2.2 Cavern Diver

Unless otherwise noted, all requirements listed under *2.1 Standards Applying to all NSS-CDS Training Programs* apply to the course.

2.2.1 Purpose

The NSS-CDS Cavern Diver course is a safety and awareness course aimed at open-water sport divers. It is not a prerequisite for, nor does it count toward Cave Diver training and certification.

Students in the Cavern Diver course use standard, single-tank sport diving equipment. They may not use sidemount, backmounted doubles or CCRs.

The Cavern Diver course helps or allows students to:

- Avoid the mistakes which lead to cave-diving fatalities.
- Educate fellow divers about the risks and hazards inherent in cavern and cave diving.
- Improve critical diving skills such as buoyancy, trim and propulsion.
- Improve the functionality of their single-tank, sport diving gear.
- Better dive as a team with similarly trained buddies.
- Use dive lights in state parks and other sites where such use is limited to certified Cavern and Cave Divers.
- Safely dive in overhead environments while remaining within clear sight of the entrance and daylight.

More significantly, Cavern Diver students will be better equipped to assess whether they possess the skills needed for Cave Diver training. They can also better evaluate whether it is worth the time and expense to do so.

2.2.2 Limits of Training

A. Daylight zone of cavern and within clear sight of the entrance.

B. Penetration is limited to a gas volume of 1,150 L/40 ft^3 or one-third the available starting volume, whichever is less.

C. Minimum starting gas volume of 1,150 L/40 ft^3.

D. Penetration distance of no more than 60 m/200 ft from the surface.

E. Depth of no more than 30 m/100 ft.

F. Minimum starting visibility of at least 12 m/40 ft.

H. No planned decompression.

I. No passing through restrictions (areas too small for two divers to pass through side-by-side).

2.2.3 Course Duration and Location

This course generally takes two days. Students must make a minimum of four dives and accrue at least 90 minutes of bottom time in caverns. If need be, instructors may use a single dive site when teaching this course.

2.2.4 Prerequisites

Students in the Cavern Diver course must meet the same prerequisites as students in other NSS-CDS training programs. The sole exception is they need only log 25 dives prior to entering the course.

2.2.5 Equipment Requirements

Equipment requirements for the Cavern diver course are similar to those for other NSS-CDS courses. The chief difference is cavern diving equipment is based on single-tank, open-water gear. Students must have:

A. Mask and fins.

B. Adequate exposure protection for depth, time and water temperature.

C. Single-tank BC.

D. Single cylinders capable of providing a starting gas volume of at least 1,850 L/65 ft^3.

E. Regulator system with primary and backup second stages. The primary second stage must have a 1.5 m/5.0 ft or longer hose.

F. At least one dive computer capable of monitoring exposure to the gas mixtures used.

G. At least one cutting tool designed to deal with guideline entanglement.

H. Primary dive light with a rated burn time of at least 150 percent of the expected dive time.

I. One backup dive light.

J. One primary reel per team with minimum of 75 m/250 ft of guideline.

K. At least one safety reel/spool per diver with a total of at least 30 m/100 ft of guideline.

2.2.6 Knowledge Development

To be certified as NSS-CDS Cavern Divers, students must be able to answer the following questions correctly:

A. The cavern environment

   1. What defines a cavern dive?
   2. What additional benefits might divers taking Cavern Diver training enjoy beyond merely learning how to safely dive in overhead environments?

3. What safety factor inherent in open-water diving do divers potentially lose when diving in overhead environments?

B. Accident Analysis

1. What role has training played in cavern diving fatalities?
2. What is the Rule of Accident Analysis which applies to guidelines?
3. To have sufficient breathing gas to exit a cavern, divers must do what?
4. What is the Rule of Accident Analysis which applies to breathing mixtures?
5. What role have dive lights played in cavern diving fatalities?

C. Landowner relations and conservation

1. Is there such a thing as unowned land?
2. What is one of the most important things you can learn about and follow at the public and private dive sites you visit?
3. What must you match with each dive site you visit?
4. How do you determine the best propulsion technique to use in any cavern?

D. Cavern formation and environmental hazards

1. What are the four basic types of underwater caverns and caves?
2. What acid is chiefly responsible for the formation of solution caverns and caves?
3. What is the primary difference between springs and siphons?
4. Why is diving into springs is almost always safer than diving into siphons?
5. What specific risks do siphons pose to divers?
6. Why is loss of visibility a concern to cavern divers?
7. What is a *restriction*?
8. What is a *line trap?*

E. Equipment

1. Why must equipment for cavern diving meet very specific objectives?
2. Why must you modify adjustable mask and fins straps, and leave snorkels behind?
3. On what factors must you base exposure suit selection?
4. What must a regulator first stage be capable of doing?
5. Your BC air cell, harness and weight system must work together to do what?
6. What pieces of information must your instruments be capable of monitoring?
7. What do cavern diving teams must take with them in terms of reels and spools?

8. What counts as the primary source of light for cavern diving?
9. What type of snap do most cavern divers choose?
10. What is the preferred cutting tool for cavern diving?
11. Into which two categories do line markers for cavern diving fall?

F. Dive planning

1. What do we consider the "Golden Rule" of cavern diving?
2. What does the *Sequence* portion of a cavern diving plan define?
3. When must cavern diving teams maintain a predefined sequence?
4. How can you help ensure you will have sufficient gas in reserve to solve problems and then exit the cavern?
5. What is the biggest mistake divers make when calculating turn pressures?
6. When both buddies are using the same size cylinders, is gas matching relatively simple or more complex?
7. Are complex gas matching calculations necessary for cavern diving?
8. What should you do if the depth of the cavern exceeds the personal limits of any team member?
9. What should you do if the depth of the cavern increases the possibility of exceeding a no-decompression limit?
10. What should you do if a cavern is so large there is a risk of accidentally exceeding the maximum penetration distance for cavern diving?
11. What must a dive plan include if the cavern you are diving has multiple entrances or is unusually large?

G. Cavern diving skills and procedures

1. What do buoyancy and trim do beyond preserving good visibility?
2. How does the modified flutter kick differ from a standard flutter kick?
3. What is the best way to describe a frog kick?
4. What may be the only effective way to move in high flow?
5. What takes precedence over doing anything with a reel or spool?
6. When running reels, whose role is almost as crucial as that of the team leader?
7. Your primary and secondary tie offs must do what?
8. What is the number one rule of reel use inside caverns?
9. What are *Command* signals?

10. What type of signals are among the easiest and most efficient to use?
11. What must happen before you can use hand signals?
12. If divers must resort to using slates or wet notes to communicate with one another, what may this indicate?

H. Preventing and dealing with problems and emergencies

1. What is the most dangerous situation which can occur underwater?
2. Dealing with regulator or valve failure may require what?
3. What are the two sources of stress?
4. What is the only reliable way to overcome panic?
5. Are reel jams inevitable?
6. What must you do before switching to a backup light?
7. What is the best response to a loss of visibility?
8. If you must exit the cavern before locating a lost teammate, it's critical you do what?
9. If lost off the guideline, what is the most important thing you can do?
10. What do entanglement and entrapment have in common?

2.2.7 Overall Skill Performance Objectives

To be certified as NSS-CDS Cavern Divers, students must be able to:

A. Develop and/or follow a dive plan which encompasses *Sequence, Air, Depth, Duration, Distance* and *Direction*, and any other activities unique to the dive.

B. Correctly assemble, test and don a complete set of cavern diving equipment.

C. Enter and exit the water in a manner consistent with ease and safety.

D. Perform a variety of common in-water, pre-dive checks, including:

1. Checking for the presence of all necessary equipment.
2. Ensuring valves are turned all the way on.
3. Testing all regulator second stages for function underwater.
4. Checking cylinder pressure.
5. Checking to ensure the long hose is fully deployable.
6. Testing fellow team members' primary (long hose) second stages for breathability and function.
7. Checking to ensure no hoses, cords, straps, gauges, reels or attachment hardware are accidentally trapped under other equipment.

8. Inspecting fellow team members for signs of equipment problems.
9. Performing a bubble check on fellow team members.

E. Move efficiently using appropriate propulsion techniques, including modified flutter and frog kicks and pulling.

F. Effortlessly maintain neutral buoyancy and horizontal body position while swimming, resting, deploying reels/spools and guidelines, and other common cavern-diving-related tasks.

G. Initiate and correctly respond to a variety of common cavern diving hand and light signals.

H. Maintain team sequence and cohesion.

I. Work effectively with fellow team members to accomplish a variety of common cavern-diving-related tasks.

2.2.8 Dry Land Exercises

Before entering the water, students are to have the opportunity to practice these skills on land:

A. Deploy and retrieve a primary reel while maintaining tension and making primary, secondary and additional tie-offs and placements.

B. Assist a teammate who is deploying and retrieving a primary reel.

C. Follow a guideline with eyes closed.

D. Follow a guideline with eyes closed while engaging in touch-contact and/or bump-and-go with a teammate. Repeat as both leader and follower.

E. Practice deploying a safety reel or spool.

2.2.9 Open-Water Exercises

Before entering the cavern, students are to conduct these exercises in open water:

A. Follow a guideline for a distance of at least 15 m/50 ft without a mask.

B. Follow a guideline with eyes closed while maintaining communication with teammates. Repeat as both leader and follower.

C. Respond within ten seconds to a diver signaling *Out of Air!* by passing the primary (long hose) second stage and deploying the full length of its hose.

D. Assume the proper position for sharing gas with another diver, both as donor and receiver.

E. While simulating total loss of visibility, follow a guideline for a distance of at least 20 m/65 ft while sharing air.

F. Practice deploying a safety reel or spool.

G. Maneuver through the water using:

1. Modified flutter kick.
2. Frog kick.
3. Pulling.
4. Helicopter turn.

2.2.10 Overhead Environment Exercises

Students are to conduct these exercises in a cavern:

A. Install and retrieve primary reel while:
   1. Orienting and holding the reel/spool correctly.
   2. Maintaining guideline tension.
   3. Correctly making tie offs and placements as needed.
   4. Avoiding situations which would inconvenience other dive teams or put them at risk.
   5. Avoiding damage to the cavern environment.

B. Effectively assist a teammate who is deploying and retrieving a primary reel, providing light and removing tie-offs and placements when doing so is helpful.

C. Simulate responding to a primary light failure by deploying a backup light and signaling buddies.

D. Exit the cavern while sharing gas with a teammate for a distance of at least 20 m/65 ft in good visibility with eyes open. Repeat as both donor and receiver.