, never as a working diver. Click on each note to find out when a line tended standby diver is needed.
OSHA Dives
All dives conducted at work fall under OSHA jurisdiction. These requirements include the use of standby divers to be deployed in the case of an emergency. The only instance when this requirement does not apply is for dives that fall under the scientific exemption. During scientific dives, the use of a standby diver is optional.

Dive Team Size
OSHA allows standby divers to be either: 1) a single line tended diver or 2) a buddy pair.
The use of a line tended standby diver reduces the size needed for a diving team from 5 to 4. This number includes: the buddy pair that is conducting work (2 people), the Divemaster / line tender (the 3rd person), and the line tended standby diver (which makes 4).

Scientific Exemption
When does a dive qualify as a "Scientific Exemption" under OSHA regulations? Find out here or click on the link in the resources tab on the top right hand corner of this window at any time.

3.

Chapter 1: Equipment

If you are going to use a line-tended standby diver with a tending line, the selection of the line is very important.

Your line-tended standby diver needs to be able to reach your team wherever they find themselves conducting diving operations. That's very critical.

Because I'm tethered, it does me no good as a rescuer, or you as a buddy team, if I can't reach you to respond to an emergency.

So, when choosing to use a single, line-tended standby diver, please ensure that you have an appropriate length of tending line.

Now, when selecting a tending line some things are also important to note.

You want a more or less neutrally buoyant line in the water. We use... this nylon line here. This is a 3/8 inch... nylon line. It has a high tensile strength. We recommend using synthetic line.

if you have hemp or jute, or some other natural fiber, it's not recommended because it rots when its wet and it has very low tensile
strength, so please choose the line appropriate...

You want to make sure that if you do choose a long length of tending line that your diver is going to be able to manage that.

You'll find that as we practice this here in just a bit that when performing line pull signals on these lines... the longer the line that you have in the water, the more difficult it is to transmit those line pulls across that length.

We do not recommend polypro line for a tending line: it floats!

If it floats it can get fouled on lots of different things.

Also, once you've chosen the appropriate length of line for your diving operations... It's important to mark that line.

We've developed a marking technique here...

Because we're using white line we use three different colors of tape to indicate distance along the length of that line.

White tape indicates every 10 feet of our tending line.

Because we're dealing with a white tending line we have to put a piece of black tape prior to the white tape from 0 to 50 feet.

So that at 20 ft., approximately, I have 2 white lines and 1 black line.

At 3...or at 30 ft. I have 3 white lines and 1 black line.

40: I have 1 black line and 4 white lines. Now, once we reach 5-0 ft. we change colors.

We go... to one yellow line.

So, for us, white lines indicate 10 ft. increments.

Yellow lines indicate 50, or 5-0 ft. increments.

So, at 6-0 ft. what two colors should I see?
[Voices from audience] - A yellow and a white...

A yellow and a white. Will I see a black?
[single person responds] -No!

Why?

[muffled response from various people] -...yellow.
[Main speaker] - 'Cause I have a yellow! See... you guys are smart!

It's awesome!

So: yellow and white. Now I have that... I have a yellow...well, I've already passed it...a yellow and 2 white. At 8-0 a yellow and 3 white...At 9-0 a yellow and 4 white...

And then, finally, the third colored tape that we use to indicate length is red.

At 100 ft. we should have a single red stripe.

And lookie lookie: a single red stripe.

Now you'll note that we mark our line from the tender...or, correction, the diver's end. We start marking from the diver's end.

And, what we've also done here is we've...before we've started our measuring process... we have kind of a length of line. We'll talk about
that here in a minute.

So... at 110 ft. what should you see?
[audience voices] - ...red...white...

One red and one white. Perfect.

at 150 what should we see?
[audience voices] - A red and a yellow...

That's 1-30... That's 1-40... Bam! 150 ft.

So... white for every 10, yellow for every 50, red for every 100. OK.
For our tending line, we've chosen a 5 gallon bucket, we've taken the lid and cut a hole at the top.
There's no real special way to feed line into this... for some reason, just faking it in
like this...works!

You'd think, oh, that's going to get all tangled up but no. It doesn't. It's magic.

Because we think positive thoughts [laughter]

and we translate our positive thoughts into action. And, well...the rest is...it's just awesome!

[laughter from audience]

4.

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Knowledge Check: Equipment

Tending line must be…
- long enough to reach the stricken diver
- rated for at least 300 lbs. of safe working load
- neutrally buoyant, light weight, kink resistant, and easy to coil
- made of synthetic material

L= (Ds + Dp) x 1.5
where L= length of line at dive site, Ds = distance and Dp = depth.

Coiling bucket (if using)

- 5 gallon bucket
- Cut hole at top of lid
- Cut small hole at bottom for tender's end of rope. This end will be secured to an immovable object.
- Start coiling from tender's end.
-

Length should be marked:

- White tape = 10 feet
- Yellow tape = 50 feet
- Red tape = 100 feet

5.

Chapter 2: Line Pull Signals

Line pull signals. There's 162 different line pull signals that you need to know before tomorrow morning... but there's an easy way to remember some of these.

One...if you get 1 line pull signal, 1 means "stop" or "are you OK"...so, stop...stop...stop...or are you OK?
2 line pull signals means "give slack", OK?

3 line pull signals means "take up slack"

4 line pull signals means "haul me to the-surface"

That's the easy way to remember those...

Search! There's 7 letters in search. If you launch a diver and you're going to use a line-tended sweep search...

When the diver enters the water you give them 7 line pull signals...they answer back 7... and the line pull signals mean pretty close to the same but not exactly.
One still means "stop" but it's kind of "stop and search where you are". It also means "are you OK?".

2 still means "give slack“ but there's a little bit added on when you're doing search signals. It's the diver's responsibility to keep tension on the tending line when doing a line-tended sweep search. Really, it's always the diver's responsibility to keep tension on the tending line.

So, when you have a diver out there doing a line-tended sweep search, they're always trying to swim away from the tending line so that they can receive short snappy line pull signals.

In the case of 2, 2 pulls, "give slack", when they're on search signals...

They're always trying to swim away from you...if you want to send the diver out 10 ft....you give them 2 line pull signals... they will answer back 2... and then you just slack the line 10 ft. and then stop letting out line.

If you wanted to bring the diver in when they are on search signals - a diver can only create about 5 lbs. of thrust, so a diver really doesn't weigh anything underwater - you would tell the diver that you're going to "give slack“ or you can also think of it as "adjust distance".

The diver is always trying to swim away...You give 2 line pull signals, if you want to bring them back in, you just pull them back in as far as you want and then you stop...
Now... when on search signals, the diver, when they receive the line pull signals always faces their tending line. So all of the signals you send for directions left or right are interpreted by the diver facing the tending line or facing you when they are in the water.

So, if I was a diver and I received 3 line pull signals when on search, that means the tender wants me to face my
tending line and swim to my right: R-I-T.
If, when I am on line tending sweep search I receive 4 line pull signals - I would answer back 4 - and that would mean that the tender wants me to face my tending line and swim to my left: L-E-F-T.

So we have 7 is "go on search", seven is also go off search...

One means "stop and search where you are" or "are you OK"...

Two means...still means "give slack" or you can think of it as "adjusting distance".

Three means "face your tending line and swim to your right", R-I-T...divers can't spell...

and four means face your tending line and swim to your left, L-E-F-T.

So...that's the basic line pull signals...

You've got, normal line pull signals are 1, 2, 3, and 4. Then, if you're on search there's 7...and 1, 2, 3, 4...

they're very similar but they mean slightly different things.

There are some other signals. There's line pull signals for emergency situations.

One of those is two, space two, space two, and it sounds corny but this is the easiest way to remember it, and it will work for you.

Two, space two, space two means "I need you". That means the diver that is line-tended needs the assistance of another diver.

Three, space three, space three means "I'm fouled but I can clear myself".

The only line pull signal that is not answered as received is four, space four, space four. If you ever get four, space four, space four you need to haul that diver to the surface IMMEDIATELY. That means they are drowning and they need to be brought to the surface.

Four, space four, space four is the only line pull signal that is not answered as given. Other than that all line pull signals are answered as given.

So, that's the easy way to remember line pull signals.

6.

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Knowledge Check: Line Pull Signals

You can download a list of NOAA line pull signals and their definitions by clicking on the “resources” menu on the upper right hand corner of this window or on the NDP website at https://www.omao.noaa.gov/find/media/documents/line-pull-signals

7.

Chapter 3: Procedures

Before you tie your line-tended standby diver in, you need to secure the top side end of the tending line to an immovable object.

To do this we tie a bowline around the object. EVERYBODY should be able to tie a bowline,

if you only know how to tie one knot, as a diver, it needs to be this knot.

Notice how the tail, or the end of the line, is on the inside of the knot.

That stops it from getting snagged on things.

And then to secure this you can tie an additional half hitch around it if you want.

Now, before you tie in your standby diver, you need to do a proper predive safety check.

There's an entire video devoted to a predive safety check that's done at demonstration speed and demonstration quality where everything is talked about in great detail. Please go watch that video!

Now, your line-tended standby diver has to be completely pre-dive safety checked, AND tied in and ready to enter the water within 1 minute of notification.

The line-tended standby diver has to be dressed in before you launch your buddy team.

Line-tended standby diver doesn't give you the option of putting one diver in the water. A line tended standby diver is just that: a standby diver. This diver is for rescue situations. This diver would only be deployed if there was a problem in the water and the buddy team couldn't work together to resolve it.

Now, when we go to tie in the line-tended standby diver, we need to make sure that the line is tied around the diver's waist.

We never tie the line to a piece of equipment that can be removed or pulled free of the diver when they are in the water.

Notice that the line goes up above the cummerbund of the diver's buoyancy compensator. And when we tie the line around the diver's waist we always tie a bowline.

A bowline is a knot that won't slip and won't become tight around the diver's waist and make it difficult for them to breathe.

Also, when we tie the line around the diver's waist, a good rule of thumb is leave the space of about your fist in between the diver and the knot. That allows them to breathe.

After you've done your predive safety check and you've tied the diver in... then you can launch your buddy team that would be going into the water to do work or science.

Here we're just going to go through the procedures of how to tend a line-tended standby diver.

Before you launch your diver, you want to make sure they can make it all the way to the water.

So, we leave a loop of line, sometimes referred to as a catenary. That way you know the diver can make it all the way into the water.

Once the diver makes their entrance...exchange OK signs...Now we're going to send the diver out on the surface.

Remember here we are just practicing the procedures for a line-tended standby diver.

You should pay attention to the line pull signals. A properly tended diver is like fishing.

The proper amount of tension on the tending line is enough to where you can feel what the diver is doing but not interfering with what they're doing.

When the diver gets to the bottom, they give a one. Topside answers back with a one.

All line pull signals are answered as given.

Two: give slack.
If slack is given the diver will swim away from the line. The tender will stop the diver with one line pull signal when they are in the position they want them in.

To aknowledge, the diver answers back with one line pull signal.

Seven! Seven is search.

Remember, all line pull signals are answered as given...that way it's and acknowledgement that it was received properly.

Three! when on search is face your tending line - keep tension on the tending line - and swim to your right, or your R-I-T.

Remember that it's the diver's responsibility to keep tension on the tending line...

Two! When on search, two means: if slack is given, swim away, if tension is taken, like it's being done here, the tender will pull the
diver in until they're in the position they want them in.

Four!

Face your tending line and swim to your left. Remember this is from the diver's perspective.

So, the diver will keep tension on the tending line, and swim to their left, until they get a one pull from the tender.

One means stop.
Three!

From the diver's perspective that means face your tending line and swim to your right or your R-I-T.

The diver will swim to their right until the tender stops them with one line pull signal.

Line pull signals! they need to be sharp, crisp, snappy signals. If they're long, mushy tugs, it's easy to misunderstand what the tender or the diver is trying to say.

It's not being rude to give a sharp, snappy line pull signal. Trust me, everybody would prefer that versus mush being transmitted back and
forth.

So the diver was just taken off search... and now is given a four... so the diver will... go to proper hand positions... and swim to the surface keeping tension on the tending line...

Reason we do this is the tender can see what's going on topside, the tender is controlling where the diver surfaces.

When the diver gets to the surface, they're going to inflate their BC. The diver and tender will exchange OK signs... and the tender can do all the work at this point. If this was a rescue, the rescuer - which is the diver in the water - would've just brought the victim to the surface. the rescuer might be a little bit tired.

The tender can pull both the rescuer and the victim to the exit point that is the most convenient for everybody.

So that's line-tended standby diver procedures.

8.

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Knowledge Check: Procedures

Prepare the Standby Diver

1. Secure topside of tending line to an immovable object.
2. Perform a pre-dive safety check (view video in the resources menu on the top right of this window).
3. Tie the tending line to the diver's waist using a bowline knot. Leave about a fist's distance of slack between the diver's body and the line.

Line Tender Procedures

1. Before the diver enters the water, leave a length of line long enough to ensure the diver can make it all the way into the water.
2. A properly tended diver is like "fishing": there is enough tension to know what the diver is doing without interfering.
3. Provide sharp and snappy signals.

Diver Responsibilities

1. Always maintain tension on the tending line.

2. Respond to signals as received.
3. Provide sharp signals that will transmit distinctly along the line. They should be 6” to 1’ in length.
4. Face the tender when responding to directions.

9.

Chapter 4: Rescue

Line-tended rescue procedures: in order to do this, we're going to create a situation where we are
forced to launch the line-tended standby diver. So in this video, there's going to be a buddy separation. One diver is not going to make it to the surface, their buddy that does make it to the surface doesn't have enough air to go down and rescue them.

Remember, your line-tended standby diver needs to be ready to enter the water within one minute of notification. Before we launched our buddy team, we did a complete predive safety check on the line-tended standby diver, tied in the topside end of the line, and tied the line around the diver's waist.

So, here comes our scenario: the diver comes to the surface, doesn't have enough air to go rescue his buddy. The diver requests assistance or calls for help. At this point the line-tended standby diver needs to enter the water within one minute of notification.

The tender gives instructions to the diver to exit the water.

The line-tended standby diver is deployed.

As the rescue diver descends... rescue diver sees the victim... and when the rescue diver gets to the victim they're going to give one big line pull signal.

It's a sharp, snappy, crisp line pull signal. It's like uppercase.

It's like a line pull signal with an exclamation point after it.

Now, the rescue diver is going to choose to give 4 uppercase line pull signals. And when you do these 4 big tugs, that means "haul me to the surface I have the victim".

Doing this, the tender does all the work for the rescue diver.

Also, the tender is pulling both the victim and the rescue diver directly towards the exit point, saving time.

Once the rescue diver gets the victim to the surface, they make them positively buoyant and they can start doing rescue breaths and stripping equipment... Now, the rescue diver still has the line tied around their waist. It's much easier for the rescue diver to untie the line - remember, we tied a bowline - everybody should be able to tie and untie a bowline without looking at it.

The rescue diver would untie themselves and then they can swim to the exit point. Remember, a line-tended standby diver is only used for rescue.

A line-tended standby diver doesn't allow you to put one diver in the water to do work or science. they're only used for rescue.

So, this is line-tended rescue on search.
So here we've launched our line-tended standby diver but the visibility is poor and the rescue diver doesn't drop right on top of the stricken diver.

When the diver gets to the bottom they give one line pull signal.

Realizing the visibility is poor, the diver can request to be put on search. Seven line pull signals.

And the tender will answer back with seven to acknowledge.

And then the tender, using somebody at the surface to help guide, can send the rescue diver using line pull signals on a search pattern to try and find the stricken diver. Sometimes you will have bubbles coming to the surface. Sometimes people have some sort of a visual reference.

So, on the first pass, the visibility is so poor the diver doesn't find them.

Tender gives 2 line pull signals, sending the diver out.

Remember, it is the diver's responsibility to keep tension on the tending line.

When the rescue diver finds them, it's one big line pull signal. It's like an uppercase.

Because the diver is farther away than the water is deep, the rescue diver in this situation decides to bring the diver to the surface dropping their weight belt, the diver and the victim will just swim directly to the surface... and then you have a rescuer that is not exhausted and the tender can pull both the diver and the victim, doing all the work, in on the surface.
So here, while the rescuer is being pulled in, the rescuer can work on rescue breaths and starting to strip and tow equipment from the victim.

Notice that the tender will bring both the diver and the victim to the exit point that's most convenient for them.

10.

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Knowledge Check: Rescue

Check each item on the list to read some important take-aways from the rescue procedures video.

Line Tender

The line tender should be prepared to pull both rescuer and victim to the exit point. When the diver signals 4 line pulls, the line tender can pull both the rescuer and the victim directly to the point of exit from the bottom. This saves the rescuer from having to swim to the surface and becoming exhausted.

Line Tended Diver

The line tended diver has the option of swimming with the victim to the surface without requesting to be pulled from the bottom. Once at the surface, the line tender can pull the

rescuer and the victim while the rescuer provides rescue breaths and strips the victim from their diving gear.
Rescue Procedures
The line tended diver should remember to ditch the victim's weight in order to make surfacing and towing easier on both the rescuer and the line tender.

11.

Special Considerations and Key Points

Special situations for line tending.

You cannot use a line-tended standby diver if you are live boating.

Because then you are putting a diver in the water with a line tied around their waist next to a propeller...or even a jet boat. No live boating with line-tended standby divers.

[Never deploy a standby diver if the conditions are not safe. For example: if the sea conditions are not within the acceptable range.]

Can a non-diver be a tender...Yes, a non-diver can be a tender but they must go through the same training that you're going through right now. You can't just
grab somebody off the deck and say: "hey, you're going to tend this line", because they don't know line pull signals, they're not familiar with diving... those are some
of the requirements. In order to be a non-diving tender you must be familiar with the diving operations that are going on and you must know the line pull signals.

Other things a non-diving tender must be able to do is do a predive safety check and check the divers before they get in the water. They should also know how to keep logs...

[The line tender’s primary responsibility is the safety of the standby diver.]

A non-diving tender must be familiar with the diving operations.

[One last consideration: If conducting a ship husbandry dive - A small boat is required to be in the water and moored alongside the ship during working dives. The small boat can be used as a platform to deploy and retrieve the standby diver. Standby divers must be tended from a fixed platform, live boating is not permitted.]

[Key Points]

Before you launch your buddy team that's going to do work, you need to have your standby diver tied in and predive checked, so...you set that person up first, and then you set up your buddy team and you can launch them. What may happen is, if you go to launch your buddy team before you get your line-tended stand by diver ready...they hit the water, there's a problem, you don't have a standby diver ready to go, they're useless!

It is the diver's responsibility to keep tension on the tending line when doing line tended sweep search.

The diver needs to constantly try and swim away from the line. The diver shouldn't take loops of line and add it up.

The topside person controls the distance. But the diver needs to constantly try and swim away, just a few pounds of thrust...

so that the line pull signals will be sharp, and clear, and crisp.

The more line that's in the water, the more muffled those line pull signals are going to be.

When giving line pull signals they need to be sharp, crisp snaps.

Mushy line pull signals like this cannot be understood under water and a true line pull signal is at least 6 inches to a foot in length. So a proper line pull signal would look like... a snap like that. So you take all the tension out of the line and then it's a quick snap, like that. And the response should be a pull back on the line, like that.

12.

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Review of Key Points

Click on each section to expand it.

OSHA Regulations

OSHA regulations require a standby diver, either line tended or with a buddy for all working dives. Exceptions can only be granted under the OSHA scientific exemption.

Tending Line Material

The tending line should be made from a synthetic material and be neutrally buoyant (do not use polypropylene).

Marking the Tending Line

White tape = every 10 feet
Yellow tape = every 50 feet
Red tape = every 100 feet

Length of Tending Line

The length of the tending line can be determined with this formula: Ds x Dp x 1.5 = L

Ds = distance from tender to dive site
Dp = depth of dive site
L= length of tending line

Before Deploying a Standby Diver

The standby diver should be dressed and pre-dive checked before any divers enter the water. Tie the tending line around the waist of the standby diver, not to a piece of equipment that might detach. Always use a bowline knot.
When setting up the tending line, remember to tie the tender's end of the line to an immovable object.

Fishing the Diver

"Fishing the diver" means maintaining enough tension in the line to detect the diver's movements in the water.

Following Directions

When on "search" the diver should always face the tender when following directional signals.

Line Pull Signals

FROM THE TENDER TO THE DIVER
1 - Pull stop or are you OK
2 - Pulls go down
3 - Pulls standby to come up
4 - Pulls come up

FROM THE DIVER TO THE TENDER
1 - Pull I'm OK or stop
2 - Pulls lower me (give slack)
3 - Pulls take up slack
4 - Pulls haul me up

EMERGENCY LINE-PULL SIGNALS
2-2-2 - Pulls I'm fouled, send help ("I need you")
3-3-3 - Pulls I'm fouled but don't need help
4-4-4 - Pulls haul me up immediately

ALL EMERGENCY SIGNALS WILL BE ANSWERED AS GIVEN EXCEPT 4-4-4

SEARCH SIGNALS
7 - Pulls go on (or off) search signals
1 - Pull stop and search where you are
2 - Pulls adjust distance (move directly away from tender if given slack; move toward the tender if tension is increased)
3-Pulls Face tender, maintain tension, and move right
4-Pulls Face tender, maintain tension, and move left

13.

Quiz