

**Central Arizona Project  
Diving Requirements  
March 1, 2016**

This document summarizes the requirements for diving operations conducted by contractors on behalf of CAP on CAP property. It is to be provided to the Contractor upon signing of the contract and for each diving activity that the Contractor is called upon to perform. This document covers the following: General Requirements for All Diving Operations; Surface-Supplied Air Diving; and Scuba Diving. In addition to this list of diving requirements, this document includes an appendix for the Dive Plan and Hazard Analysis required for each diving activity.

**I. General Requirements for All Diving Operations**

- A. General Requirements.** Conventional hardhat and lightweight surface-supplied and scuba diving operations must conform to the more stringent requirements of this document or to 29 CFR 1910, Subpart T, "Commercial Diving Operations." If an issue or item is not addressed in these requirements, look to the regulations contained in the U.S. Navy Diving Manual, volumes I through V, for guidance.
- B. Hazard Control Measures.** Diving equipment may be brought to the worksite only after a diving plan and dive hazard analysis have been developed by the dive supervisor and reviewed by CAP. The dive hazard analysis and diving plan must specifically address safety procedures for each separate diving location or mode and include procedures that ensure compliance with these and referenced standards. If conditions change, all diving operations are to cease until conditions are reevaluated and appropriate controls have been implemented. Minimum requirements for the dive plan and dive hazard analysis are included in the appendix to this document. A Safe Practices Manual must be kept at the dive site.
- C. Diver qualifications.** Divers must not take part in diving operations if they have colds, sinus or ear infections, alcohol or drug intoxication or its aftereffects, fatigue, acute illness or vertigo, or any other medical condition that may impair his/her ability to safely perform a dive operation. Divers performing work for CAP, including those on stand-by, must have a certificate of training from a recognized diving school. A diver may dive to depths greater than 100 feet seawater equivalent only if they have previous experience diving to the maximum depth required in the planned dive. Divers must be at least 18 years old and be fully familiar with the equipment, diving system and emergency procedures to be used. Divers must have a medical evaluation within the 12 months previous to the dive certifying that the diver is physically fit for diving. All dive team members must be trained in CPR, first aid (American Red Cross standard course, or equivalent), and oxygen first aid. Prior to mobilizing on site

and commencing diving operations, the dive supervisor must submit to CAP for review satisfactory evidence that all dive team members have met the above requirements. Note: CPR courses must include hands-on training. Online training, by itself, is unacceptable.

- D. Supervision.** A designated, experienced, onsite dive supervisor must personally supervise all diving operations.
- E. Equipment.** Use a tagging or logging system to record equipment modification, repair, testing, calibration, or maintenance services. Include the date and type of work performed and the name or initials of the person who did the work.
- a. Air Compressor System.** Compressors that supply air to the surface-supplied air (SSA) diver must have a volume cylinder with a check valve on the inlet side, a pressure gauge, a relief valve, a drain valve, and a carbon monoxide filter and alarm system. Compressors must have the capacity to overcome any line loss or other losses and deliver a minimum of 4.5 cubic feet per minute to each diver at the maximum working depth. Air compressor intakes must be located away from areas containing exhaust or other contaminants. Respirable air supplied to a diver, or to air tanks, must not contain:
1. Carbon monoxide (CO) greater than 10 parts per million (ppm).
  2. Carbon dioxide (CO<sub>2</sub>) greater than 1,000 ppm.
  3. Oil mist greater than 5 milligrams per cubic meter.
  4. A noxious or pronounced odor.
- Test the air compressor system output for air purity at least every six (6) months, by taking samples at the connection to the distribution system.
- b. Compressed Gas Cylinders.** Compressed gas cylinders must:
1. Be designed and maintained according to the applicable provisions of 29 CFR 1910.101(a).
  2. Be stored in a ventilated area and protected from excessive heat.
  3. Be secured against falling.
  4. Have shutoff valves recessed into the cylinder or protected by a cap, except when in use, when manifolded, or when used for diving.
- F. Accident reporting.** Any accident which results in injury or property damage must be immediately reported to the dive supervisor and CAP. A detailed, written report of all such incidents addressing the causal factors and appropriate

prevention strategies must be submitted to the CAP within seven calendar days of the incident.

## II. Surface-Supplied Air Diving

**A. Auxiliary Air Supply.** An auxiliary air supply must be provided during all dives. The auxiliary air supply must have a standby compressor or air flasks with a capacity of 72 cubic feet or more. Compressors that are used for diving operations must not be used for any other purpose. Auxiliary air supply must meet the requirements in the subsection, "Air Compressor System."

**B. Decompression.** A recognized decompression specialist must prepare decompression tables. Post decompression times inside and outside decompression chambers.

**C. Decompression Chamber.** The following circumstances require an onsite, dual-lock, multiplace decompression chamber (capable of recompressing the diver to a minimum of 165 feet seawater equivalent) and trained operating personnel:

- Diving operations that are outside the no-decompression limits or to depths greater than 100 feet seawater
- When surface recompressing capabilities are recommended by the decompression specialists, Dive Supervisor, or where necessitated by onsite conditions.

Decompression chambers must accommodate at least two persons.

**D. Decompression Dives.** Divers engaged in dives outside no-decompression limits or engaged in mixed-gas diving must remain awake and close to an attended decompression chamber for at least one hour following the dive. The diver must be able to contact a decompression chamber facility during the 4-hour period immediately following treatment or after leaving the water.

**E. Communications.** All divers and standby divers must be equipped with communication systems that permit simultaneous, two-way conversations between the diver, his tender, other divers and tenders, and the dive supervisor. Communication systems must be operable from the time the diver puts on his helmet or mask until it is removed.

**F. Minimum Crew Size.** Two divers must be available for all diving operations. The standby diver must be available, suited up, and ready to dive in an emergency. The standby diver must not serve as a tender. The minimum crew must consist of at least four persons: the dive supervisor, a diver, a standby

diver, and a tender. For each diver added to the crew, one tender must also be added.

- G. Reserve Breather Gas Supply.** Each diver using lightweight SSA must carry a reserve breather gas tank. When heavy, deep-sea diving gear is used, when diving to depths exceeding 100 feet of seawater, or when diving outside the no-decompression limits, the standby diver must have an extra breathing gas hose for the working diver.

### **III. Scuba Diving**

- A. Requirement.** Scuba diving is permitted only when sanctioned by the contract specifications and authorized in writing by CAP.
- B. Maximum Depths.** Limit scuba diving to depths and times that will not require decompression staging as set forth in the U.S. Navy Standard Air Decompression Tables. Scuba dive depths must not exceed 100 feet of seawater after altitude adjustment.
- C. Compressed Air.** Oxygen or mixed gases are prohibited, except for up to 40 percent nitrox, when used in accordance with the National Oceanic and Atmospheric Administration (NOAA) Diving Manual: Diving for Science and Technology, Chapter 15, "Nitrox Diving" and Appendix VII, "Nitrox Dive Tables." Use only open circuit scuba systems.
- D. Diving Equipment.** A recognized approving agency must approve scuba diving equipment. Use and maintain scuba diving equipment in accordance with the manufacturer's recommendations.
- E. Buddy system.** A dive may be made singly if the dive is less than 20 feet deep, there is little current and visibility is good (at the discretion of the dive supervisor). All other dives with scuba gear must use a buddy system. Buddy pair divers must maintain visual contact or use a buddy line securely fastened to both divers. When working in fast currents, murky water, or in confined spaces, a tether line must be attached to the diver and it shall be continuously tended from the surface.
- F. Standby Diver.** A standby diver must be provided for each diver or buddy pair. The standby diver must be a qualified, fully equipped scuba diver and remain on the surface, close to the diver.
- G. Standard Equipment.** Scuba divers must wear buoyancy compensators and have a depth indicating device, timing device, cutting tool, flashlights, compass, submersible pressure gauge (or integrated dive computer) to monitor cylinder/system air pressure, and an alternate second stage air source, such as an octopus or safe second.

## APPENDIX

**Dive Plan and Hazard Analysis.** Prepare a dive plan and hazard analysis before each diving activity. All personnel involved must review the dive plan and hazard analysis before suiting up. As a minimum, the plan must contain the following:

1. Names and duties of dive team members, including the dive supervisor.
2. Date, time, and location of the dive operation.
3. Diving mode to be used (scuba, surface-supplied air, etc), including a description of the backup air supply.
4. A description of the work divers will perform, and inspection requirements.
5. Surface and underwater conditions, including visibility, temperature, thermal protection, and currents.
6. Activity hazard analysis for each phase of work, including the hazards of flying after diving.
7. Maximum depth and bottom time (make altitude adjustments to dive tables for dives at altitudes of 1000 feet or more above sea level).
8. Emergency management plan, including emergency procedures, means of notification, telephone numbers for ambulance, doctors, and Divers Alert Network; locations of evacuation routes; and other emergency assistance protocols.
9. Lockout/tagout procedures, including how to deal with differential water pressures due to unequal water elevations.
10. Equipment servicing records, procedures, and checklists and requirements for special tools and equipment.

**Submittals:** The following information must be submitted to and approved by CAP prior to mobilizing on site:

1. The Dive Plan and Hazard Analysis
2. Evidence of training for each diver for the method of diving to be used.
3. For dives exceeding a depth greater than 100 feet seawater equivalent, evidence that the divers have had previous experience diving to the maximum depth.

4. Evidence of medical evaluations for each diver, conducted within 12 months previous to the dive.
5. Evidence of first aid, CPR and oxygen first aid training and current certification for each dive team member
6. Insurance certificates in accordance with contract requirements.