

**Forest Service Handbook
National Headquarters (WO)
Washington, DC**

Forest Service Handbook 4209.11 – Wildlife, Fish, Water, and Air Research Handbook

Chapter 10 – Diving and Snorkeling Safe Practices

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Responsible Staff:

Explanation of changes: Following is an explanation of the changes throughout the directive by section.

11.04: Updates some roles and responsibilities.

11.05: Updates snorkeling and free diving definitions and provides additional technical definitions.

12: Renames section title from “Certification” to “Authorization” and sets forth direction.

12.2: Revises free diving direction to meet technical industry standards.

13.8: Removes waiver of Forest Service diving standards language but retains language of how to request OSHA standards waiver.

14.0: Clarifies use of diving equipment direction.

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11 - Diving and Snorkeling

The Forest Service Diving Program is comprised of four types of activities:

1. Snorkeling.
2. Free diving.
3. Scientific diving.
4. Commercial diving.

11.01 - Authority

1. Title 29, Code of Federal Regulations, part 1910, Subpart T (29 CFR part 1910, Subpart T). This authority sets forth the Occupational Safety and Health Administration (OSHA) guidelines and additional requirements specific to commercial diving.
2. Title 29, Code of Federal Regulations, part 1910, Subpart T, Appendix B (29 CFR part 1910, Subpart T, Appendix B). This authority sets forth the OSHA guidelines and additional requirements specific to scientific diving.

11.02 - Objective

To ensure the safety and health of all Forest Service divers who engage in snorkeling, free diving, scientific diving, and commercial diving for the Forest Service.

11.03 - Policy

1. The Forest Service Diving Program is designed to ensure that all diving under the auspices of the Forest Service is conducted in a manner that maximizes protection of divers from accidental injury, illness, or death. This includes:
 - a. Diving must not be conducted unless procedures have been established for emergency evacuation of divers to a hyperbaric chamber or other appropriate medical facility.
 - b. All diving must be planned and executed in such a manner as to ensure that every diver maintains constant, effective communication with at least one other comparably trained and/or equipped diver in the water (surface supplied diving excluded), or onshore for snorkeling.

- c. All Regions, Stations, Forests, and Laboratories with diving programs must prepare an annual report and review of all diving activities and submit the reports to the National Diving Safety Officer and Diving Control Board.

11.04 - Responsibility

11.04a - Washington Office, Deputy Chief for Research and Development

The Washington Office, Deputy Chief for Research and Development shall:

1. Consider recommendations from the Diving Control Board concerning policy and operation of the Forest Service Diving Program.
2. Resolve national issues, concerns, and policy conflicts relating to the Forest Service Diving Program and associated operations that affect the employee's safety, health, and work environment.
3. Designate a Deputy Chief's representative for diving safety.
4. Appoint a National Diving Safety Officer based on the recommendation of the Diving Control Board.

11.04b - Deputy Chief's Representative for Diving Safety

The Deputy Chief's representative for Diving Safety shall:

1. Provide overall program leadership and safety oversight for the Forest Service Diving Program.
2. Suspend diving operations that are considered unsafe or unwise.
3. Determine and approve other designated Forest Service representatives to the Diving Control Board in collaboration with the national and Regional Diving Safety Officers.
4. Serve as liaison between the Diving Control Board and the Washington Office, Deputy Chief of Research and Development.

11.04c - National Diving Safety Officer

The National Diving Safety Officer shall:

1. Suspend diving operations that are considered unsafe or unwise.
2. Serve as a voting member on the Diving Control Board regarding policy recommendations to the Washington Office, Director, Office of Safety and Occupational Health.

3. Determine and approve other designated representatives to the Diving Control Board in collaboration with the regional Diving Safety Officers.
4. Convene the annual national Forest Service Diving Workshop.
5. Represent the Forest Service on interagency diving safety boards.
6. Have a diving instructor certification by a nationally or internationally recognized SCUBA diving organization.

11.04d - Diving Technical Advisor

One or more diving technical advisor(s) are appointed by the Diving Control Board at its discretion. The diving technical advisor(s) shall:

1. Advise the Diving Control Board on technical issues, problems, regulatory interpretations, and other diving matters, as requested.
2. Assist with special projects and activities that promote diving program management, as necessary, when requested or authorized by the Diving Control Board.

11.04e - Liaison, Office of Safety and Occupational Health

The liaison is appointed by the Director of the Office of Safety and Occupational Health. The liaison shall:

1. Advise the Diving Control Board on technical safety and health issues, problems, regulatory interpretations, and other safety matters, as requested.
2. Assist with special projects and activities that promote diving program safety, as necessary, when requested or authorized by the Diving Control Board.

11.04f - Diving Control Board

The Diving Control Board (sec. 11.05) shall:

1. Execute operational control of the Forest Service Diving Program.
2. Provide operational, technical, and safety oversight of Forest Service divers, including Regions, Stations, Forests, Laboratories, and Law Enforcement, when diving is conducted.
3. Serve as an official representative of the Forest Service in matters concerning the Forest Service Diving Program.
4. Serve as a board of appeal on diver authorization suspensions and related issues.

5. Recommend the issuance or reissuance of Forest Service diving authorizations.
6. Recommend Forest Service Diving Program policy, operational requirements, and training that promote safety, efficiency, and expertise.
7. Advise the Washington Office, Deputy Chief's representative for diving safety and the liaison for Safety and Occupational Health of any circumstances affecting the safety and efficiency of the Forest Service Diving Program.
8. Establish and/or approve dive training programs through which applicants can satisfy authorization requirements found in section 12 of this handbook.
9. Establish criteria for equipment selection, approval, and use.
10. Recommend and approve new equipment, techniques, and practices.
11. Review all specialized diving operations beyond the provisions outlined in this section, or recommend the establishment of a review committee for these projects and activities.
12. Establish and/or approve programs for inspection and maintenance of diving apparatus and associated equipment.
13. Review regional diving program management and performance.
14. Investigate all reported Forest Service diving accidents, and potentially serious incidents, and recommend preventative measures, as required.
15. Serve on accident investigation teams and boards of review involving diving accidents and serious incidents.
16. Attend the annual National Forest Service Diving Workshop.
17. Participate in scheduled Region and Station safety manager conference calls.

11.04g - Regional Foresters and Station Directors

Regional Foresters and Station Directors with a diving program shall:

1. Appoint a regional diving safety officer based on recommendations of the Diving Control Board. Where geographic distribution of Regions and Stations align, Regional Foresters and Station Directors will collaborate to appoint joint regional dive safety officers based on the recommendations of the Diving Control Board.
2. Ensure that sufficient resources are available to manage a safe and effective regional diving program.

11.04h - Regional Diving Safety Officers

Regional Diving Safety Officers (RDSOs) shall:

1. Administer the Forest Service Diving Program at the regional level, which includes support to National Forest System, Research and Development, and State and Private Forestry.
2. Ensure operational performance of regional diving programs to include:
 - a. Training and authorization records.
 - b. Diving plans.
 - c. Diving records.
 - d. Compliance with direction in sections 11 through 13 and other applicable Forest Service direction.
3. Serve as a voting member of the Diving Control Board.
4. Comply with the direction of the Diving Control Board.
5. Delegate portions of the regional diving program to qualified employees, as appropriate.
6. In regions with active scientific, commercial, or free diving programs, RDSOs maintain scientific or commercial diver status, knowledge of diving techniques, and Forest Service Diving Program directives, procedures, and practices.
7. In Regions with active snorkeling programs and no diving, RDSOs maintain snorkel status, knowledge of snorkel techniques, and Forest Service Diving Program directives, procedures, and practices.
8. Report any physical problems or adverse physiological effects, including symptoms of pressure-related injuries, to the National Diving Safety Officer and Diving Control Board.
9. Restrict or revoke diver authorizations in accordance with section 12.1, 12.2, and 12.7 of this Handbook.
10. Suspend diving operations that are considered unsafe or unwise.
11. Prepare an annual report and review of diving activities and submit the report to the National Diving Safety Officer and Diving Control Board.

11.04i - Forest Supervisors and Laboratory Line Officers

The Forest Supervisor and laboratory Line Officer on each forest or lab ("unit") with a diving program shall:

1. Appoint a Unit Diving Safety Officer based on recommendations of the Regional Diving Safety Officer.
2. Provide sufficient resources for implementing a safe and effective diving program.
3. All Regions, Stations, Forests, and Laboratories with diving programs must prepare an annual report and review of all diving activities and submit the reports to the Regional Diving Safety Officer.

11.04j - Unit Diving Safety Officers

Unit Diving Safety Officers shall:

1. Administer the Forest Service Diving Program at the unit level.
2. Ensure operational compliance of the unit diving program to include:
 - a. Conducting training and authorization.
 - b. Approving diving plans.
 - c. Completing a risk assessment.
 - d. Maintaining diving records.
 - e. Complying with applicable Forest Service direction.
3. Comply with the direction of the Diving Control Board.
4. Maintain Forest Service diver authorization to a level commensurate with the unit's diving program.
5. Maintain knowledge of diving techniques and Forest Service Diving Program directives, procedures, and practices.
6. Prepare an annual report and review of diving activities and submit the report to the Regional Diving Safety Officer.
7. Report to the Regional Diving Safety Officer any diving related physical problems or adverse physiological effects, including symptoms of pressure-related injuries. This is in addition to any normal accident reporting procedures.

8. Suspend diving operations that are considered unsafe or unwise.
9. Conduct necessary dive/snorkel training in collaboration with the Regional Diving Safety Officer.

11.04k - Lead Divers

Lead divers shall:

1. Maintain Forest Service diver authorization in accordance with the Forest Service Diving Program standards.
2. Maintain knowledge of diving techniques and Forest Service Diving Program directives, procedures, and practices.
3. Coordinate with other known projects and activities in the vicinity that are likely to interfere with diving operations prior to the commencement of the dive.
4. Ensure that all dive team members possess and maintain current authorizations and are qualified for the type of diving operation to be executed.
5. Plan dives in accordance with section 13 of this Handbook.
6. Ensure that safety and emergency equipment is operable and on hand at the dive site prior to each dive.
7. Brief dive team members on:
 - a. Dive objectives, including a review of the applicable risk assessments.
 - b. Environmental conditions or unusual hazards likely to affect the safety of the diving operation.
 - c. Modifications to diving or emergency procedures and mitigation factors necessitated by the specific diving operation and/or identified hazards.
8. Suspend diving operations when conditions are unsafe or unwise.
9. Report to the unit diving safety officer any self-contained underwater breathing apparatus (SCUBA) diving related physical problems or adverse physiological effects, including symptoms of pressure-related injuries in addition to any normal incident reporting procedures.
10. Ensure that air supplies meet air quality standards as set out in section 13 of this handbook.

11. Ensure diving equipment that is subjected to extreme usage under adverse conditions receives more testing and maintenance beyond annual requirements.

11.04I - Divers

The Forest Service does not employ full time divers or diving safety personnel. Engagement in diving activities or diving safety are collateral duties for Forest Service employees.

Divers shall:

1. Possess and maintain current diving authorizations and proficiency and maintain qualifications for the type of diving operation to be executed.
2. Plan dives in accordance with section 13 of this handbook.
3. Ensure divers know the location of the onsite safety and emergency equipment and are proficient in its use.
4. Dive to no more than the authorized depth limits for which they are authorized.
5. Suspend diving operations when conditions are unsafe or unwise.
6. Report to the lead diver any physical problems or adverse physiological effects, including symptoms of pressure-related injuries.
7. Conduct functional checks of their diving equipment in the presence of the diving buddy or tender.
8. Refuse to dive, if the dive conditions are perceived as unfavorable or would violate the precepts of training or the requirements of this section.
9. Use the "buddy system" on every dive. The "buddy system" is based upon a pair of divers and provides mutual assistance, especially in the case of an emergency. All divers shall surface and re-establish contact, if loss of effective communication occurs within a buddy team.

11.05 - Definitions

Blue Water Diving. Diving in open water where the bottom is generally greater than 200 feet deep that requires special training and the use of multiple-tethered diving techniques.

Commercial Diver. A diver who has completed all requirements and authorizations in section 12.5 of this handbook.

Commercial Diving. Diving performed as a necessary part of an activity by employees whose sole purpose for diving is to perform commercial tasks. Included within this definition of commercial diving are construction and trouble-shooting tasks traditionally associated with commercial diving, such as placing or removing heavy objects underwater, inspection of pipelines and similar objects, construction, or the inspection of structures.

Designated Person In Charge. An individual at the dive location in charge of all aspects of the diving operation affecting the safety and health of dive team members who is experienced and trained in the conduct of the assigned diving operation.

Dive. A descent into the water, an underwater diving activity utilizing compressed gas, and ascent, and return to the surface.

Diver-in-Training. A diver who has completed all requirements and obtained authorizations in section 12.3 of this handbook.

Diving Control Board. A board consisting of the National Diving Safety Officer, diving technical advisor, and the Regional Diving Safety Officers whose majority consists of active divers employed by the Forest Service, having operational control of the Forest Service Diving Program.

Forest Service Auspices. Any diving operation, project, or activity that involves Forest Service employees performing within the scope of their employment for the purpose of either furthering scientific data gathering or performing commercial tasks.

Free Diving (also called Breath-Hold Diving or Apnea Diving). Water immersion with mask and snorkel with or without fins, but with no pressurized gas supply, and occurs from a depth of 4 feet to 30 feet.

Hookah. While similar to Surface Supplied (see below) in that the breathing gas is supplied from the surface by means of a pressurized hose, the supply hose does not require a strength member, pneumofathometer hose, or communication line. Hookah equipment may be as simple as a long hose attached to a standard scuba cylinder supplying a standard scuba second stage. The diver is responsible for monitoring his/her own depth, time, and diving profile.

Scientific Diver. A diver who has completed all requirements and authorizations in section 12.4 of this handbook.

Scientific Diving. Diving performed as a necessary part of a scientific, research, or educational activity by employees whose sole purpose for diving is to perform scientific data gathering. The tasks of a Scientific Diver are those of an observer and data gatherer. Not included within this definition of scientific diving are construction and trouble-shooting tasks traditionally associated with commercial diving, such as placing

or removing heavy objects underwater; inspection of pipelines and similar objects; construction; demolition; cutting or welding; or use of explosives. Scientific divers, based on the nature of their activities, must use scientific expertise in studying the underwater environment, and therefore, are scientists or scientists-in-training.

Scientific Diving Exemption. An exemption granted by OSHA from its commercial diving regulations for scientific diving under the guidelines stated in Appendix B to 29 CFR 1910, Subpart T.

SCUBA. Self-contained underwater breathing apparatus.

Shallow Water. Of a depth that the individual can stand on the substrate with head above water and breathe naturally.

Snorkeling. Snorkeling is water immersion that is surface focused and vertical migration is limited to 4' depth or less.

Strength Member. A cable or rope attached to the diver and the spool with all the other hoses, allowing dive tenders to pull on the cable and not the life support hoses.

Surface Supplied. Dives where the breathing gas is supplied from the surface by means of a pressurized umbilical hose. The umbilical generally consists of a gas supply hose, strength member, pneumofathometer hose, and communication line. The umbilical supplies a helmet or full-face mask. The diver may rely on the tender at the surface to keep up with the divers' depth, time, and diving profile.

Swift Water. Water velocity is 1.68 feet per second (1 knot) or greater.

11.06 - References

1. *Blue Water Diving Guidelines.* California Sea Grant Publication No. T-CSGCP-014.
2. *Cold Water Diving: a Guide to Ice Diving.* John N. Heine. Best Publishing Company. Flagstaff AZ.
3. *Diving and Subaquatic Medicine.* Fourth Edition, 2002. C. Edmonds, C. Lowery, J. Pennefather, and R.Walker. Oxford University Press Inc. New York, NY.
4. *Diving Medicine.* Third Edition, 1997. A. Bove and J. Davis. W.B. Saunders Company, Philadelphia.
5. *Guidelines for Conduct of Research Diving, 1990.* National Science Foundation, Division of Polar Programs.
6. *Inspecting Cylinders SCUBA & SCBA, Fourth Edition 2001.* William L. High. Professional Scuba Inspectors, Inc., Kenmore, Washington.

7. *Medical Examination of Sport SCUBA Divers, Third Edition 1998*. Alfred Bore, M.D., Ph.D. Medical Seminars, Inc., One Elm Place, Suite 204, 11107 Wurzbach, San Antonio, TX 78230.
8. *NOAA Diving Manual, Revision 4*. Superintendent of Documents, U.S. Government Printing Office, Washington, DC.
9. *Physician's Guide to Diving Medicine*. C.W. Shilling, C.B. Carlston, and R.A. Mathias. Plenum Press, New York, NY.
10. *SCUBA Diving Safety and Health*. C.W. Deuker. Madison Publishing Associates, Diving Safety Digest, P.O. Box 2735, Menlo Park, CA 94026.
11. *U.S. Navy Diving Manual*. Superintendent of Documents, U.S. Government Printing Office, Washington, DC.
12. *The American Academy of Underwater Sciences: Standards for Scientific Diving* Web site "<http://www.aaus.org/>"
13. *Underwater Inspection of Bridges*. Report No. FHWA-DP-80-1, Federal Highway Administration, Washington, DC.

12 - Authorization

No person (including volunteers) shall engage in diving and snorkeling operations under the auspices of the Forest Service Diving Program unless they possess a recognized authorization issued by the Forest Service. Diving authorizations issued are:

Snorkeler. This authorization signifies that the individual is qualified as a snorkeler meeting the safety standards within their unit's Job Hazard Analysis (JHA).

Free Diver. This authorization signifies that the individual is qualified as a free diver meeting the safety standards within their unit's JHA.

Diver-in-Training. This authorization to dive signifies that a diver is certified as an open-water diver through a nationally or internationally recognized certifying agency. Individual diver-in-training authorizations also specify that the diver is either a scientific or commercial diver in training and has any other certifications or training needed to complete certain scientific or commercial tasks.

Scientific Diver. This authorization signifies that a diver can perform work as a Forest Service scientific diver. This authorization to dive is only valid while current, and the diver performs within the intended purpose of the authorization.

Commercial Diver. This authorization signifies that a diver can perform work as a Forest Service commercial diver. This authorization to dive is only valid while current, and the diver performs within the intended purpose of the authorization.

12.1 - Snorkeling

The following minimum requirements must be met to be authorized to participate in snorkeling activities:

1. Individual Employee Requirements.

- a. Current cardiopulmonary resuscitation (CPR).
- b. Current medic first aid (or equivalent).
- c. Demonstrate ability to do the following in a pool or confined water:
 - (1) Clear mask and snorkel.
 - (2) Swim 25 yards with a minimum of 4 breaths.
 - (3) Without swim aids, tread water for 5 minutes or 2 minutes without use of hands. meaning: (a) Tread water normally (using hands and feet) for 5 minutes, or (b) Tread water only using your feet (no hands) for 2 minutes. Both option a and b are to be done without using any swim aids.
 - (4) Buddy rescue techniques such as towing another person a distance of 25 yards in the water without the use of swim aids.
- d. Demonstrate knowledge of the following:
 - (1) Function, care, use, and maintenance of snorkeling equipment.
 - (2) Currents, swift water, and waves associated with rivers, lakes, and beaches.
 - (3) Dangerous terrestrial and aquatic animals.
 - (4) Emergency procedures.
 - (5) Planning and supervision of snorkeling operations.
 - (6) Snorkel hazards.
 - (7) Causes, symptoms, treatment, and prevention of the following:
 - (a) Near drowning.

(b) Exhaustion and panic.

(c) Hypothermia, hypoxia, and anoxia.

e. Demonstrate knowledge and skills as identified in JHA.

2. Unit Documentation Requirements.

a. Document that the individual employee met the requirements in paragraphs 1a through 1e listed in section 12.1 as well as any snorkel-related training completed beyond the minimum requirements.

b. A JHA that at a minimum addresses environmental hazards (such as currents, tides, and so forth), wildlife hazards (terrestrial and aquatic), medical hazards (hypothermia, exhaustion, anoxia, hypoxia, drowning, and so forth), and local conditions (swift water, night, boats, depth, air/water temps, and so forth).

c. Document emergency plan procedures.

3. Continuation of Authorization.

a. Current medic first aid (or equivalent) and CPR certifications.

b. Authorization is maintained by completing one snorkel per 12-month period.

c. Reauthorization is required if inactive for more than 12 months.

4. Snorkel Procedure.

a. Solo snorkeling for any reason is strictly prohibited.

b. Snorkeling buddy pair will maintain visual contact. Buddy pair consists of either a pair of snorkelers in the water or the snorkeler and a surface tender.

c. Refusal to snorkel:

(1) The decision to snorkel is at the discretion of each individual snorkeler. Snorkelers are authorized and have a duty to refuse to snorkel without fear of penalty, if in their judgment, conditions are unsafe or unfavorable, or if they would violate the precepts of training or the requirements of section 12 of this handbook.

(2) Each individual snorkeler has ultimate responsibility for their personal safety and the safety of those under their direct supervision.

d. Termination of Snorkel. Snorkelers are authorized to terminate the snorkel, without fear of penalty, whenever they believe it is unsafe to continue the snorkel,

or continuation of the snorkel would compromise the safety of another snorkeler already in the water.

5. Emergencies and Deviations. Snorkelers are authorized to deviate from the requirements of sections 12.1 to the extent necessary to prevent or minimize a situation that is likely to cause death, serious physical harm, or major environmental damage. A written report of such actions must be submitted to the National Diving Safety Officer and Diving Control Board explaining the circumstances and justifications.

6. Snorkel Record Keeping and Reporting Requirements.

a. Record Maintenance.

(1) Unit Diving Safety Officers shall maintain records for each respective Forest Service snorkeler and provide an annual snorkeling activity report to the Regional Diving Safety Officer.

(2) Files must include evidence of each snorkeler having met all requirements in section 12.1, any waivers, reports of disciplinary actions by the Diving Control Board, and other pertinent information deemed necessary.

b. Accident Reporting.

(1) Report all snorkeling accidents resulting in serious injury to the Director, Office of Safety and Occupational Health, Diving Control Board, and the Regional Diving Safety Officer, in addition to the normal Forest Service accident reporting and notification requirements (FSM 6730).

(2) Regional Diving Safety Officers shall record the occurrence of any snorkeling related injury or illness which requires hospitalization for 24 hours or more, or after an episode of unconsciousness related to a snorkeling activity. The report must specify the circumstances of the accident and the extent of any injuries or illnesses.

7. Snorkel Revocations and Restrictions. Failure of snorkelers to comply with agency requirements may be cause for restriction or revocation of Forest Service snorkeling authorization.

8. Snorkeling Equipment.

a. Snorkelers shall wear apparel which provides appropriate thermal protection. Apparel will include fins or other appropriate foot protection (i.e. wading boots).

b. Each snorkeler shall be equipped with a diving mask and snorkel.

12.2 - Free Diver

Individuals seeking free diving authorization shall meet the following requirements:

1. Prerequisites.

- a. Approved by a licensed physician to be medically qualified for diving as outlined in section 15 before proceeding with diving evaluations and designated training.
- b. Current cardiopulmonary resuscitation (CPR).
- c. Current medic first aid (or equivalent).
- d. Emergency oxygen administration, 2-year recertification.
- e. Freediving certification by a nationally or internationally recognized diving organization.

2. Application. Submit form FS-6700-29, Diving Application for free diving to the Diving Safety Officer.

3. Authorization Requirements. Applicants shall show either the Diving Safety Officer or the qualified instructor that the Diving Safety Officer has approved their ability, commensurate with the job identified in the risk assessment, to perform the following, in a pool or in confined water:

- a. Demonstrate skills, commensurate with the job identified in the risk assessment, in free diving, swimming, and lifesaving acceptable to the unit diving safety officer, such as, but not limited to:

(1) Demonstrate in-water rescue breathing.

(2) Demonstrate the ability to clear mask.

(3) Demonstrate the capability of achieving and maintaining positive buoyancy at any time during a dive.

(4) Swim underwater without swim aids for a distance of 25 yards without surfacing.

(5) Swim 400 yards in less than 12 minutes without swim aids.

(6) Tread water normally for 10 minutes (using hands and feet) or tread water only using your feet (no hands) for 2 minutes. Either option is to be done without using any swim aids.

(7) Transport another person a distance of 25 yards in the water without the use of swim aids.

b. Demonstrate knowledge of the following:

(1) Function, care, use, and maintenance of free diving equipment.

(2) Currents and waves associated with rivers, lakes, and beaches.

(3) Dangerous terrestrial and aquatic animals.

(4) Demonstrate knowledge of free diving physiology.

(5) Emergency procedures.

(6) Planning and supervision of free diving operations.

(7) Free diving hazards.

(8) Causes, symptoms, treatment, and prevention of the following:

(a) Near drowning.

(b) Exhaustion and panic.

(c) Hypothermia, hypoxia (of ascent also called shallow water blackout), anoxia, and hyperventilation.

4. Authorization Maintenance.

a. Current medic first aid (or equivalent), CPR and Emergency Oxygen administration certifications.

b. Authorization is maintained by completing 12 free dives per 12-month period.

c. Reauthorization is required if inactive for more than 12 months.

5. Free Diving Required Equipment.

a. Fins.

b. Mask and Snorkel.

c. Timing Device and depth gauge, or a dive computer capable of logging free dive time and depths.

d. Knife.

- e. Thermal protection adequate to maintain normal body temperature.
- f. Buoyancy control system as necessary to maintain neutral buoyancy during dive (may include weights).

6. Pre-Free Diving Planning.

a. Diving plans.

- (1) Dives should be planned around the competency of the least experienced diver.
- (2) Make diver's breath-hold range and duration known to diver's buddy.
- (3) For each dive, designate one individual who is present at the dive location during the diving operation as the lead diver.
- (4) Dives must be planned for 40 seconds or less total dive time with a surface interval of 1 minute or more between dives. Divers will not exceed the limits of their training when planning or executing dives.

b. Equipment evaluations. Each diver shall:

- (1) Ensure that their dive equipment is operable and used in accordance with manufacturers' recommendations and that the equipment is suitable and appropriate for the type of diving operation planned.
- (2) Have the capability of achieving and maintaining positive buoyancy. The diving safety officer shall determine proper buoyancy for free diving and snorkeling.

c. Site evaluations. Evaluate the environmental conditions at the dive site before each diving operation.

7. Free Diving Procedure.

- a. Solo free diving for any reason is strictly prohibited. A diver must have a buddy.
- b. While the first buddy team member dives, the second buddy will remain at the surface until the first diver returns to the surface.
- c. Free diving activities will have a maximum time of 40 seconds and depth of 30 feet. Visual contact between the surface buddy and the diver must be maintained at all times.
- d. A free dive constitutes each descent and ascent to the surface.
- e. Refusal to Free Dive:

(1) The decision to free dive is at the discretion of each individual diver. Free divers are authorized and have a duty to refuse to dive without fear of penalty, if in their judgment, conditions are unsafe or unfavorable, or if they would violate the precepts of training or the requirements of section 12 of this handbook.

(2) Each individual free diver has ultimate responsibility for their personal safety as well as the safety of those under their direct supervision.

f. Termination of free dive. Free divers are authorized to terminate the dive, without fear of penalty, whenever they believe it is unsafe to continue the dive, or continuation of the dive would compromise the safety of another diver already in the water.

8. Emergencies and Deviations. Free divers are authorized to deviate from the requirements of section 12.2 to the extent necessary to prevent or minimize a situation that is likely to cause death, serious physical harm, or major environmental damage. Submit a written report of such actions to the National Diving Safety Officer and Diving Control Board explaining the circumstances and justifications.

9. Free Diving Recordkeeping and Reporting Requirements.

a. Free Diving Log.

(1) Each authorized free diver shall log every dive made under the auspices of the Forest Service Diving Program. Divers are also encouraged to log recreational dives.

(2) Submit diving logs to the unit diving safety officer for inclusion in the free diver's permanent file. Details of the submission procedures are left to the discretion of the Regional Diving Safety Officer.

b. Record Maintenance.

(1) Unit Diving Safety Officers shall maintain records for each respective authorized Forest Service free diver.

(2) Files must include evidence of authorizations, reports of disciplinary actions by the Diving Control Board, and other pertinent information deemed necessary.

c. Availability of Records. Medical records must be available to the attending physician of a diver or former diver when the affected diver provides authorization for release in writing.

d. Accident Reporting.

(1) Report all free diving accidents resulting in serious injury to the Director, Office of Safety and Occupational Health, Diving Control Board, and Regional Diving Safety Officer, in addition to the normal Forest Service accident reporting and notification requirements (FSM 6710).

(2) Regional Diving Safety Officers shall record the occurrence of any free diving related injury or illness which requires hospitalization for 24 hours or more, or after an episode of unconsciousness related to a free diving activity. The report must specify the circumstances of the accident and the extent of any injuries or illnesses.

10. Free Diving Revocations and Restrictions. Failure of free divers to comply with agency requirements may be cause for restriction or revocation of Forest Service free diving authorization.

12.3 - Diver-in-Training

Individuals seeking diver-in-training authorization for either scientific or commercial activities shall meet the following requirements:

1. Prerequisites.

- a. Certification by a licensed physician to be medically qualified for diving as outlined in section 15 before proceeding with diving evaluations and designated training.
- b. Certification in the following:
 - (1) Current cardiopulmonary resuscitation (CPR).
 - (2) Current medic first aid (or equivalent).
 - (3) Emergency oxygen administration, 2-year recertification.
- c. A minimum of open water certification by a nationally or internationally recognized SCUBA diving organization (does not include “resort-type” certifications).

2. Application. Submit form FS-6700-29, Diving Application, for scientific and/or commercial diver to the Diving Safety Officer.

3. Authorization Requirements.

- a. Swim underwater without swim aids for a distance of 25 yards without surfacing.
- b. Swim 400 yards in less than 12 minutes without swim aids.

c. Tread water normally for 10 minutes (using hands and feet) or tread water only using your feet (no hands) for 2 minutes. Either option is to be done without using any swim aids.

d. Transport another person a distance of 25 yards in the water without the use of swim aids.

12.4 - Scientific Diver

Individuals seeking scientific diver authorization shall meet the following requirements:

1. Prerequisites.

a. Meet prerequisites for diver-in-training under the auspices of the Forest Service authorization.

b. A minimum of advanced open water diver and rescue diver certifications by a nationally or internationally recognized SCUBA diving organization.

2. Application. Submit form FS-6700-29, Diving Application, for scientific diver to the Diving Safety Officer.

3. Demonstrate to the Diving Safety Officer sufficient skill and proficiency to be authorized as a scientific diver under the Forest Service Diving Program.

4. Practical training must include a cumulative total of at least 12 supervised open-water dives in a variety of dive sites and diving conditions for a cumulative bottom time of 6 hours. A supervised dive consists of diving at the depth of the scientific diver's rating, with an authorized scientific diver. No more than three training dives may be made in one day.

5. Complete additional theoretical aspects and practical training beyond the diver-in-training authorization as required to accomplish Forest Service mission goals and objectives. Theoretical aspects should include principles and activities appropriate to the intended area of scientific study. Suggested topics include, but are not limited to, data gathering techniques, collecting, common biota, behavior, installation of scientific apparatus, use of chemicals, site selection, site location and relocation, animal and plant identification, ecology, tagging, photography, scientific dive planning, coordination with other agencies, appropriate governmental regulations, and small boat operation.

12.5 - Commercial Diver

Individuals seeking a commercial diver authorization shall meet the following requirements:

1. Prerequisites.

- a. Meet prerequisites for Diver-in-Training under the auspices of the Forest Service authorization.
 - b. A minimum of advanced open water diver, and rescue diver certification by a nationally or internationally recognized SCUBA diving organization.
2. Application. Submit form FS-6700-29, Diving Application, for commercial diver to the diving safety officer.
3. Demonstrate to the Diving Safety Officer sufficient skill and proficiency to be authorized as a commercial diver under the Forest Service Diving Program.
4. Practical training must include a cumulative total of at least 12 supervised ocean- or open-water dives in a variety of dive sites and diving conditions for a cumulative bottom time of 6 hours. A supervised dive consists of diving at the depth of the commercial diver's rating, with an authorized commercial diver. No more than three training dives may be made in one day.
5. Complete additional theoretical aspects and practical training beyond the diver-in-training authorization as required, accomplishing Forest Service mission goals and objectives. Theoretical aspects should include principles and activities appropriate to the commercial diving task. Suggested topics include, but are not limited to, installation of apparatus, marking/labeling, photography, weed removal, commercial dive planning, coordination with other agencies, appropriate governmental regulations, underwater inspection, and small boat operation.

12.6 - Depth Authorizations

Forest Service diving authorizations must specify an authorized depth limit for divers. Forest Service divers shall not exceed their authorized depth limits.

1. Authorization to 30-Foot Depth. This is the initial authorization depth.
2. Authorization to 60-Foot Depth. A diver holding a 30-foot authorization may be authorized to a depth of 60 feet after successfully completing 12 logged training dives to depths between 31 and 60 feet for a minimum total time of 4 hours while under supervision of an authorized Scientific Diver or Commercial Diver.
3. Maximum depth authorization for commercial divers. Authorization to 100-foot depth. A commercial diver holding authorization to 60-feet may be authorized to a depth of 100-feet by logging four dives near the maximum depth category. One diver authorized to at least the same depth shall validate these qualification dives in writing. The diver seeking qualification to 100 feet shall also meet authorization levels for 100 feet depth by a nationally or internationally recognized SCUBA diving organization (does not include "resort-type" certifications). The diver seeking qualification to the 100 feet

depth shall also demonstrate an acceptable level of proficiency in the use of the appropriate U.S. Navy Decompression Tables or equivalent tables.

4. Maximum depth authorization for scientific divers. Authorization to 130- feet depth. A scientific diver holding a 60-feet authorization may be authorized to depths of 130 feet by logging four dives near the maximum depth category. One diver authorized to at least the same depth shall validate these qualification dives in writing. The diver seeking qualification to the 130 feet depth shall also demonstrate an acceptable level of proficiency in the use of the appropriate U.S. Navy Decompression Tables or equivalent tables.

12.7 - Continuation of Authorization

1. Minimum Activity to Maintain Authorization. During any 12-month period, each authorized scientific diver must log a minimum of 12 work-related and/or recreational dives, and each authorized commercial diver must log a minimum of 12 work-related and/or recreational dives. One dive must be logged near the maximum depth of the diver's depth authorization during each 6-month period. Divers who have not logged a minimum of 12 dives must meet Section 12.3.3, 12.4.4 or 12.5.4.

2. Divers may use personally-owned equipment if it meets the requirements of section 13.8 and is approved by the Regional Diving Safety Officer. Government equipment may be used on off-duty time for diving skills maintenance and non-commercial activities with approval of the RDSO. Solo diving is prohibited, and all dives shall be within the limits of the individual diver authorization.

3. Medical Examination. All active authorized divers, excluding snorkelers, shall pass a medical evaluation at the intervals specified in section 15 of this handbook.

12.8 - Restriction or Revocation of Authorization

1. Violation of requirements of the Forest Service Diving Program may be considered cause for restriction or revocation of Forest Service authorization.

2. Regional Diving Safety Officers shall inform affected divers in writing of the reason(s) for restriction or revocation of authorization and give the diver the opportunity to present their case in writing to the Diving Control Board for reconsideration and reauthorization.

3. All such written statements and requests are formal documents and become part of the diver's file.

12.9 - Reauthorization

1. Regional Diving Safety Officers have the discretion to reissue a diver authorization when it has lapsed. A minimum of 4 supervised dives with a RDSO approved and authorized diver will be required.
2. When a diver's authorization is revoked, it may be reissued after the affected diver complies with conditions specified by the Diving Control Board. Give divers an opportunity to present their case to the Diving Control Board before conditions for reauthorization are stipulated.
3. When a diver's depth authorization has lapsed due to lack of activity, the diver may be requalified by completing four dives at the previously authorized depth with a qualified scientific or commercial diver (matching the individual's prior authorization).

13 - Diving Standards

13.1 - Sanctioned Diving

Only sanctioned dives should be conducted under the auspices of the Forest Service Diving Program. Types of sanctioned dives include the following:

1. Open-Circuit SCUBA Diving. Open-circuit SCUBA diving must comply with:
 - a. Diving authorization requirements set forth in sections 12 through 12.9 and 16 of this Handbook.
 - b. Applicable depth limits.
2. Hookah Diving.
 - a. Hookah diving must comply with open-circuit SCUBA diving requirements.
 - b. Divers using the hookah diving mode shall be equipped with a diver-carried independent reserve breathing gas supply. The Diving Safety Officer may make an exception to this requirement in shallow waters or areas where the diver has the ability to stand up.
 - c. Each hookah diver shall be hose-tended by a separate dive team member while in the water, except in situations where the Diving Safety Officer determines that the conditions warrant the use of one tender for two divers, as in shallow waters.
 - d. The hookah breathing gas supply must be sufficient to support all hookah divers in the water for the duration of the planned dive, including decompression.

e. The dive tender is required to have current first aid, CPR and Emergency Oxygen Administration certifications.

3. Surface Supplied Diving.

a. Surface supplied diving requires prior Diving Control Board review & approval.

b. Surface supplied diving must comply with all open-circuit SCUBA diving requirements and procedures.

c. Divers using the surface supplied mode shall be equipped with a diver-carried independent reserve breathing gas supply.

d. Each surface supplied diver shall be hose-tended by a separate dive team member while in the water.

e. Divers using the surface supplied mode shall maintain voice communication with the surface tender.

f. The surface supplied breathing gas supply must be sufficient to support all surface supplied divers in the water for the duration of the planned dive, including decompression.

g. During surface supplied diving operations when only one diver is in the water, there must be a standby diver in attendance at the dive location.

h. A diver shall be stationed at the underwater point of entry when diving is conducted in enclosed or physically confining spaces.

i. Each diving operation must have a primary breathing gas supply sufficient to support divers for the duration of the planned dive including decompression.

j. The dive tender is required to have current first aid, CPR and Emergency Oxygen Administration certifications.

4. Specialty Diving. The following forms of diving require a unique level of expertise. Additional training and/or advanced certification, as approved by the Diving Control Board is required. The following list is not all-inclusive:

a. Drysuit diving.

b. Blue-water diving.

c. Ice and polar diving.

d. Overhead/cavern environments diving.

- e. Night/low visibility diving.
- f. High altitude diving (elevation of 1000 feet or greater).
- g. Full Face Mask diving.
- h. Use of lift bags.

13.2 - Pre-Dive Procedures

1. Prepare a written diving plan prior to implementing the project.
2. Plan dives around the competency of the least experienced diver.
3. For each dive, designate one individual who is present at the dive location during the diving operation as the lead diver.
4. The lead diver for the proposed operation shall consider the following information before conducting any diving operation:
 - a. Diver qualifications and the type of authorization held by each diver.
 - b. Emergency plan with the following information.
 - (1) Name of person to be contacted for each diver in the event of an emergency.
 - (2) Telephone number of each emergency contact person.
 - (3) Relationship of emergency contact person to each respective diver.
 - c. Nearest operable recompression chamber.
 - d. Nearest accessible hospital.
 - e. Available means of transportation.
 - f. Approximate number of proposed dives.
 - g. Location(s) of proposed dives.
 - h. Estimated depth(s) and bottom time(s) anticipated.
 - i. Decompression status and repetitive dives, if required.
 - j. Proposed work, equipment, and/or boats to be employed.
 - k. Any hazardous conditions known or anticipated.

13.3 - Pre-Dive Safety Checks

1. Diver Evaluations. Dive team members shall not be:
 - a. Exposed to hyperbaric conditions against their will, except when emergency measures are necessary, to prevent or treat a life-threatening pressure-related injury of which the diver is unaware.
 - b. Permitted to dive for the duration of any known condition that is likely to adversely affect their safety and health or other dive team members.
2. Equipment Evaluations. Each diver shall:
 - a. Ensure that their dive equipment is operable and used in accordance with manufacturers' recommendations and that the equipment is suitable and appropriate for the type of diving operation planned.
 - b. Have the capability of achieving and maintaining positive buoyancy. The Diving Safety Officer shall determine proper buoyancy for free diving and snorkeling.
3. Site Evaluations. Evaluate environmental conditions at the dive site before each diving operation.

13.4 - Diving Procedures

1. Topside Support-Scientific Diving. A topside support person shall be available at the site and be ready, willing, and able to render assistance in an emergency for all open-water dives. This person shall be familiar with the dive activities being conducted and be physically able to assist in the recovery of an injured diver. This person shall also be trained and certified in First Aid, CPR, and Emergency Oxygen Administration.
2. Commercial dives shall meet the following:
 - a. Requires a 4-member team:
 - (1) A designated person in charge shall be at the dive site supervising the dive operations.
 - (2) A stand-by diver shall be available while the dive buddy team is in the water.
 - (3) The dive buddy team will be in constant visual contact in the water.
 - b. A diver shall be stationed at the underwater point of entry when diving is conducted in enclosed or physically confining spaces.
 - c. Each diver shall carry an independent reserve cylinder with a separate regulator and a separate pressure gauge.

- d. The valve of the reserve breathing gas supply must be in the closed position prior to the dive. The valve must also be located on the front side of the diver within visual sight of the diver and where the diver can access it, if needed during the dive. The pressure gauge for the reserve breathing gas supply must also be visible to the diver.
3. Solo Diving. Solo diving for any reason is strictly prohibited, except for surface supplied and hookah diving with tender present.
4. Mixed Gas (including Nitrox). Mixed gas diving for any reason is prohibited.
5. Depth Limits. Diving certificates must specify authorized depth limits for the diver.
- a. Dives shall not exceed “no decompression limits.”
- b. Depth limits for commercial dives will not exceed 100 feet.
6. Currents. All commercial diving in currents exceeding 1 knot (1.68 fps) or in physically confined spaces the diver shall be line tended.
7. Cylinder PSI. All divers must surface with a minimum of 500 psi remaining in the cylinder. In the case of commercial dives, the reserve breathing gas supply does not count towards the minimum of 500 psi remaining in the main cylinder.
8. Refusal to Dive.
- a. The decision to dive is at the discretion of each individual diver. Divers are authorized and have a duty to refuse to dive without fear of penalty, if in their judgment, conditions are unsafe or unfavorable, or if they would violate the precepts of training or the requirements of section 12 of this handbook.
- b. Each individual diver has ultimate responsibility for their personal safety and the safety of those under their direct supervision.
9. Termination of Dive.
- a. Divers are authorized to terminate the dive, without fear of penalty, whenever they believe it is unsafe to continue the dive, or continuation of the dive would compromise the safety of another diver already in the water.
- b. Terminate dives while there is still sufficient tank pressure to permit divers to safely reach the surface, including decompression time, or to safely reach an additional air source at the decompression station.
10. Emergencies and Deviations. Divers are authorized to deviate from the requirements of this handbook chapter to the extent necessary to prevent or minimize a

situation that is likely to cause death, serious physical harm, or major environmental damage. A written report of such actions must be submitted by the Regional Diving Safety Officer to the National Diving Safety Officer and Diving Control Board. This report must include dive plan, circumstance that caused deviation, and result of deviation.

13.5 - Tasks Specific to Commercial Diving

The commercial-specific tasks listed below are expected to be common tasks the Forest Service performs, including, but not limited to: bridge inspections up to FHWA Level II (Federal Highway Administration), dam inspections, aquatic structure maintenance/inspections (such as piers, docks, buoys and installation), underwater boat maintenance, and aquatic invasive species control. If a proposed task is not listed here, it will be submitted to their respective Regional Diving Safety Officer for Diving Control Board approval.

13.6 - Post-Dive Procedures

1. After the completion of a dive, each diver shall report any physical problems, symptoms of decompression sickness, or equipment malfunctions to the lead diver and unit diving safety officer.
2. A diver who completes any number of dives on supplied air must wait for a period of 24 hours before flying.

13.7 - Recordkeeping and Reporting Requirements

1. Diving Log.
 - a. Each authorized diver, including diver-in-training, shall log every dive made under the auspices of the Forest Service Diving Program. Divers are also encouraged to log recreational dives. Each log entry must include at a minimum: date, location, start/end psi, start/end time, total dive time, max depth, surface interval, buddy(s) names.
 - b. Submit diving logs to the unit diving safety officer to be placed in the diver's permanent file. Details of the submission procedures are left to the discretion of the Regional Diving Safety Officer.
2. Record Maintenance.
 - a. Unit Diving Safety Officers shall maintain records for each respective authorized Forest Service diver in accordance with FSH 6209.11, Records Management Handbook, Chapter 20. Records containing PII must be kept in secure locked cabinets.

b. Files must include evidence of authorization, personal diving log sheets, results of current physical examinations, reports of disciplinary actions by the Diving Control Board, and other pertinent information deemed necessary.

c. Maintain dive plan with the project file.

3. Accident Reporting.

a. Report all diving accidents requiring recompression or resulting in serious injury to the National Diving Safety Officer, Diving Control Board, and Regional Diving Safety Officer, in addition to the normal Forest Service accident reporting and notification requirements (FSM 6730).

b. Regional Diving Safety Officers shall record the occurrence of any diving related injury or illness which requires a dive team member to be hospitalized for 24 hours or more, or after an episode of unconsciousness related to a diving activity, or after treatment in a recompression chamber following a diving accident. The report must specify the circumstances of the accident and the extent of any injuries or illnesses.

c. The Diving Control Board shall investigate and document any incident of pressure-related injury, prepare a report, and forward to the Director, Office of Safety and Occupational Health (this report may be a component of an official Forest Service accident investigation team report).

d. Regional Diving Safety Officers shall record and retain the following additional information for 5 years if pressure-related injuries are suspected or if symptoms are evident:

(1) Complete accident report.

(2) Description of symptoms, including depth limit and time of onset.

(3) Description and results of treatment.

13.8 - Waiver of Diving Standards

Forest Service officials do not have authority to waive OSHA standards. Requests for OSHA waivers must be initiated by the Forest Service Washington Office and submitted by the Washington Office to OSHA for approval.

14 - Diving Equipment

Standardization of equipment within an area is encouraged to facilitate efficient maintenance, service, and familiarity of use.

All diving equipment used by authorized Forest Service divers under the auspices of the Forest Service Diving Program, regardless of ownership, must conform to the following standards. Equipment that is subjected to extreme usage under adverse conditions may require more frequent testing and maintenance.

1. Regulators:

- a. Only makes and models commercially available, appropriate for the task, meet American National Standards Institute (ANSI) standards, and either approved by the RDSO or is on the "Approved for Navy Use equipment list" will be used.
- b. A certified technician shall inspect SCUBA regulators annually or prior to use when 12-months has exceeded the last inspection due to non-use of equipment.
- c. Regulators must consist of a first stage, second stage, and an alternate air source (such as an octopus second stage or redundant air supply).

2. Full Face Masks (FFM). Only makes and models commercially available, appropriate for the task, and either approved by the RDSO or is on the "Approved for Navy Use equipment list" will be used. If using a full-face mask, the diver is required to have a spare dive mask available during the dive.

a. Full face masks and helmets must have:

- (1) A non-return valve on the mask that closes readily and positively.
- (2) An exhaust valve.
- (3) A minimum ventilation rate capable of maintaining a diver at the diving depth limit.

b. For makes and models that have an integrated second stage regulator (inseparable), the diver shall also:

- (1) Have an additional stand-alone second stage, primary regulator available for diver in the case of a full-face mask failure. A secondary regulator would remain available for the dive buddy to use in an emergency.
- (2) The additional second stage regulator must be easily accessible to the diver; a regulator necklace is recommended for positioning this second stage regulator.
- (3) The FFM will also have a quick disconnect near the mask end of the hose in order to stop a free-flowing air event at depth after the diver has switched over to an alternate mask and stand-alone second stage as the primary regulator.

c. Makes and models that have a two-cavity design and a lower pod with regulator (diver supplied) attached:

(1) The pod/regulator will have a quick disconnect to allow the second stage to be used without the FFM.

3. SCUBA/Reserve Cylinders. SCUBA cylinders must be:

- a. Designed, constructed, and maintained in accordance with the applicable provisions of the Unfired Pressure Vessel Safety Orders.
- b. Hydrostatically tested by a qualified technician in accordance with Department of Transportation standards.
- c. Visually inspected by a qualified technician to meet Professional Scuba Inspectors standards at intervals not to exceed 12 months.

4. SCUBA/Reserve Cylinder Valves. SCUBA cylinder valves must be functionally tested at intervals not to exceed 12 months.

5. Flotation Devices (Buoyancy Compensator Devices-BCD):

- a. Only makes and models commercially available, appropriate for the task, and either approved by the RDSO or is on the "Approved for Navy Use equipment list" will be used.
- b. Each diver shall have the capability of achieving and maintaining positive buoyancy.
- c. Personal flotation systems, buoyancy compensators, dry suits, or other variable volume buoyancy compensation devices must be equipped with an exhaust valve.
- d. Each diver shall inspect the flotation devices and weight systems for serviceability prior to each use.
- e. A certified technician shall inspect BCDs annually or prior to use when 12-months has exceeded the last inspection due to non-use of equipment.
- f. BCDs without integrated weight systems must have a quick release device designed to permit weight jettisoning with a single motion from either hand.

6. Timing Devices and Depth-Pressure Gauges:

- a. Only makes and models commercially available, appropriate for the task, and either approved by the RDSO or is on the "Approved for Navy Use equipment list" will be used.

- b. Both members of a diving pair shall have an underwater time-keeping device, approved depth indicator, and submersible tank pressure gauge.
- c. A certified technician shall inspect equipment gauges being used for scientific purposes annually, or prior to use if it has been 12 months since the last inspection.
- d. A certified technician shall inspect equipment gauges being used for commercial purposes every 6 months, or prior to use if it has been 6 months since the last inspection.
- e. Diving Safety Officers shall maintain a record of equipment inspections, tests, and repairs.

7. Diving Tables and Computers:

- a. Only makes and models commercially available, appropriate for the task, and either approved by the RDSO or is on the "Approved for Navy Use equipment list" will be used.
- b. Diving tables that are recognized by national diving organizations (if other than U.S. Navy Standard Air Tables) must be available at the dive location.
- c. Dive computers that meet industry standards may be used in place of diving tables. Dive computers must be water activated.

8. Reserve air source:

- a. Surface supplied, hookah and commercial divers must carry a reserve breathing gas supply. This must be an independent reserve cylinder with a separate regulator and separate pressure gauge.
- b. The reserve cylinder must be a minimum of a 13 cubic foot capacity. Depending on dive profile and safety stop, divers may need a larger cylinder.

14.1 - Auxiliary Equipment

- 1. All auxiliary equipment must be of a type approved by the Diving Control Board.
- 2. Hand-held underwater power tools and equipment used underwater must be specifically approved for this purpose. Electrically powered tools and equipment supplied from the surface must be de-energized before being placed into or retrieved from the water.
- 3. Do not supply hand-held power tools and equipment with electrical current from the dive location until requested by the diver.

14.2 - Support Equipment

1. First-Aid Supplies.

- a. A first-aid kit must be available at the dive location.
- b. Emergency oxygen must be available at the dive location.

2. Diver's Flag. A diver's flag must be displayed prominently within 100 feet of the dive when diving in navigable waters.

3. Compressor Systems under Forest Service Control.

a. Design and Location of Compressors.

- (1) Low pressure compressors used to supply air to divers must be equipped with a volume tank and check valve on the inlet side, a pressure gauge, relief valve, and drain valve.
- (2) Compressed air systems over 500 psig (pounds per square inch gauge) must have slow-opening shut-off valves.
- (3) Locate all air compressor intakes away from areas containing exhaust or other air contaminants.

b. Compressor Operation and Air Test Records.

- (1) Gas analyses and air tests must be performed on each Forest Service controlled breathing air compressor at regular intervals of no more than 100 hours of operation or 6 months, whichever occurs first. Enter the results of these tests in a formal log and maintain for the life of the compressor.
- (2) Maintain a log showing operation, repair, overhaul, filter maintenance, and temperature adjustment for each compressor.

4. Medical Oxygen Systems.

- a. Equipment used with oxygen or mixtures containing over 40 percent by volume oxygen must be designed and maintained for oxygen service.
- b. Components, except umbilical, exposed to oxygen, or mixtures containing over 40 percent by volume oxygen must be cleaned of flammable materials before being placed into service.
- c. Oxygen systems over 125 psig must have slow-opening shut-off valves.

14.3 - Equipment Maintenance and Tracking

The unit diving safety officer shall log each equipment modification, repair, test, calibration, or maintenance service, including the date and nature of work performed, serial number of the item, and the name of the person performing the work for the following equipment:

1. Regulators.
2. Full Face Masks.
3. SCUBA/Reserve cylinders.
4. SCUBA/Reserve cylinder valves.
5. Flotation Devices (BCDs).
6. Timing Devices and Depth-Pressure Gauges.
7. Diving Computers.
8. Compressor systems.
9. Medical oxygen systems.

14.4 - Air Quality Standards

Breathing air for SCUBA must meet the specifications in exhibit 01 as set forth by the Compressed Gas Association (CGA Pamphlet G-7.1, Table 1) and referenced in 29 CFR 1910.430.

14.4 - Exhibit 01

Compressed Gas Association Specifications for Breathing Air

<i>Grade E</i>	
COMPONENT	MAXIMUM
Oxygen	20-22%/v
Carbon Monoxide	10 PPM/v
Carbon Dioxide	1000 PPM/v
Condensed Hydrocarbons	5 mg/m ³
Total Hydrocarbons as Methane	25 PPM/v
Water Vapor	(2)
Objectionable Odors	None

15 - Medical Standards

The medical standards are outlined at: The American Academy of Underwater Sciences (AAUS): Standards for Scientific Diving, Section 5.0 (most current version). Contact your RDSO if you have questions about the medical standards.

15.1 - General

1. Diving Safety Officers shall determine that divers have passed a current diving physical examination and have been declared by the examining physician to be fit to engage in diving activities.
2. All required medical evaluations must be performed by or under the direction of a licensed physician of the applicant diver's choice, preferably one trained in diving/hyperbaric medicine. Provide form AAUS Standard Appendix 4, Recommended Physicians With Expertise in Diving Medicine, to applicants to assist them in identifying a physician of choice.

15.2 - Conditions for Restriction from Diving

Divers shall meet the medical standards as outlined in: The American Academy of Underwater Sciences (AAUS): Standards for Scientific Diving, Section 5.0 (most current version). Contact your RDSO if you have questions about the medical standards.

15.3 - Frequency of Medical Evaluations

Medical evaluations must be completed:

1. Before divers begin diving. Diving Safety Officers shall obtain the results of examinations that have been reviewed and found satisfactory, unless equivalent initial medical evaluations have been given within the preceding 5 years if under the age of 40, at 5 year intervals up to age 40, every 3 years after age 40, and every 2 years after age 60.
2. A physician's clearance to return to diving is required after any major injury or illness or any condition requiring hospitalization for more than 24 hours. If the injury or illness is pressure-related, then clearance to return to diving must come from a physician trained in diving/hyperbaric medicine.

15.4 - Information Provided to Physicians

Diving Safety Officers shall provide a copy of the AAUS Appendix 1, Diving Medical Exam Overview for the Examining Physician, to the examining physician.

15.5 - Content of Medical Evaluations

Medical examinations conducted initially and at the intervals specified in section 15.3 of this handbook must consist of the following:

1. Applicant agreement for release of medical information to the Diving Safety Officer, as deemed necessary, for the administration and management of the Forest Service Diving Safety Program, AAUS Appendix 2b, Applicant's Release of Medical Information Form.
2. Medical history, AAUS Appendix 3, Diving Medical History Form.
3. Diving physical examination, AAUS Appendix 2, AAUS Medical Evaluation Of Fitness For Scuba Diving Report.

15.6 - Requirements for Diving Medical Examinations

The medical examination requirements are outlined at: The American Academy of Underwater Sciences (AAUS): Standards for Scientific Diving, Section 5.0 (most current version). Contact your RDSO if you have questions about the medical standards.

15.7 - Physician's Written Report

After any medical examination relating to an individual's fitness to dive, the Diving Safety Officer shall provide a copy of the physician's report, AAUS Appendix 2, AAUS Medical Evaluation of Fitness for Scuba Diving Report, to the individual.

16 - Contact Diving Operations

16.1 - General

1. Contractors shall demonstrate compliance with OSHA requirements of 29 CFR part 1910, Subpart T or 29 CFR part 1910, Subpart T, Appendix B.
2. Contracting officers or contracting officer representatives shall have a working knowledge of OSHA requirements of 29 CFR part 1910, Subpart T and 29 CFR part 1910, Subpart T, Appendix B to monitor contract diving operations or consult with the RDSO.
3. Any failure to comply with the requirements of section 11 will be cause for suspension or termination of the contract.

16.2 - Dive Operations Plans

1. Dive operation plans must be developed and implemented by the contractor for each separate diving operation. As a minimum, the plan must contain the following:

- a. Names and duties of dive team members, including diving supervisor.
- b. Date, time, and dive location of the diving operation.
- c. Diving mode to be used (for example, SCUBA or surface supplied air), giving a description of the backup air supply.
- d. Nature of work to be performed by the divers and requirements for inspection.
- e. Surface and underwater conditions, including visibility, temperature, thermal protection, and currents.
- f. Safety procedures for contract.
- g. Maximum depth and bottom time (altitude adjustments to dive tables must be accomplished for dives made at altitudes of 1,000 feet (300 meters) or more above sea level).
- h. Emergency management plan, including emergency procedures, means of notification, telephone numbers (for ambulance, doctors, and recompression chambers), and location of evacuation routes, nearest U.S. Coast Guard rescue center, and emergency assistance.
- i. Lockout/tag out procedures, including procedures for dealing with differential water pressures due to unequal water elevations (when applicable).
- j. Equipment certification, procedures, and checklists and requirements for special tools and equipment.
- k. The statement,

If for any reason the dive operations plan is altered in mission, depth, personnel, or equipment, the contracting officer shall be contacted and shall review any revision prior to actual operation.

- 2. The dive operation plans must be submitted to the unit diving safety officer prior to commencement of diving operations.
- 3. A copy of the diving operation plans must be at the diving location whenever diving is conducted.
- 4. The dive operation plans must be made available to the government contracting officer.

16.3 - Pre-Dive Conferences and Briefings

A pre-dive conference must be held on site with the lead contract diver and a representative of the contractor with sufficient authority to implement any requirements made by the government contracting officer.

16.4 - Recordkeeping and Reporting Requirements

The contractor shall submit two copies of all dive operations plans, dive logs, and diving related accident reports to the contracting officer for inclusion in the contract file. The contracting officer submits a copy to the unit dive safety officer.