2.4.5 Diver Propulsion Vehicle Cave

2.4.5.1 Course Outcomes

GUE's Diver Propulsion Vehicle (DPV) Cave course is designed to cultivate mastery-level skill in the use of underwater propulsion vehicles in the cave environment. Other course outcomes include: reinforcing the outcomes of GUE's DPV 1 course, managing the ramifications of using multiple DPVs and stage cylinders, and environment-specific applications.

2.4.5.2 Prerequisites

Applicants for a DPV Cave course must:

a. Submit a completed Course Registration Form, Medical History Form, and Liability Release Form to GUE HQ.
b. Hold insurance that will cover diving emergencies such as hyperbaric treatment, e.g., DAN Master-level insurance or equivalent.
c. Be physically and mentally fit.
d. Be a nonsmoker.
e. Obtain a physician's prior written authorization for the use of prescription drugs, except for birth control, or for any medical condition that may pose a risk while diving.
f. Be a minimum of 18 years of age. Documented parental or legal guardian consent must be submitted to GUE HQ when the participant is a minor.
g. Be a certified GUE Cave Diver Level 2 diver.
h. Be a certified GUE Diver Propulsion Vehicle Level 1 diver.
i. Have completed at least 50 non-training Cave 2 dives beyond GUE Cave Diver Level 2 certification.
j. Have completed at least 25 DPV 1 dives beyond GUE Diver Propulsion Vehicle Level 1 certification.
k. Own a GUE-approved DPV with sufficient burn time for the cave environment.

2.4.5.3 Course Content

The Diver Propulsion Vehicle Cave course is normally conducted over five days. It requires a minimum of five cave dives and at least forty hours of instruction, encompassing classroom lectures, land drills, and in-water work.

2.4.5.4 Diver Propulsion Vehicle Cave Specific Training Standards

a. Student-to-instructor ratio is not to exceed 3:1 during land drill or surface exercises; it cannot exceed 2:1 during any in-water training.
b. Maximum depth of 100 ft/30 m

2.4.5.5 Training Materials

GUE training materials and recommended reading as determined by the course study packet received via online download after GUE course registration.

2.4.5.6 Academic Topics

a. Introduction: GUE organization and course overview (objectives, limits, expectations)
b. Equipment considerations
c. DPV components

d. DPV maintenance
e. Leashes (lengths, knots, lanyards)
f. Bottom stages and decompression stages
g. Exposure suit for the cave environment
h. Dive planning (operational, team, support, objectives)
i. Matching different speeds while using a DPV
j. Emergency procedures (includes: gas sharing, towing diver, and runaway scooter)
k. Gas planning
l. Trigger time and multiple scooter use
m. Towing a DPV
n. Stage management
o. Line use (installing, following, and retrieving)
p. Managing, switching, dropping, and stowing DPVs

2.4.5.7 Land Drills and Topics

a. Proper position while using a DPV
b. Ready position
c. Runaway DPV
d. Switching DPVs
e. Dropping DPVs
f. Use of a primary light while operating a DPV
g. Team order and protocols
h. Use of spools and reels
i. Navigation
j. Pre-dive drills

2.4.5.8 Required Dive Skills and Drills

a. Must be able to swim at least 500 yds/450 m in less than 14 minutes without stopping. This test should be conducted in a swimsuit and, if necessary, appropriate thermal protection.
b. Must be able to swim a distance of at least 60 ft/18 m on a breath hold while submerged.
c. Demonstrate proficiency in safe diving techniques, including pre-dive preparation, in-water activity, and post-dive assessment.
d. Demonstrate awareness of team member location and a concern for safety, responding quickly to visual indications and dive partner needs.
e. Demonstrate a safe and responsible demeanor throughout all training.
f. Demonstrate proficiency in underwater communication while using a DPV.
g. Demonstrate basic proficiency in managing the GUE equipment configuration.
h. Demonstrate safe ascent and descent procedures.
i. Demonstrate proficiency in making adjustments to maintain proper buoyancy and trim while using a DPV. Approximate reference is a maximum of 20 degrees off horizontal while remaining within 3 ft/1 m of a target depth.
j. Demonstrate proficiency in laying and retrieving line with a DPV; this includes the use of a primary reel and jumps/gaps.
k. Demonstrate proficiency in switching from one DPV to another.

l. Demonstrate proficiency in all aspects of stage cylinder management while also managing DPVs.
m. Demonstrate proficiency in calculating accurate available trigger time.
n. Demonstrate effective use of a compass and proficiency in navigation.
o. Demonstrate ability to match speeds with team members.
p. Demonstrate ability to tow a diver.
q. Demonstrate control while managing a runaway DPV.
r. Demonstrate proficiency with the sequential management of an out-of-gas scenario.
s. Demonstrate ability to tow an out-of-gas diver for a distance of 500 ft/150 m while using a DPV.
t. Demonstrate proficiency in managing breathing system failures, including proper assessment and valve manipulation with regulator switching as appropriate.
u. Demonstrate proficiency with effective decompression techniques, including depth and time management.
v. Demonstrate an efficient exit on a backup light.
w. Demonstrate ability to follow a guideline in a simulated zero-visibility scenario while managing stage(s) and DPV(s).
x. Demonstrate ability to manage equipment through restricted areas with concern for the environment.

2.4.5.9 Equipment Requirements

GUE base equipment configuration as outlined in Appendix A, plus:

a. GUE double tank configuration
b. One primary and two backup lights
c. One bottom stage with stage regulator
d. One decompression stage with stage regulator
e. One safety spool
f. At least two jump spools
g. One primary reel per team
h. At least twelve line markers; six directional and six non-directional
i. Two approved DPVs

Excluding:

a. Surface marker buoy with spool

An approved DPV is one that is tow-behind style with variable speed adjustment and clutch mechanism. The DPV must include an attached cord at the back with a bolt snap to be clipped on the front crotch strap D-ring and a leash attached to the front to be used for towing a disabled DPV.

Prior to the commencement of the class, students should consult with a GUE representative to verify equipment requirements and appropriateness of any selected equipment.

Appendix A - GUE Base Equipment Configuration

The GUE base equipment configuration is comprised of:

a. Tanks/cylinders: Students may use a single tank/cylinder with a single- or dual-outlet valve. Students may also use dual tanks/cylinders connected with a dual-outlet isolator manifold, which allows for the use of two first stages. Dual tanks/cylinders connected with a dual-outlet, non-isolator manifold can be used, but only in recreational (no decompression) diving, and are considered an alternative for a single tank/cylinder. Consult course-specific standards and your instructor to verify size requirements.
b. Regulators:
    i. Single tank: The first stage must supply a primary second stage via a 5 to 7 ft/1.5 to 2 m hose. A backup second stage must be necklaced and supplied via a short hose. The first stage must also supply an analog pressure gauge, inflation for the buoyancy compensator (BC), and (when applicable) inflation for a drysuit.
    ii. Double tank: One first stage must supply a primary second stage via a 5 to 7 ft/1.5 to 2 m hose (7 ft/2 m hose is required for all cave classes), and inflation for the buoyancy compensator (BC). The other first stage must supply a necklaced backup second stage via a short hose, an analog pressure gauge, and (when applicable) inflation for a drysuit.
c. Backplate system:
    i. Is held to the diver by one continuous piece of webbing. This webbing is adjustable and uses a buckle to secure the system at the waist.
    ii. A crotch strap is attached and looped through the waistband to prevent the system from riding up a diver's back.
    iii. The continuous webbing must support five D-rings;
        1. The first placed at the left hip
        2. The second placed in line with a diver's right collarbone
        3. The third placed in line with the diver's left collarbone
        4. The fourth and fifth are placed on the front and back of the crotch strap when divers plan to use advanced equipment such as DPVs.
    iv. The harness below the diver's arms has small restrictive bands to allow for the placement of backup lights. The webbing and system retains a minimalist approach.
d. Buoyancy compensation device (BC):
    i. A diver's BC is back-mounted and minimalist in nature.
    ii. It is free of extraneous strings, tabs, or other material.
    iii. There are no restrictive bands or restrictive elastic affixed to the buoyancy cell.
    iv. Wing size and shape is appropriate to the cylinder size(s) employed for training.
e. At least one time/depth measuring device
f. Wrist-mounted compass
g. Mask and fins: Mask is low-volume; fins are rigid, non-split.
h. Backup mask
i. At least one cutting device
j. Wetnotes with pencils
k. Surface marker buoy (SMB) with spool: when required, the SMB should be appropriate for environmental conditions and deployed using a spool with at least 100 ft/30 m of line.
l. Exposure suit appropriate for the duration of exposure

Additional Course-Specific Equipment

a. Where required, back gas and stage cylinders are marked in accordance with the GUE General Training Standards, Policies, and Procedures document and configured in line with GUE protocols.
b. When drysuit inflation systems are applicable, they should be sized appropriately for the environment; small tanks are placed on the left side of the backplate with larger supplies affixed to the diver's left back gas tank.
c. Underwater lights:
    i. When required, backup lights should be powered by alkaline batteries (not rechargeable) and stowed on the D-rings at a diver's chest.
    ii. Backup lights should have a minimal amount of protrusions and a single attachment at the rear.
    iii. The primary light should consist of a rechargeable battery pack and be fitted with a Goodman-style light handle.
    iv. When burn time requirements create the need for an external battery pack, it should reside in a canister mounted on the diver's right hip.
d. Guideline devices, as required during cave diving activities:
    i. A primary reel is required for all cave diving and provides a minimalist form factor with a handle designed to support a Goodman or "hands free" handle operation. The primary reel must contain at least 150 ft/45 m of line.
    ii. A safety spool is required for each diver while cave diving and must contain at least 150 ft/45 m of line.
    iii. A jump or gap spool is required during Cave 2 diving and must contain at least 75 ft/23 m of line.