

LOS ANGELES POLICE DEPARTMENT UNDERWATER DIVE UNIT OPERATIONS GUIDE



**Los Angeles Police Department
Underwater Dive Unit
Operations Guide**

Table of Contents

Volume 1: General Provisions

Volume 2: Diving Regulations

Volume 3: Operations

Volume 4: Minimum Requirements for Testing and Tryouts

Volume 5: Diver Requalification Requirements

Volume 6: Equipment

Volume 7: Boat Operations

Appendix A: Diving Tables

Volume 1 General Provisions

1.0 Underwater Dive Unit Operations Guide Established

The Operations Guide of the Los Angeles Police Department's Underwater Dive Unit is hereby established and shall hereafter be referred to as "the Operations Guide." It is and shall be a composite of current policies, procedures, and rules pertaining to Underwater Dive Unit (UDU) operations.

1.1 Organization of the Underwater Dive Unit Operations Guide

Volume 1, "General Provisions." This section is composed of general statements concerning the objectives and principles, outlines the organizational structure and defines the responsibilities and functions of every position.

Volume 2, "Diving Regulations." This section outlines general diving regulations, depth limits and the use of diving tables and computers.

Volume 3, "Operations." This section outlines the policies, rules, and regulations pertaining to a dive operation.

Volume 4, "Minimum Requirements for Testing and Tryouts." This section outlines the policies, rules, and regulations pertaining to the testing and evaluation of candidates.

Volume 5, "Annual Requalification Requirements." This section outlines the policies, eligibility requirements, and requalification standards for divers.

Volume 6, "Equipment." This section outlines the requirements for dive equipment and breathing gas.

1.2 Responsibilities for Maintaining the Underwater Dive Unit Operations Guide

The UDU Operations Guide shall be periodically reviewed by UDU supervisory personnel to ensure that the policies and procedures delineated within remain current and up to date.

1.3 Amendments to the Underwater Dive Unit Operations Guide

1.3.1 Requests for Amendments

A request for amendments to the Operations Guide shall be prepared on an Employee's Report, Form 15.7, and forwarded through the chain of command to the Officer-in-Charge. All amendments shall be approved by the Commanding Officer, Metropolitan Division, or their designee.

1.3.2 Issuance of Amendments

Amendments to the Underwater Dive Unit Operations Guide shall be issued and distributed per paragraph 1.2.

1.4 Issuance of Notices

1.4.1 Authorization

Notices shall be issued at the direction of the Officer-in-Charge or their designee.

1.4.2 Definition

Notices are defined as publications for the circulation of routine notification, schedules, maintenance schedules, training, and medical exams.

1.4.3 Issuance

Notices may be issued electronically or via paper document.

1.5 Responsibilities of the Underwater Dive Unit

It is the responsibility of the Los Angeles Police Department's Underwater Dive Unit to conduct the following:

- Underwater criminal investigations
- Search and recovery of criminal evidence, both underwater and land-based, via the use of metal detectors or other special equipment
- Recovery of lost or stolen property, including vehicles, vessels, aircraft, etc.
- Underwater photography and videography
- Body recoveries
- Removal of conditions which pose a threat to life and property, or where City liability exists
- Suspect apprehension
- Homeland security, including critical site surveys of piers and ship hulls, critical site threat assessments, mutual aid requests, and other duties related to waterborne homeland security issues
- Support of Divisional requests such as transportation, undercover operations, etc.
- Support of Tactical Waterborne elements
- Support of Air Support Division maritime related operations
- Support of Hazardous Materials Section maritime related operations
- Other specific missions as directed by the Commanding Officer, Metropolitan Division.

1.6 Organization

The Underwater Dive Unit shall consist of the following leadership positions:

- Officer-in-Charge
- Assistant Officer-in-Charge
- Instructor Cadre
- Squad Leader
- Assistant Squad Leader
- Logistics Officer
- Boat Crew Supervisor

1.6.1 Officer-in-Charge

The Officer-in-Charge shall be appointed by the Commanding Officer, Metropolitan Division.

The Officer-in-Charge shall have the responsibility and authority to manage day to day operations within the framework of the mission, policies, procedures, goals and objectives of the Los Angeles Police Department. The Officer-in-Charge reports directly to the Commanding Officer, Metropolitan Division and shall be responsible for the following:

- Selection and training of personnel
- Development and management of the annual budget
- Maintain records and files, including personnel files for all dive team members.
- Incident Command of all diving related accidents and injuries
- Suspend and remove personnel
- Review and approve all requests for dive operations
- Conduct periodic meetings with supervisory personnel
- Develop policy and procedure
- Approve all equipment that is utilized by UDU personnel
- Coordinate and distribute all written material, including but not limited to amendments to the Operations Guide, notices, and incident reports
- Supervise liaison efforts with other Department entities
- Maintain liaison with other public safety agencies and the Port Dive Operations Group (PDOG)
- Periodically inspect all UDU personnel and equipment
- Ensure all current UDU members meet annual requalification requirements

1.6.2 Assistant Officer-in-Charge

The Assistant Officer-in-Charge shall be selected in accordance with Department procedures.

The Assistant Officer-in-Charge shall have the responsibility and authority to manage operations in the absence of, or at the direction of, the Officer-in-Charge. The Assistant Officer-in-Charge reports directly to the Officer-in-Charge. The Assistant Officer-in-Charge shall be responsible for the following, subject to the approval of the Officer-in-Charge:

- Management of diving operations
- Supervision of dive unit members
- Selection of personnel for diving operations
- Document all diving related accidents and injuries
- Review all requests for dive operations and make appropriate recommendations to the Officer-in-Charge regarding the approval of such requests
- Selection, testing and maintenance of all UDU equipment
- Review and approve all training plans
- Perform other duties as directed by the Officer-in-Charge

1.6.3 Instructor Cadre

The Instructor Cadre shall be appointed by the Officer-in-Charge or their designee. The Instructor Cadre will perform the following tasks:

- Plan and organize all regular UDU training days
- Regularly provide the Officer-in-Charge with an evaluation of the dive training within the Underwater Dive Unit.
- Periodically review the diving qualifications of all UDU members and provide the results of the review to the Officer-in-Charge
- Train and certify UDU members in various diving specialties
- Complete other specific duties as specified by the Officer-in-Charge or their designee.

1.6.3.1 Instructor Cadre Qualifications

All personnel involved in diving instruction shall be qualified for the type of instruction being given. The Instructor Cadre shall consist of UDU members who are certified diving instructors from an approved certifying agency.

1.6.4 Squad Leader

The Squad Leaders shall be selected by the Officer-in-Charge or their designee. The Squad Leaders will:

- Be responsible for the in-water direction of all dive unit members
- Contact the Assistant Officer-in-Charge prior to training days and other operations to obtain updated information.
- Disseminate information to the Assistant Squad Leader and other squad members.
- Complete other specific duties as specified by the Officer-in-Charge, Assistant Officer-in-Charge, or their designee.

1.6.5 Assistant Squad Leader

The Assistant Squad Leader shall be selected by the Officer-in-Charge or their designee. The Assistant Squad Leader will:

- Be responsible for the in-water direction of all dive unit members, as designated by the Squad Leader
- Contact the Squad Leader prior to training days and other operations to obtain pertinent information for distribution to squad members.
- Complete other specific duties as specified by the Officer-in-Charge or their designee.

1.6.6 Logistics Officer

The Logistics Officer shall be selected in accordance with Department procedures. The Logistics Officer will conduct the following duties:

- Maintain all UDU equipment.
- Provide logistics to the dive site.
- Operate UDU response vehicles.
- Complete other specific duties as specified by the Officer-in-Charge or Assistant Officer-in-Charge.

1.6.7 Boat Crew Supervisor

The Boat Crew Supervisor shall be selected in accordance with Department procedures. The Boat Crew Supervisor will conduct the following duties:

- Manage all boat operations.
- Supervise the boat operators.
- Complete other specific duties as specified by the Officer-in-Charge or Assistant Officer-in-Charge.

1.7 Medical Examination

All divers shall pass a diving medical examination, which shall be administered by the City of Los Angeles, Personnel Department, Medical Services Division, to determine fitness to dive. The expiration date of the examination shall be maintained in the individual diver's records. Each diver shall be examined annually, after any serious medical episode, after treatment in a hyperbaric facility following a diving accident, after a serious illness or injury, or when directed by the Officer-in-Charge.

1.8 Police Reserve Program

The Underwater Dive Unit may utilize reserve police officers when their expertise may be of benefit to the Underwater Dive Unit.

1.9 Standard of Conduct

All members of the Underwater Dive Unit shall participate in all Underwater Dive Unit functions, including training and call outs, unless prior exemption has been granted by the Officer-in-Charge or their designee. Members who fail to attend without prior approval may have their diving status suspended or may be removed from the Underwater Dive Unit, at the discretion of the Officer-in-Charge or their designee.

1.10 Physical Fitness

All Underwater Dive Unit personnel shall maintain themselves in good physical condition. Each member shall be required to pass an annual Physical Fitness Qualification Test (PFQ). Personnel who fail to achieve a passing score on the PFQ shall have their diving status suspended and will be removed from the Underwater Dive Unit.

1.11 Requests for Call Out

All requests for the use of Underwater Dive Unit personnel shall be directed to the Officer-in-Charge or, in their absence, their designee. During off hours all requests should be made through RACR Division. RACR Division shall immediately notify the Officer-in-Charge, or in their absence, their designee. In their absence, all requests shall be directed to Metropolitan Division. The Officer-in-Charge, or their designee, will direct the appropriate response of UDU personnel..

When it is determined that a dive should be performed, a notification will be made to the Commanding Officer, Metropolitan Division, when feasible.

Volume 2 Diving Regulations

2.1 General Policy

No person shall engage in diving operations under the auspices of the Underwater Dive Unit unless they have satisfactorily met the requirements for fitness to dive and have the approval of the Officer-in-Charge or their designee.

Diving shall not be conducted unless emergency procedures have been established to initially treat and transport divers to an operational hyperbaric facility or appropriate emergency medical facility.

At all times that divers are in the water there shall be at least one standby diver, 90 percent capable and ready to assist divers in the water. The standby diver shall be fully briefed on the operation. The standby diver shall be equipped with a detachable air cylinder, various types of cutting tools, and a tending line. Deviations to this paragraph may be approved during rescue or lifesaving operations, or at the discretion of the Officer-in-Charge or their designee.

2.2 Diving Procedures

2.2.1 Tended Dives

Prior to engaging in tended diving, all involved personnel (diver and tender) shall have received sufficient training in the various aspects and techniques of tended diving. During a solo, line-tended diving operation, a 100 percent ready and a 90 percent ready standby diver shall be utilized.

2.2.1.1 Exception

In rare circumstances, such as shallow water conditions, a fully equipped safety diver may not be necessary. This determination will be made by the Safety Officer and the Diving Supervisor.

2.2.2 Enclosed or Confined Spaces

Where an enclosed or confined space is not large enough for two divers, a diver shall be stationed at the underwater point of entry and a line reel shall be utilized. Only personnel with appropriate training and certifications shall be permitted to conduct penetration diving. A remote operated vehicle (ROV) should also be considered as an option for this type of operation.

2.2.3 Diver's Flag

During all diving operations in an open water environment, a red and white "Diver Down" flag and an international Alpha flag shall be prominently displayed when feasible.

2.2.4 Flotation Devices

During every dive, all divers shall possess the capability of attaining and maintaining positive buoyancy. An inflatable exposure suit by itself shall not be used as the sole source of buoyancy.

2.2.5 Timing Devices, Depth and Pressure Gauges

During every dive, all divers shall have their own underwater timekeeping device, an approved depth indicator, and a submersible pressure gauge. During surface supplied air operations, depth and dive time may be delegated to the operator of the surface supplied air system, if appropriately equipped to perform said functions.

2.2.6 Decompression Tables and Computers

Divers may utilize a dive computer to track cylinder pressure, depth, and dive time. However, the Diving Safety Officer shall utilize one of the following tables to plan dives and calculate ending pressure groups and surface intervals:

- U.S. Navy, No-Decompression Air Dive Tables
- U.S. Navy, No-Decompression – Shallow Water Tables
- NOAA, No-Decompression Air Dive Tables
- NOAA, No-Decompression Nitrox 32% Tables
- NOAA, No-Decompression Nitrox 36% Tables
- U.S. Navy Air Decompression Dive Tables

General Provisions

Only those dive computers which have been approved by the Officer-in-Charge, or their designee may be utilized within the Underwater Dive Unit diving program.

Each diver utilizing a dive computer must be trained to understand basic decompression theory and how to properly and safely operate the dive computer with which they dive. Documentation of this training shall be maintained in the diver's permanent diving record.

Each diver relying on a dive computer to plan dives and determine decompression status must have their own unit. A diver who is not using a personal dive computer is prohibited from relying on a computer used by another diver.

If a diver experiences a computer failure, the dive shall be immediately terminated using appropriate surfacing procedures.

Repetitive and multi-level diving procedures dictate that divers should start the dive or series of dives at the maximum planned depth followed by subsequently shallower exposures. Deviations to this procedure shall be approved by the Diving Supervisor.

Multiple deep dives that approach the no-decompression limits of the dive computer or dive table require special consideration and planning.

During dives in which dive computers are used, the diver shall have the capability for redundant time and depth measurements. Throughout all dives, the diver shall maintain awareness of maximum depth and bottom time.

Table Rules

A single dive is any dive made more than 12 hours following a previous dive. A repetitive dive is any dive made less than 12 hours after surfacing from a prior dive.

Dives that are less than 10 minutes apart will be considered to be the same dive. The bottom times of both dives shall be added together for the total bottom time. The deepest depth achieved during either portion of the dive will be the maximum depth for the dive.

The diving ascent rate for a non-altitude dive shall not exceed 30 feet per minute.

Divers shall make a three minute safety stop at 15 feet, for dives deeper than 60 feet and when the pressure group at the end of a dive is within three pressure groups of the no-decompression limit. However, a diver may opt to make a safety stop on any dive that the diver deems necessary.

Divers shall not exceed the no-decompression limits of the dive computer or dive table at any time during the dive unless certified to conduct decompression diving, and only with the authorization of the Officer-in-Charge or their designee.

Omitted Decompression

Should a diver realize that they have exceeded the no-decompression limits prior to reaching the surface, they should stop their ascent at 10 to 15 feet, notify the Safety Officer via communications, and provide maximum depth and bottom time. The Safety Officer will consult the U.S. Navy Air Decompression Dive Tables for the appropriate decompression time.

If the diver does not have communications with the surface, the diver should conduct the following:

- Stop their ascent between 10 and 15 feet
- Remain for a minimum of 15 minutes or until 300 psi in their cylinder, whichever comes first.
- Upon surfacing, consult the U.S. Navy Air Decompression Tables to determine if the amount of time spent at 10 to 15 feet met or exceeded the amount of decompression time required by the Tables.

- If the time was not met or exceeded, the diver should be placed on oxygen for a minimum of 30 minutes, observed, and restricted from diving for 12 hours.
- If the diver becomes symptomatic they should remain on oxygen and be transported to the nearest medical facility for treatment.

If a diver does not realize that they have exceeded the no-decompression limits prior to reaching the surface, or the diver does not have a sufficient gas supply to be able to conduct a decompression stop, the following steps should be taken:

- Ascend at a normal rate.
- Upon surfacing notify the Safety Officer.
- If asymptomatic and able to be safely returned to the water within five minutes, return to the depth of omitted decompression and remain for 1 ½ times the required decompression stop time.
- If unable to be safely returned to the water within five minutes of surfacing, the diver should be placed on oxygen for a minimum of 60 minutes
- If asymptomatic after breathing oxygen for 60 minutes, the diver should be observed for a minimum of 12 hours for signs and symptoms of DCS and restricted from diving during this observational period.
- If the diver becomes symptomatic, he should remain on oxygen and be transported to the nearest medical facility for treatment.

2.2.7 Altitude Diving

Additional considerations apply when conducting a dive at an altitude of 1000 feet above sea level or higher, or when travelling to such an altitude following a dive.

The cross correction technique should be used for all altitude dives. This technique will yield a sea level equivalent depth that is greater than the actual dive and will provide the extra decompression needed to offset the effects of diving at altitude.

To correct the depth of a dive at altitude, the following formula should be used:

$$\text{Equivalent Depth (fsw)} = \text{Altitude Depth (fsw)} \times \frac{\text{Pressure at Sea Level (psi)}}{\text{Pressure at Altitude (psi)}}$$

Use the Sea Level Equivalent Depth Table (Table A.8) to figure the altitude depth. Use the Pressure Variations with Altitude Table (Table A.9) to figure the pressure at altitude and the starting repetitive group designation.

Travelling to Altitude Following a Dive

Prior to making an ascent to altitude following a dive, divers should consult Table A.5 to obtain their required surface interval.

2.2.8 Depth Limits

An Underwater Dive Unit diver under the auspices of the Underwater Dive Unit organization shall not exceed the depth limit of their certification except as follows:

- A diver may exceed the depth limit of their training, only while accompanied by an instructor, who is certified to the planned depth, and only on a training dive.

Dives exceeding 130 feet in depth may only be conducted by divers who have been trained to conduct extended range decompression diving, and then only with the approval of the Officer-in-Charge or their designee.

Any violation of this provision will result in the immediate suspension of dive status and a review by the UDU Instructor Cadre, Officer-in-Charge, and Assistant Officer-in-Charge.

2.2.9 NITROX Diving

Enriched Air NITROX (EAN) Diving may only be conducted by UDU divers who have been NITROX certified by a UDU instructor or through a nationally recognized training organization.

Any mixture between 21% and 40% EAN may be utilized as a primary breathing gas.

Every cylinder containing a NITROX mixture shall be analyzed for oxygen content prior to its use as a breathing gas. The oxygen percentage shall be affixed to the cylinder using adhesive tape.

When conducting NITROX Dives, the NOAA NITROX Tables (Tables A.4 and A.5) shall be utilized. Alternately, the U.S Navy No-Decompression Air Dive Tables may be used with the Equivalent Air Depth Table (Table A.6).

2.2.10 Decision to Dive

The ultimate decision to dive rests with the individual diver. Diving shall not be conducted whenever the diver determines that it is unsafe to make a dive or that it is beyond their capabilities as a diver.

Ultimate responsibility for safety rests with the individual diver. It is the diver's responsibility and duty to terminate a dive if, in their judgment, conditions are unsafe, or if diving would violate the precepts of their training or the standards of this Operations Guide.

2.2.11 Termination of a Dive

Unless it compromises the safety of another diver already in the water, it is the responsibility of the diver to terminate the dive, whenever the diver determines that it is unsafe to continue.

The dive shall be terminated while there is still sufficient tank pressure to permit the diver to:

- Safely reach the surface, including decompression time; or
- Safely reach an additional air source at a planned decompression station.

Divers shall endeavor at all times to surface with no less than 500 psi of air in their main cylinder.

The Diving Supervisor shall terminate the dive at any time that they believe there is an unmanageable risk to divers.

Volume 3 Operations

3.1 General Policy

All diving activities under the auspices of the Underwater Dive unit shall conform to the guidelines contained in this volume.

3.2 Diving Operations

The success of any dive mission is directly related to thorough planning. The nature of each operation will determine the scope of the planning effort. The below listed considerations shall be applied to every operation:

- Divers should not be used if the objective can be more efficiently accomplished by another means.
- Bottom time is always at a premium and any planning inputs, which will conserve bottom time or increase the effectiveness of the diver, should be given high priority.
- Diving operations should not be conducted under extreme environmental conditions or whenever the safety of the divers or of the support personnel will be unnecessarily compromised.
- Diving operations that are to be carried out in extreme environments, such as high and low temperatures and contaminated or polluted water, must be planned to ensure that all appropriate safety equipment and protocols are utilized.
- All dive plans shall include the means for treating an injured diver, including all nearby operational hyperbaric and emergency medical facilities, and the transportation plan to a hyperbaric or emergency medical facility.
- The equipment and supplies being used must be appropriate for the operation and adequate to complete the operation unless approved by the Dive Supervisor.

3.3 Preliminary Diving Plan

Upon receiving a request for the services of the Underwater Dive Unit, the Officer-in-Charge, or their designee, will designate a Diving Supervisor and appropriate personnel, to respond to the site of the proposed mission.

The Diving Supervisor shall complete a site survey and prepare a preliminary plan of action to determine if the operation will require a land based operation (such as deployment of metal detectors, transportation of Officers via boats, etc.) or an underwater diving operation.

Once it is determined that an operation should be conducted, a diving/ operations plan will be prepared and submitted to the Officer-in-Charge or their designee. The Officer-in-Charge, or their designee, will then review the plan for approval and implementation.

3.4 Dive Planning

This section provides a comprehensive guide to effective dive planning. The following steps should be considered while planning diving operations:

- Define objectives
- Collect and analyze data
- Establish operational tasks
- Select diving technique
- Select equipment and supplies
- Determine the necessity of boat assets
- Determine the necessity of additional assets or personnel
- Select and assemble the diving team
- Brief the diving team
- Make final preparation and check all safety precautions
- Dry rehearsal of the dive scenario
- Equipment inspection of all divers prior to entering the water

3.4.1 Define Objectives

Establish a clear statement of the objective. Why is the operation being undertaken, and what is to be accomplished?

3.4.2 Collect and Analyze Data

Pertinent information should be acquired and studied. This will aid in the selection of techniques, equipment, divers and support personnel, identification of potential hazards, emergency procedures, and contingency procedures.

The extent of and type of information, which must be gathered, will be influenced by such factors as the size of the operation, the location of the dive site, and the time of the year.

If the operation involves the recovery of an object from the bottom, the Underwater Dive Unit will need to know the dimensions and weight of the object. Additional information might include floodable volume, established lifting points, construction material, length of time on the bottom, probable degree the item is embedded in the mud or silt and the type and degree of damage to the object. This data will help define the type of lift to be used.

For any operation, which will involve a search for an object or underwater site, data gathered in advance will help to minimize the time required for the search.

Whenever the object of a search has been found, the site should be marked with a buoy, which has been rigged in advance, ready for immediate use.

Detailed information must be collected as an aid in identifying hazards. If a diver will be working around or under a ship they must know the location of all sea-suction and discharge points and of propellers, rudders, bow thrusters, azi-pods, recent repair work, sonar transducers, cathodic protection, etc. In addition, the Safety Officer shall ensure that proper lockout/ tagout procedures are conducted and completed on the ship to be searched, in accordance with UDU standards.

A diver should know in advance what sort of underwater conditions to expect ranging from the temperature to the type of marine growth common to the area.

Most of the data gathered in the planning phase of the operation will come from outside sources or surface observations and will be gathered before the actual diving phase begins. If time and conditions permit, survey dives or surface swims can be of great value in refining the database and in improving the dive plan. For all diving operations, data should be collected and analyzed in the following general categories:

- Surface Conditions
- Underwater Conditions and hazards
- Overhead and confined space hazards
- Resources
- Assistance and Emergencies

Surface Conditions

Conditions on the surface in the operating area will affect the divers, boat crew, and all topside personnel. These conditions are influenced by the location, weather, tides and currents, temperature, visibility, and maritime traffic.

Underwater Conditions

Underwater conditions will have an influence on the selection of the divers, dive techniques, and the equipment to be utilized. Conditions of particular concern include:

- Depth
- Tide and currents
- Visibility
- Temperature
- Contaminants and Pollution
- Obstacles or other underwater hazards
- Type of bottom and bottom composition

Three basic types of currents affect diving operations. These currents include river and major ocean currents; currents produced by the ebb and flow of the

tides, which may contribute to, or abate, existing currents; and undertow or rip currents.

Underwater visibility varies with depth and turbulence. The degree of underwater visibility will influence selection of dive technique and may greatly influence the time required for a diver to complete a given task.

Water temperature can drastically affect the diver's performance. In cold water, their ability to concentrate and their working efficiency will diminish rapidly.

The temperature range at most Los Angeles area dive sites will be constant throughout the year. Specific man-made facilities may have depressed or elevated water temperatures. Water temperature should be known prior to the dive, to allow for the application of appropriate protective equipment.

Divers may encounter dangerous forms of pollution, which can cause severe medical problems. A diver working near sewer outlets or industrial discharges may be exposed to the hazards of disease or chemical poisoning. Toxic materials or volatile fuels leaking from barges or tanks or just after a heavy rain can irritate the skin and corrode equipment. When using SCUBA a diver may inadvertently take polluting materials into their mouth, posing both physical and psychological problems. The diver is especially vulnerable to ear and skin infections.

Hazardous Conditions

When planning for operations in water known or suspected to be polluted, full protective clothing (i.e. dry suit and full face mask), appropriate preventative medical procedures and a decontamination station must be provided and shall be utilized by each diver.

Operational obstacles and hazards include electric shock, explosions, sonar, nuclear radiation, marine life, entanglement, underwater structures, and other underwater hazards.

The type of bottom may have a decided effect upon a diver's ability to move and work efficiently and safely. Advance knowledge of bottom conditions and profile is important for the selection of diving techniques and the equipment to be used.

3.4.3 Establish Operational Tasks

With the objectives of the operation defined and data gathered and studied to properly establish conditions under which a dive will take place, a basic outline for the operation itself can be prepared. Each task should be identified, and placed in the context of an overall schedule, or job profile so that the interrelationship of all tasks will be apparent. This should be done for even the most routine operations.

All phases of an operation are important. A common failure in planning is to put all of the emphasis on the actual dive phases, while not fully considering boat operations, pre-dive and post-dive activities. Another common failure is to treat the operation, especially those of a recurring nature with an indifference to safety that comes with familiarity of procedures.

A diving operation is not completed once the objective has been met. Good planning must carry the dive team through debriefing the operation, individual gear clean up and maintenance, team gear and response truck clean up and maintenance, boat clean up, maintenance and loading, and the proper filing of records and reports. The schedule should allocate sufficient time for the preparation of equipment, transit to the site, rendezvous with the other vessels or units, establishment of a secure site, pre-dive brief and safety brief.

A complete dive plan should include the following:

- Recovery, inspection, repair, storage and cleaning of all equipment.
- Disposition of any materials recovered during the operation.
- De-briefing of divers, other team members, and support personnel
- Analysis of the success of the operation, as planned and actually carried out.
- Preparation and submission of all required reports.
- Re-stocking of expended materials.
- Ensuring the readiness of the Underwater Dive Unit to respond to the next assignment.

3.4.4 Selecting the Diving Technique

There are two basic types of diving equipment in current use by the Underwater Dive Unit. These techniques are Self-Contained Underwater Breathing Apparatus (SCUBA) and Surface Supplied Air (SSA). During certain operations both techniques may be suitable. In other operations, one option may be preferred over the other. The selection of the technique will depend upon the availability of equipment, trained personnel, the dive location, and the objective of the dive.

3.4.5 Selecting and Assembling the Diving Team

When planning diving assignments and matching the qualifications and experience of diving personnel to specific requirements of the operation, a thorough knowledge of the duties responsibilities and relationships of the various members of the diving team is essential.

The ultimate responsibility for the safe and effective conduct of all diving operations rests with the Officer-in-Charge. The Officer-in-Charge delegates appropriate authority to selected members of the Underwater Dive Unit. These members and subordinate personnel make up the Underwater Dive Unit. These include the assistant Officer-in-Charge, the dive supervisor, squad leaders and the divers.

3.4.6 Diving Personnel

The Diver must be qualified for the diving technique used, the particular equipment involved, and for diving to the depth required. While working, the diver must keep topside personnel informed of the conditions on the bottom, of their progress, and of any developing problems that may indicate the need for changes in the plan or a call for assistance from other divers.

Divers are responsible for the dive gear they will use and must be sure that it is complete, in good repair, configured according to unit protocol and ready for use at any time.

Divers must be qualified and designated in accordance with instructions issued by the Officer-in-Charge, or their designee, and this Operations Guide.

3.4.6.1 Standby Diver (Safety Diver)

A standby diver is a primary requirement for all diving operations. The standby diver is a fully qualified diver, assigned for back-up or to provide emergency assistance and immediately ready to enter the water. A standby diver shall wear the apparatus and be completely ready for quick deployment. The standby diver receives the same briefings and instructions as the working diver and monitors the progress of the work as reported by the diver on the bottom, so that if called upon for assistance, they are fully prepared to respond.

In rare circumstances, when deemed appropriate by the Safety Officer and the Diving Supervisor, a standby diver may not be a necessary requirement.

3.4.6.2 Team Leader

The team leader will be selected by the Diving Supervisor and will direct all in-water diving personnel. Generally the team leader will be one of the squad leaders. However, a senior diver who has the requisite training and experience may be assigned as a team leader, at the discretion of the Diving Supervisor.

The team leader will select the diving team and will assign each diver to a specific task. The team leader will conduct a pre-dive operational briefing with all assigned personnel and will ensure that each participant understands their duties.

3.4.6.3 Divers

Divers will be selected for specific tasks based upon their training, experience, and their ability to perform the necessary task. Divers must assess their own abilities and should defer from conducting a dive that they believe to be beyond their capabilities.

3.4.6.4 Buddy Diving

A buddy diver is the dive partner for a scuba operation when the divers are working in pairs or teams. Each of the divers is the buddy for the other. The buddy divers are jointly responsible for the assigned mission and each keeps track of the depth and time factors for the dive. Each diver has a particular responsibility for the safety and well-being of the other.

3.4.7 The Dive Briefing

Each member of the dive team must fully understand the plan, their role in the plan, and the roles of the other members of the team and support personnel.

For each Diving Operation there will be two briefings provided to all involved personnel.

3.4.7.1 Operational Briefing

The operational briefing will be provided by the Team Leader and will include the following information:

- Intelligence
- Mission objectives
- Conditions in the operating area
- Diving technique and equipment to be used
- Assignments
- Method of deployment
- In-water movement
- Method of extraction
- Other information that is pertinent to the mission or mission specific

3.4.7.2 Safety Briefing

The safety briefing will be provided by the Safety Officer. The briefing will be conducted from a standardized written or Power Point format. The Safety Briefing will take place prior to divers departing the staging area unless an exigency exists as determined by the Dive Supervisor.

3.4.8 De-Briefing the Diving Team

Prompt de-briefing of divers returning to the surface will provide the Diving Supervisor with information that may influence or alter the next phase of the operation. Divers should be interviewed regarding the progress of the work, bottom conditions and anticipated problems. They should also be asked for any suggestions they might have for changes to the dive plan.

After all diving operations have ceased, all personnel shall be assembled for a general de-briefing.

3.5 Diving Operations Assignments and Duties

For each operation that requires diving, a Diving Supervisor and a Safety Officer shall be designated.

3.5.1 Diving Supervisor

The Diving Supervisor shall be appointed by the Officer-in-Charge or their designee to be in charge of a diving operation as the Incident Commander.

The Diving Supervisor will appoint individuals to perform the functions of a surface crew. These functions may include logistics, tender, timekeeper, safety officer, safety diver(s), emergency medical technician personnel, surface supplied air personnel, lock out and tag out team, and other duties as dictated by the needs of the operation. In addition, the dive supervisor will work in tandem with the boat crew supervisor to support the overall mission of the diving operation.

The Diving Supervisor shall:

- Be a qualified member of the Underwater Dive Unit, as defined by this Operations Guide, with the appropriate training and experience to assume operational responsibility of an incident
- Hold a certification by a nationally recognized dive training organization as a SCUBA instructor, assistant instructor, or divemaster.
- Be accountable to the Officer-in-Charge for the conduct of a diving operation
- Manage all diving operations and be responsible for the safe diving practices of all divers assigned to an operation
- Have the authority to suspend or terminate diving operations
- Be the on-site liaison with other law enforcement representatives or public safety agencies
- Be responsible for the preparation of the basic plan for the diving operation
- Ensure that all personnel that are participating in the diving mission are thoroughly briefed on the mission and that they know and understand all applicable safety regulations and emergency procedures as outlined in the dive-briefing
- Designate a team leader(s) for the diving operation
- Determine equipment requirements, recommend diving assignments, search patterns, diving technique and establish contingency requirements for the operation
- Control all diving operations upon commencement of a dive
- Monitor progress, de-brief divers returning to the surface, update instructions to working divers, and ensure that the Officer-in-Charge is advised of the progress and of any changes to the original plan

- Gather appropriate data for analyzing the results of the operation and for use in preparing reports
- Ensure completion of post-dive incident reports

3.5.2 Safety Officer

The Safety Officer shall be appointed by the Dive Supervisor. The Safety Officer shall:

- Be responsible for the management of safety programs
- Check the status of medical facilities and medical assets prior the commencement of any diving operation
- Ensure that all divers participating in a diving operation are medically fit to dive
- Gather and maintain safety information regarding contaminants and hazards, diving accidents, decontamination procedures, and equipment maintenance
- Be responsible for the assessment of safety related issues during the planning and execution of training and operational dives.
- Maintain a liaison with local law enforcement, emergency medical agencies, and other municipal entities where an operation is taking place, for the purpose of support and information gathering.
- Ensure that all emergency medical equipment is available at the dive site and is operational. This includes oxygen, first aid kit, and automated electronic defibrillator
- Ensure that all safety diver equipment is inspected and is available to the safety diver at the dive site
- Inspect all equipment that is to be used for the operation, conduct pre-dive safety briefings, and conduct a final equipment safety check on all divers
- Ensure that proper lockout/ tagout procedures were conducted and completed on the ship to be searched, in accordance with UDU standards.
- During diving operations, maintain dive profile information, operate underwater communications with the divers and coordinate with the boat crew.

3.5.3 Surface Crew

The dive supervisor will appoint individuals to perform the functions of a surface crew. These functions may include logistics, tender or timekeeper, lock out and tag out team, safety diver(s), emergency medical technician personnel, boat operators, safety officer, surface supplied air operators, and other duties as dictated by the operation.

3.5.4 Boat Operators

A boat squad supervisor will be responsible for the planning and operation of UDU vessels and requisite personnel. Refer to the Boat Operations Procedures Guide for additional information.

Volume 4 Minimum Requirements for Testing and Tryouts

4.1 Entry Level Requirements

All applicants shall meet the following requirements prior to testing for the position of Police Diver.

- Active non-probationary employment as a sworn member of the Los Angeles Police Department.
- Hold a minimum of an Open Water SCUBA Diving certification, issued by a nationally recognized SCUBA training agency.
- Hold a CPR certification at the Basic Life Support level, issued by a nationally recognized training agency.

4.2 Testing Requirements

All applicants shall receive a passing score on all phases of testing in order to be considered for an assignment to the Underwater Dive Unit. Testing shall include the following phases:

- Physical Fitness Qualification Exam
- Written Examination
- Confined water SCUBA skills evaluation
- Open Water SCUBA skills evaluation
- Oral Interview
- Background Investigation

4.2.1 Physical Fitness Qualification Exam

All applicants shall pass a physical fitness qualification (PFQ). All PFQ tasks will be administered on the first day of the tryouts except for the Open Water Swim. All Day One PFQ tasks shall be completed with a passing score in order to continue on in the tryout process.

Applicants will perform all of the following physical fitness tasks:

Day One

- **Toe Touch** – Applicants will bend at the waist with their knees locked out and touch their toes with the tips of their fingers.
- **Push Ups** – Applicants will complete a minimum of 30 push ups
- **Sit Ups** – Applicants will complete a minimum of 50 sit-ups.
- **400 meter swim** – Applicants will complete a 400 meter swim, in a pool, in no longer than 13 minutes. The swim must be continuous. Applicants who stop or rest prior to completing 400 meters will be disqualified.

- **800 meter swim** – Applicants must complete an 800 meter swim in a pool. The ending times of each diver will be ranked and will contribute to an overall score. There is no minimum time for completion of the swim. Applicants shall use a mask, fins, and a snorkel.
- **25 yard underwater swim** - This swim will be conducted underwater, on one breath hold, and without the use of any swimming aids.
- **Tread Water** – Applicants will tread water for no less than 15 minutes. During this task applicants may not touch the wall or use any object that aids flotation.

Day Two

- **Open water swim** – This swim will be conducted in full diving gear and will be timed. The ending times of each diver will be ranked and will contribute to an overall score. There is no minimum time for completion of the swim.

4.2.2 Written Examination

Applicants must achieve a passing score of 70 percent on a written examination that demonstrates knowledge of the following:

- Function, care, use, and maintenance of diving equipment
- Physics and physiology of diving
- Environmental maritime conditions
- Dangerous marine animals
- Emergency procedures
- Decompression theory and the use of Decompression tables
- Underwater communications
- Basic aspects of freshwater versus saltwater diving
- Basic aspects of altitude diving
- Planning and supervision of diving operations
- Diving hazards
- Prevention, causes, signs and symptoms, and field treatment of diving related maladies and environmental illnesses

4.2.3 Confined Water SCUBA Skills Evaluation

The applicant must satisfactorily demonstrate the ability to perform the following skills in a pool or confined area with similar conditions:

- Entering and leaving the water wearing full SCUBA equipment
- Understand underwater signs and signals
- Clear a flooded and partially flooded mask
- Recover and clear a regulator
- Remove and replace all SCUBA equipment, while submerged and on the surface

- Achieve neutral buoyancy, while performing a fin pivot, hover, or other technique designated by an instructor
- Buddy Breathing while stationary and while swimming
- Alternate air source breathing (donor and recipient)
- Controlled Emergency Swimming Ascent
- Other watermanship abilities acceptable to the examiner and as determined by the Officer-in-Charge or their designee.

4.2.4 Open Water SCUBA Skills Evaluation

The applicant must satisfactorily demonstrate the ability to perform the following skills in an open water environment:

- Entering and leaving the water or surf while wearing SCUBA gear
- Clear a flooded and partially flooded mask
- Recover and clear a regulator
- Remove and replace all SCUBA equipment, while submerged and on the surface
- Achieve neutral buoyancy, while performing a fin pivot, hover, or other technique designated by an instructor
- Buddy breathing while stationary and while swimming
- Alternate air source breathing (donor and recipient)
- Controlled Emergency Swimming Ascent
- Other watermanship abilities acceptable to the examiner and as determined by the Officer-in-Charge or their designee
- Ability to plan and execute a dive
- Judgment adequate for safe diving

4.2.5 Oral Interview

The applicant will submit to an oral interview in accordance with Department procedures.

4.2.6 Background Investigation

The applicant will undergo a background investigation that is consistent with the standards set forth by the Commanding Officer, Metropolitan Division.

Volume 5 Annual Diver Qualification Requirements

5.1 General Policy and Prerequisites

5.1.1 Eligibility

Only persons currently assigned to the Underwater Dive Unit shall be eligible to participate in Underwater Dive Unit training and operations. All UDU divers shall be required to satisfactorily complete periodic re-qualification requirements

5.2 Requirements for Annual Requalification of Active Dive Status

Divers must demonstrate they possess the necessary skills and judgment for all diving activities, as set forth by the Officer-in-Charge or their designee. Upon approval, divers will be renewed as active status.

5.2.1 Requirements

The diver shall complete the following tasks periodically and at minimum, annually:

- Information/ Roster update
- Medical certification of fitness to dive
- Proof of bi-annual CPR certification at the Basic Life Support level and Standard First Aid, from a nationally recognized training agency or a UDU Instructor
- Inspection of all UDU issued equipment to ensure accountability and working order
- Physical Fitness Qualification

5.2.2 Required Training

The diver must periodically complete any additional theoretical and practical training or certifications beyond the Open Water Diver level that the UDU requires.

Theoretical aspects combined with appropriate, practical training should include the following topics:

- Underwater Dive Unit Team Operations
- Advanced Diver Certification
- Rescue Diver Certification
- Underwater Navigation
- Search and Recovery
- Underwater Working and Rigging
- Underwater Salvage
- Underwater Lift Tools and Applications
- Underwater Lifting and Recovery

- Surface Craft Operations
- Surface and Underwater Imagery
- Underwater Surveys
- Underwater Crime Scene and Body Recovery
- Night Diving
- Limited Visibility and Blackout Diving
- Ordnance Familiarization and procedures
- Hull and Pier Searches, including lock-out/ tag-out
- Underwater Communications Devices
- Freshwater Diving
- Deep Diving
- Wreck Diving
- Underwater Tools
- Surface Supplied Air Operations
- Dry Suit Diving
- Equipment Maintenance
- Helicopter Operations
- Enriched Air Familiarization
- Metal Detector Usage
- Search Techniques
- Port Dive Operations Group
- Suspect Apprehension
- Sonar and Remote Operated Vehicle Operations
- Other training deemed necessary by the Officer-in-Charge

5.2.3 Required Examinations

The following examinations are required to gain additional certifications or if deemed necessary by the Officer-in-Charge or their designee:

- Appropriate written examinations for the certification level
- Confined water skills evaluation, including emergency ascent techniques
- Open water skills evaluation

5.3 Night Dive Requirements

During any 12 month period each UDU diver must log at least one night dive in conjunction with a UDU operation or training. The UDU Officer-in-Charge will determine the description of Night Dive conditions.

5.4 Depth Certification and Requirements

During any 12 month period each UDU diver must log at least one dive at or near the maximum depth of the diver's certification.

Authorization to dive below a specific depth is based upon the certification level and training experience of the individual diver and the approval of the Officer-in-Charge or their designee. The UDU training program shall seek to certify all UDU divers to the level of Deep Diving Specialty. At least one training day per year shall be conducted in the area of Deep Diving Operations. The certifications and their corresponding depth levels are as follows:

5.4.1 Open Water Diver Certification

A diver certified to the level of Open Water Diver may dive to a depth, not to exceed 60 feet without the accompaniment of a UDU instructor.

5.4.2 Advanced Open Water Diver Certification

A diver certified to the level of Advanced Open Water Diver may dive to a depth, not to exceed 100 feet without the accompaniment of a UDU instructor.

5.4.3 Deep Diving Specialty

A diver certified to the level of Advanced Open Water Diver, who holds a Deep Diving Specialty certification, may dive to a depth, not to exceed 130 feet without the accompaniment of a UDU instructor.

5.4.4 Additional Training

A diver who holds a deep diving certification, who attends additional training, or has experience in extended range and or decompression procedures, may exceed 130 feet and dive to the limits of their certification level, only with the express approval of the Officer-in-Charge, or their designee, and within the guidelines of this Operations Guide.

5.5 Maintaining Active Dive Status

5.5.1 Requirements to Maintain Active Dive Status

A diver must meet the following requirements to maintain active dive status:

Attendance

Each certified Underwater Dive Unit diver must attend all UDU training days, unless excused for court, vacation, sickness, work conflict, or another valid reason deemed appropriate by the Officer-in-Charge or their designee.

There may be times when unforeseen work conflicts arise that preclude a diver from attending training or call outs. This should be the rare exception. Absence at training significantly reduces the level of performance required by the UDU from its members. Failure to respond to a call out when notified impacts the level of service provided by the UDU and can reduce the overall safety of the mission.

If the diver's current assignment or personal commitments cause them to be unable to meet the requirements of a UDU assignment, a determination will be

made by the OIC of the UDU to remove them from the ancillary duty of the UDU assignment.

A diver who fails to conduct at least one training dive or call out dive during a consecutive six week period may be placed on inactive dive status.

Dive Proficiency Requirement

Divers must log a minimum of three dives during each quarter of the calendar year. Divers who fail to log three dives per quarter will be placed on inactive dive status.

Requirements for maintaining active dive status may be waived by the Officer-in-Charge, or their designee, based upon the operational necessities of the UDU. Failure to abide by the preceding conditions may result in a diver being placed on inactive dive status and possibly removed from the UDU.

Re-activation of Active Dive Status

A diver who is placed on inactive dive status due to a major illness, injury; or at the direction of the Officer-in-Charge, or their designee, may achieve active dive status through the following procedures:

- Conduct one or more training dives with a UDU Instructor, displaying proficiency in all aspects of UDU operational diving.
- Be approved for UDU operational diving by the Officer-in-Charge or their designee.

A diver who is placed on inactive dive status for a period exceeding six months, may be subject to removal from the UDU.

5.6 Physical Fitness Qualification Test (PFQ)

All divers shall be required to pass a periodic PFQ as determined and scheduled by the Officer-in-Charge or their designee. Divers shall achieve a minimum passing score as determined by the Officer-in-Charge or their designee.

5.6.1 Failure to Pass the PFQ

Divers who fail to take or pass the regularly scheduled PFQ shall be placed on inactive dive status and be required to pass a make-up test within 30 days. Divers shall be required to retake the entire PFQ. Any diver, who is unable to take the PFQ due to vacation, sick or IOD, shall be required to take the PFQ within 30 days after returning to full duty status.

5.7 Annual Medical Examination

All Underwater Dive Unit divers shall submit to and pass an annual medical examination performed by a licensed physician with the City of Los Angeles, Personnel Department, Medical Services Section. After each major illness, injury, or at the direction of the Officer-in-Charge, or their designee, a diver shall submit to a medical interview or examination before resuming diving activities.

5.8 Suspension and Revocation of Active Dive Status

5.8.1 General

UDU active dive status may be temporarily suspended or permanently revoked for cause.

The temporary suspension of UDU active dive status may result for medical reasons or from minor infractions of UDU diving regulations, policies, or procedures.

Permanent revocation of dive status may result from serious conditions or violations of UDU diving regulations, policies, or procedures.

5.8.2 Temporary Suspension

Representative examples of situations and infractions leading to temporary suspension include, but are not limited to:

- Failure of a diver to maintain minimum diving proficiency on a recurring basis;
- A lapse of CPR, first aid, and/or oxygen administration;
- Failure to pass the annual Physical Fitness Qualification;
- Failure of a diver to pass a UDU diving medical examination within the prescribed, age-based interval, as determined by Medical Services Section;
- Failure of a diver to properly use or maintain UDU-issued diving gear or support equipment;
- Failure of a diver to comply with the policies and procedures of this operations guide;
- Committing a significant safety violation.

Dive certifications can be temporarily suspended for cause by the Officer-in-Charge or their designee.

5.8.3 Permanent Revocation

Representative examples of situations and infractions leading to permanent revocation include, but are not limited to:

- Flagrant violation of LAPD or UDU standards, regulations, and policies; (e.g., diving solo without a tender, diving after notification of a lapsed physical exam without obtaining reauthorization); or

- A not-fit-for-duty determination has been made by the Officer-in-Charge or their designee, following the conclusion of an Individualized Assessment Period (probationary divers).
- Serious Department misconduct which would preclude an officer or supervisor from working a field assignment.

Volume 6 Diving Equipment

6.1 General Policy

All equipment used by Underwater Dive Unit personnel shall meet Underwater Dive Unit standards.

6.2 Equipment Maintenance

An approved technician or facility must accomplish all inspections, tests, and maintenance procedures.

6.2.1 Recordkeeping

Each equipment modification, repair, test, calibration, or maintenance shall be logged, including the date and nature of work performed, serial number of item, and the name of the person performing the work for the following equipment:

- Air Filtration Systems
- Air Storage Cylinders
- Analytical Instruments
- Compressors
- Cylinder Valves
- Depth Gauges
- Dive Computers
- Gas Control Panels
- Regulators
- Scuba Cylinders
- Full Face Mask Apparatus
- Submersible Pressure Gauges
- Sonar Systems
- Remote Operated Vehicles

6.3 Regulators

SCUBA regulators used in the Underwater Dive Unit diving program shall be inspected prior to the first use and once per year thereafter.

6.4 Full Face Masks

Full Face Masks shall have the following features:

- A non-return valve at the attachment point between the mask hose, which shall close readily and positively
- An exhaust valve

- Minimum ventilation rates capable of maintaining the diver at the depth to which they are diving.

6.5 SCUBA Cylinders

SCUBA cylinders shall be designed, constructed, and maintained in accordance with the applicable provisions of the Unified Pressure Vessel Safety Orders. SCUBA cylinders must be hydrostatically tested at least every 5 years. SCUBA cylinders must have a visual cylinder inspection at intervals not to exceed 12 months. SCUBA cylinder valves shall be functionally tested at intervals not to exceed 12 months.

6.6 Auxiliary Equipment

All auxiliary equipment shall be of the type approved by the Officer-in-Charge or their designee.

- Buoyancy Compensators and weight systems shall be regularly inspected by the person to whom they are issued and being used. Additionally, these systems shall be equipped with quick release mechanisms which allow for single handed, single motion jettisoning.
- All personnel involved in the diving operation should wear personal flotation devices (PFD) appropriate to the task that they are performing. Personal flotation systems, buoyancy compensators, dry suits, or other variable-volume buoyancy compensation devices shall be equipped with a reliable, rapid exhaust valve which can be operated in a horizontal swimming position. These devices as well as any associated auto-inflation devices shall be functionally inspected and tested prior to their first use and as recommended by the manufacturer. An inflatable exposure suit by itself shall not be used as the sole source of buoyancy. Dry suits shall be equipped with a hands free exhaust valve.
- Gauges shall be inspected, tested, and calibrated prior to their use and every six months thereafter. A diver shall be aware of the calibration curve of any depth gauge that they utilize.
- A first aid kit, adequate for the diving operation shall be available at the dive site. This kit will contain a demand type oxygen system.
- Lift bags and other devices designed to lift objects from underwater shall be inspected prior to and after each use.
- All issued personal equipment shall be cleaned following each use in accordance with the manufacturer's recommendations.
- Personal equipment that is lost or unserviceable shall be reported to the Officer-in-Charge or their designee, on an Employee's Report, form 15.7.

6.7 Breathing Gas

6.7.1 Minimal Standards for Air Operations

Compressed air used for all diving activities shall meet the following specifications as well as the air quality standards:

- Minimum Oxygen Requirement: Atmospheric
- Maximum Carbon Monoxide: 0.001 % (10 ppm)
- Maximum Carbon Dioxide: 0.10 % (1000 ppm)
- Dust, Oil, and Water: None
- Odors and Vapors: None

6.7.2 Minimal Standards for Enriched Air NITROX Operations

All divers engaging in the use of Enriched Air NITROX, as a primary breathing gas, shall be properly trained and certified for the mixture being used. Prior to employing Enriched Air NITROX as a primary breathing gas, a risk assessment shall be conducted to determine the feasibility of using the gas. Enriched Air NITROX shall only be used, as a primary breathing gas, with the approval of the Officer-in-Charge or their designee. The maximum oxygen content for Enriched Air NITROX Operations is 40%.

Nothing in this section precludes the use of breathing gas with higher oxygen contents, from being used during planned decompression diving operations.

6.7.3 Compressor Systems Operated by the Underwater Dive Unit

The design and location of the system shall meet the following requirements:

- Low pressures used to supply air to the diver shall be equipped with a volume tank with a check valve on the inlet side, pressure gauge, a relief valve, and a drain valve
- Compressed air systems over 500 PSIG shall have slow opening shut-off valves.
- All air compressor intakes shall be located away from areas containing exhaust or other contaminants.
- Gas analyses and air tests shall be performed on each UDU controlled air compressor that is used to pump breathing air. These tests and analyses shall be conducted at regular intervals of no more than 200 hours of operation or annually, whichever occurs first. This will ensure compliance with minimum breathing air standards. The results of these tests shall be entered in a formal log and maintained by the Assistant Officer-in-Charge.
- Compressor operation and air test records shall be maintained for accountability.

All personnel who operate a Department air or NITROX fill station shall be certified according to nationally recognized standards.

6.8 Oxygen Safety

The following requirements regarding the use of oxygen shall be followed:

- Equipment used in oxygen or in mixtures containing over 40% oxygen shall be designated and maintained for oxygen service.
- Components exposed to oxygen or mixtures containing over 40% oxygen shall be cleaned of flammable materials prior to being placed into service.
- Oxygen systems over 125 PSIG shall have slow-opening shut-off valves.

Volume 7 Boats

7.1 Responsibilities

It is the responsibility of the boat crew to support the following (but not limited to) missions below:

- Support Underwater Dive Unit (UDU) missions
- Support Tactical Waterborne (TWB) missions
- Support HAZMAT missions
- Support United States Coast Guard (USCG) missions
- Support the Los Angeles Border Enforcement Security Team (LABEST)
- Support the Central California Maritime Agency Coordination Group (CenCal MAC)
- Support additional military units when called upon
- Support additional missions deemed necessary by the Commanding Officers, Metropolitan Division

7.2 Operations

The following considerations shall be taken into account prior to all missions. The Boat Crew supervisor shall be responsible for making underway decisions as it pertains to crew and passenger safety. If the Boat Crew supervisor is not on scene, a Boat Crew member deemed certified by the UDU Officer-in-Charge, or their designee, shall be responsible for making underway decisions as it pertains to crew and passenger safety, regardless of rank. In these critical situations, experience outweighs all other factors.

7.3 Planning

The below listed considerations shall be taken into account when planning any mission, whether it is inside a harbor or offshore:

- Weather shall be checked, both current and anticipated within the time frame of the mission.
- Equipment as it is suited for the conditions anticipated and to support the mission. Additionally, any mechanical issues affecting safety or the mission shall deem a vessel unusable.
- Personnel experience and ability shall be taken into consideration when planning a mission.
- When supporting a dive related mission, assure that all dive related safety equipment is on board prior to departure.

7.4 Minimum Requirements

The following requirements shall be met for all Boat Crew personnel. Although prior boat experience is not required, it is highly preferred:

- Active non-probationary employment as a sworn member of the Los Angeles Police Department.
- Hold a CPR certification at the Basic Life Support level, issued by a nationally recognized training agency.
- Complete the 2 week Basic Maritime Operators Course (BMOC) at the Maritime Law Enforcement Training Center (MLETC). This must be completed prior to appointment to the Boat Crew.
- Complete the 1 week Anti-Terrorism Boat Operators Course (ATBOC) tactical coxswain class during six month probation period.
- Become familiar with and understand all aspects of the Boat Crew Manual.
- Successfully perform all duties of a boat crew member during a six month probation period.

7.4.1 Oral Interview

The applicant will submit to an oral interview in accordance with Department procedures.

7.4.2 Background Investigation

The applicant will undergo a background investigation that is consistent with the standards set forth by the Commanding Officer, Metropolitan Division.

Appendix A Diving Tables

Contents

- A.1** U.S. Navy, No-Decompression Air Dive Tables
- A.2** U.S. Navy, No-Decompression Shallow Water Tables
- A.3** NOAA, No-Decompression Air Dive Tables
- A.4** NOAA NITROX 32, No-Decompression Dive Table
- A.5** NOAA NITROX 36, No-Decompression Dive Table
- A.6** U.S. Navy Equivalent Air Depth Table
- A.7** Ascent to Altitude After Diving Table
- A.8** Sea Level Equivalent Depth Table
- A.9** Pressure Variation with Altitude Table

A.1 U.S. Navy No-Decompression Air Dive Tables

Table 9-7. No-Decompression Limits and Repetitive Group Designators for No-Decompression Air Dives.

| Depth (fsw) | No-Stop Limit | Repetitive Group Designation | | | | | | | | | | | | | | | |
|-------------|---------------|------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | Z |
| 10 | Unlimited | 57 | 101 | 158 | 245 | 426 | * | | | | | | | | | | |
| 15 | Unlimited | 36 | 60 | 88 | 121 | 163 | 217 | 297 | 449 | * | | | | | | | |
| 20 | Unlimited | 26 | 43 | 61 | 82 | 106 | 133 | 165 | 205 | 256 | 330 | 461 | * | | | | |
| 25 | 595 | 20 | 33 | 47 | 62 | 78 | 97 | 117 | 140 | 166 | 198 | 236 | 285 | 354 | 469 | 595 | |
| 30 | 371 | 17 | 27 | 38 | 50 | 62 | 76 | 91 | 107 | 125 | 145 | 167 | 193 | 223 | 260 | 307 | 371 |
| 35 | 232 | 14 | 23 | 32 | 42 | 52 | 63 | 74 | 87 | 100 | 115 | 131 | 148 | 168 | 190 | 215 | 232 |
| 40 | 163 | 12 | 20 | 27 | 36 | 44 | 53 | 63 | 73 | 84 | 95 | 108 | 121 | 135 | 151 | 163 | |
| 45 | 125 | 11 | 17 | 24 | 31 | 39 | 46 | 55 | 63 | 72 | 82 | 92 | 102 | 114 | 125 | | |
| 50 | 92 | 9 | 15 | 21 | 28 | 34 | 41 | 48 | 56 | 63 | 71 | 80 | 89 | 92 | | | |
| 55 | 74 | 8 | 14 | 19 | 25 | 31 | 37 | 43 | 50 | 56 | 63 | 71 | 74 | | | | |
| 60 | 60 | 7 | 12 | 17 | 22 | 28 | 33 | 39 | 45 | 51 | 57 | 60 | | | | | |
| 70 | 48 | 6 | 10 | 14 | 19 | 23 | 28 | 32 | 37 | 42 | 47 | 48 | | | | | |
| 80 | 39 | 5 | 9 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 39 | | | | | | |
| 90 | 30 | 4 | 7 | 11 | 14 | 17 | 21 | 24 | 28 | 30 | | | | | | | |
| 100 | 25 | 4 | 6 | 9 | 12 | 15 | 18 | 21 | 25 | | | | | | | | |
| 110 | 20 | 3 | 6 | 8 | 11 | 14 | 16 | 19 | 20 | | | | | | | | |
| 120 | 15 | 3 | 5 | 7 | 10 | 12 | 15 | | | | | | | | | | |
| 130 | 10 | 2 | 4 | 6 | 9 | 10 | | | | | | | | | | | |
| 140 | 10 | 2 | 4 | 6 | 8 | 10 | | | | | | | | | | | |
| 150 | 5 | 2 | 3 | 5 | | | | | | | | | | | | | |
| 160 | 5 | | 3 | 5 | | | | | | | | | | | | | |
| 170 | 5 | | | 4 | 5 | | | | | | | | | | | | |
| 180 | 5 | | | 4 | 5 | | | | | | | | | | | | |
| 190 | 5 | | | 3 | 5 | | | | | | | | | | | | |

* Highest repetitive group that can be achieved at this depth regardless of bottom time.

A.2 U.S. Navy, No-Decompression – Shallow Water Tables

Optional Shallow Water Diving Tables

- 2-A1.1 Introduction. At the shallow depths typical of ship husbandry diving, a small change in the diver's maximum depth can make a significant difference in the allowable no-decompression time. For example, at 35 fsw the no-decompression time on air is 232 minutes; at 40 fsw it is only 163 minutes, more than an hour less. When the diver's maximum depth is accurately known at the beginning of the dive, e.g., in ballast tank dives, or when continuous electronic depth recording is available, e.g., with a decompression computer, use of a decompression table with depth listed in one-foot increments rather than five-foot increments may result in a significant gain in no-decompression time.

Shallow Water Diving Tables covering the depth range of 30–50 fsw in one-foot increments are given in Tables 2A-1 and 2A-2. These tables are simply an expansion of Tables 9-7 and 9-8 and the rules for using Tables 2A-1 and 2A-2 are identical to the rules for using Tables 9-7 and 9-8. These Shallow Water Diving Tables are optional. They may be used instead of Tables 9-7 and 9-8 if they offer a gain in no-decompression time. The Optional Shallow Water Diving Tables are most suited to ship husbandry diving, but can be used in other shallow air diving applications as well.

Table 2A-1. No-Decompression Limits and Repetitive Group Designators for Shallow Water Air No-Decompression Dives.

| Depth (fsw) | No-Stop Limit (min) | Repetitive Group Designation | | | | | | | | | | | | | | | |
|----------------|------------------------|------------------------------|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | Z |
| 30 | 371 | 17 | 27 | 38 | 50 | 62 | 76 | 91 | 107 | 125 | 145 | 167 | 193 | 223 | 260 | 307 | 371 |
| 31 | 334 | 16 | 26 | 37 | 48 | 60 | 73 | 87 | 102 | 119 | 138 | 158 | 182 | 209 | 242 | 282 | 334 |
| 32 | 304 | 15 | 25 | 35 | 46 | 58 | 70 | 83 | 98 | 114 | 131 | 150 | 172 | 197 | 226 | 261 | 304 |
| 33 | 281 | 15 | 24 | 34 | 45 | 56 | 67 | 80 | 94 | 109 | 125 | 143 | 163 | 186 | 212 | 243 | 281 |
| 34 | 256 | 14 | 23 | 33 | 43 | 54 | 65 | 77 | 90 | 104 | 120 | 137 | 155 | 176 | 200 | 228 | 256 |
| 35 | 232 | 14 | 23 | 32 | 42 | 52 | 63 | 74 | 87 | 100 | 115 | 131 | 148 | 168 | 190 | 215 | 232 |
| 36 | 212 | 14 | 22 | 31 | 40 | 50 | 61 | 72 | 84 | 97 | 110 | 125 | 142 | 160 | 180 | 204 | 212 |
| 37 | 197 | 13 | 21 | 30 | 39 | 49 | 59 | 69 | 81 | 93 | 106 | 120 | 136 | 153 | 172 | 193 | 197 |
| 38 | 184 | 13 | 21 | 29 | 38 | 47 | 57 | 67 | 78 | 90 | 102 | 116 | 131 | 147 | 164 | 184 | |
| 39 | 173 | 12 | 20 | 28 | 37 | 46 | 55 | 65 | 76 | 87 | 99 | 112 | 126 | 141 | 157 | 173 | |
| 40 | 163 | 12 | 20 | 27 | 36 | 44 | 53 | 63 | 73 | 84 | 95 | 108 | 121 | 135 | 151 | 163 | |
| 41 | 155 | 12 | 19 | 27 | 35 | 43 | 52 | 61 | 71 | 81 | 92 | 104 | 117 | 130 | 145 | 155 | |
| 42 | 147 | 11 | 19 | 26 | 34 | 42 | 50 | 59 | 69 | 79 | 89 | 101 | 113 | 126 | 140 | 147 | |
| 43 | 140 | 11 | 18 | 25 | 33 | 41 | 49 | 58 | 67 | 76 | 87 | 98 | 109 | 122 | 135 | 140 | |
| 44 | 134 | 11 | 18 | 25 | 32 | 40 | 48 | 56 | 65 | 74 | 84 | 95 | 106 | 118 | 130 | 134 | |
| 45 | 125 | 11 | 17 | 24 | 31 | 39 | 46 | 55 | 63 | 72 | 82 | 92 | 102 | 114 | 125 | | |
| 46 | 116 | 10 | 17 | 23 | 30 | 38 | 45 | 53 | 61 | 70 | 79 | 89 | 99 | 110 | 116 | | |
| 47 | 109 | 10 | 16 | 23 | 30 | 37 | 44 | 52 | 60 | 68 | 77 | 87 | 97 | 107 | 109 | | |
| 48 | 102 | 10 | 16 | 22 | 29 | 36 | 43 | 51 | 58 | 67 | 75 | 84 | 94 | 102 | | | |
| 49 | 97 | 10 | 16 | 22 | 28 | 35 | 42 | 49 | 57 | 65 | 73 | 82 | 91 | 97 | | | |
| 50 | 92 | 9 | 15 | 21 | 28 | 34 | 41 | 48 | 56 | 63 | 71 | 80 | 89 | 92 | | | |

Table 2A-2. Residual Nitrogen Time Table for Repetitive Shallow Water Air Dives.

Locate the diver's repetitive group designation from his previous dive along the diagonal line above the table. Read horizontally to the interval in which the diver's surface interval lies.

Next, read vertically downward to the new repetitive group designation. Continue downward in this same column to the row that represents the depth of the repetitive dive. The time given at the intersection is residual nitrogen time, in minutes, to be applied to the repetitive dive.

* Dives following surface intervals longer than this are not repetitive dives. Use actual bottom times in the Air Decompression Tables to compute decompression for such dives.

| | | Repetitive Group at Beginning of Surface Interval | | | | | | | | | | | | | | | |
|------------|-----|---|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|
| | | Z | O | N | M | L | K | J | I | H | G | F | E | D | C | B | A |
| Dive Depth | Z | O | N | M | L | K | J | I | H | G | F | E | D | C | B | A | |
| | 30 | 372 | 308 | 261 | 224 | 194 | 168 | 146 | 126 | 108 | 92 | 77 | 63 | 51 | 39 | 28 | 18 |
| 31 | 334 | 282 | 243 | 210 | 183 | 159 | 139 | 120 | 103 | 88 | 74 | 61 | 49 | 38 | 27 | 17 | |
| 32 | 305 | 262 | 227 | 198 | 173 | 151 | 132 | 115 | 99 | 85 | 71 | 59 | 47 | 36 | 26 | 17 | |
| 33 | 282 | 244 | 213 | 187 | 164 | 144 | 126 | 110 | 95 | 81 | 69 | 57 | 46 | 35 | 25 | 16 | |
| 34 | 262 | 229 | 201 | 177 | 156 | 138 | 121 | 105 | 91 | 78 | 66 | 55 | 44 | 34 | 25 | 16 | |
| 35 | 245 | 216 | 191 | 169 | 149 | 132 | 116 | 101 | 88 | 75 | 64 | 53 | 43 | 33 | 24 | 15 | |
| 36 | 231 | 204 | 181 | 161 | 143 | 126 | 111 | 98 | 85 | 73 | 62 | 51 | 41 | 32 | 23 | 15 | |
| 37 | 218 | 194 | 173 | 154 | 137 | 122 | 107 | 94 | 82 | 70 | 60 | 50 | 40 | 31 | 23 | 14 | |
| 38 | 207 | 185 | 165 | 148 | 132 | 117 | 103 | 91 | 79 | 68 | 58 | 48 | 39 | 30 | 22 | 14 | |
| 39 | 197 | 177 | 158 | 142 | 127 | 113 | 100 | 88 | 77 | 66 | 56 | 47 | 38 | 29 | 21 | 14 | |
| 40 | 188 | 169 | 152 | 136 | 122 | 109 | 97 | 85 | 74 | 64 | 55 | 45 | 37 | 29 | 21 | 13 | |
| 41 | 180 | 163 | 146 | 132 | 118 | 105 | 93 | 82 | 72 | 62 | 53 | 44 | 36 | 28 | 20 | 13 | |
| 42 | 173 | 156 | 141 | 127 | 114 | 102 | 91 | 80 | 70 | 61 | 52 | 43 | 35 | 27 | 20 | 13 | |
| 43 | 166 | 150 | 136 | 123 | 110 | 99 | 88 | 78 | 68 | 59 | 50 | 42 | 34 | 26 | 19 | 12 | |
| 44 | 160 | 145 | 131 | 119 | 107 | 96 | 85 | 75 | 66 | 57 | 49 | 41 | 33 | 26 | 19 | 12 | |
| 45 | 154 | 140 | 127 | 115 | 104 | 93 | 83 | 73 | 64 | 56 | 48 | 40 | 32 | 25 | 18 | 12 | |
| 46 | 149 | 136 | 123 | 111 | 101 | 90 | 81 | 71 | 63 | 54 | 46 | 39 | 32 | 25 | 18 | 12 | |
| 47 | 144 | 131 | 119 | 108 | 98 | 88 | 78 | 70 | 61 | 53 | 45 | 38 | 31 | 24 | 18 | 11 | |
| 48 | 139 | 127 | 116 | 105 | 95 | 85 | 76 | 68 | 60 | 52 | 44 | 37 | 30 | 24 | 17 | 11 | |
| 49 | 135 | 123 | 112 | 102 | 92 | 83 | 74 | 66 | 58 | 51 | 43 | 36 | 30 | 23 | 17 | 11 | |
| 50 | 131 | 120 | 109 | 99 | 90 | 81 | 73 | 65 | 57 | 49 | 42 | 35 | 29 | 23 | 17 | 11 | |

Residual Nitrogen Times (Minutes)

A.3 NOAA No-Decompression Multiple Dive Table



NOAA NO-DECOMPRESSION TABLE MULTIPLE AIR DIVES

CHART 1 – DIVE TIMES WITH END-OF-DIVE GROUP LETTER

WARNING: EVEN STRICT COMPLIANCE WITH THESE CHARTS WILL NOT GUARANTEE AVOIDANCE OF DECOMPRESSION SICKNESS. CONSERVATIVE USAGE IS STRONGLY RECOMMENDED.

RNT RESIDUAL NITROGEN TIME
+ ABT ACTUAL BOTTOM TIME
ESDT EQUIVALENT SINGLE DIVE TIME
 (USE ESDT TO DETERMINE END-OF-DIVE LETTER GROUP)

THESE CHARTS ARE BASED ON THE U.S. NAVY AIR DECOMPRESSION TABLES 7, 8, & 9 REV. 6

| DEPTH | 00 | | MAXIMUM NO-STOP TIME | | | | | | | | | | | | | | | | DIVE TIME REQUIRING DECOMPRESSION STOP | |
|-------|-----|-----|----------------------|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|--|----|
| | msw | fsw | 12 | 20 | 27 | 36 | 44 | 53 | 63 | 73 | 84 | 95 | 108 | 121 | 135 | 151 | 163 | 180 | 00 | 06 |
| 12.2 | 40 | 12 | 20 | 27 | 36 | 44 | 53 | 63 | 73 | 84 | 95 | 108 | 121 | 135 | 151 | 163 | 180 | 14 | 20 | |
| 15.2 | 50 | 9 | 15 | 21 | 28 | 34 | 41 | 48 | 56 | 63 | 71 | 80 | 89 | 92 | 100 | 110 | 130 | 4 | 8 | |
| 16.8 | 55 | 8 | 14 | 19 | 25 | 31 | 37 | 43 | 50 | 56 | 63 | 71 | 74 | 80 | 90 | 100 | 110 | 4 | 8 | |
| 18.3 | 60 | 7 | 12 | 17 | 22 | 28 | 33 | 39 | 45 | 51 | 57 | 60 | 65 | 70 | 80 | 90 | 100 | 2 | 4 | |
| 21.4 | 70 | 6 | 10 | 14 | 19 | 23 | 28 | 32 | 37 | 42 | 47 | 48 | 55 | 60 | 70 | 80 | 90 | 1 | 2 | |
| 24.4 | 80 | 5 | 9 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 39 | 45 | 50 | 55 | 60 | 70 | 80 | 1 | 2 | |
| 27.4 | 90 | 4 | 7 | 11 | 14 | 17 | 21 | 24 | 28 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80 | 1 | 2 | |
| 30.5 | 100 | 4 | 6 | 9 | 12 | 15 | 18 | 21 | 25 | 28 | 32 | 35 | 40 | 45 | 55 | 65 | 75 | 1 | 2 | |
| 33.6 | 110 | 3 | 6 | 8 | 11 | 14 | 16 | 19 | 20 | 25 | 28 | 30 | 35 | 40 | 50 | 60 | 70 | 1 | 2 | |
| 36.6 | 120 | 3 | 5 | 7 | 10 | 12 | 15 | 18 | 19 | 22 | 25 | 28 | 30 | 35 | 45 | 55 | 65 | 1 | 2 | |
| 39.6 | 130 | 2 | 4 | 6 | 9 | 10 | 12 | 15 | 18 | 20 | 22 | 25 | 28 | 30 | 40 | 50 | 60 | 1 | 2 | |

| GROUP LETTER | DIVE TIMES (hours:minutes) | | | | | | | | | | | | | | | |
|--------------|----------------------------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|
| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | Z |
| 13 | 2:20 | 3:36 | 4:31 | 5:23 | 6:15 | 7:08 | 8:00 | 8:52 | 9:44 | 10:36 | 11:29 | 12:21 | 13:13 | 14:05 | 14:58 | 15:50 |
| 150 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 21 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 142 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 29 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 134 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 37 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 126 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 45 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 118 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 55 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 108 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 64 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 99 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 74 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 89 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 85 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 78 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 97 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 66 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 109 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 54 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 122 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 41 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 136 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 27 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 152 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |
| 11 | 1:16 | 2:11 | 3:00 | 3:55 | 4:48 | 5:40 | 6:32 | 7:24 | 8:16 | 9:09 | 10:01 | 10:53 | 11:45 | 12:37 | 13:30 | 14:22 |

CHART 3 – REPETITIVE DIVE TIME
 RED NUMBERS (TOP) ARE RESIDUAL NITROGEN TIMES (RNT)
 BLACK NUMBERS (BOTTOM) ARE ADJUSTED NO STOP REPETITIVE DIVE TIME
 AND THE FOLLOWING BOTTOM TIME SHOULD NOT EXCEED THIS NUMBER

CHART 2 – SURFACE INTERVAL TIME
 Time Ranges in hours: minutes
 Enter Chart 2 from the top,
 move down to find surface interval time,
 move left to find the next repetitive group letter.

A.4 NOAA NITROX 32, No-Decompression Dive Table



NOAA NITROX 32 NO-DECOMPRESSION DIVE TABLE - Abbreviated USE ONLY WITH 32% OXYGEN 68% NITROGEN MIXTURES

WARNING: EVEN STRICT COMPLIANCE WITH THESE CHARTS WILL NOT GUARANTEE AVOIDANCE OF DECOMPRESSION SICKNESS. CONSERVATIVE USAGE IS STRONGLY RECOMMENDED

RNT RESIDUAL NITROGEN TIME
+ABT ACTUAL BOTTOM TIME
ESDT EQUIVALENT SINGLE
DIVE TIME

PO₂ has been rounded
to the next highest value

CHART 1 - DIVE TIMES WITH END-OF-DIVE GROUP LETTER

| PO ₂ | START DEPTH | | DIVE TIME REQUIRING DECOMPRESSION | | | | | | | | | | | | | | | 00 |
|-----------------|-------------|-----|---|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| | msw | fsw | MINUTES REQUIRED AT 10 fsw STOP (3 msw) | | | | | | | | | | | | | | | |
| 0.8 | 12 | 40 | 15 | 30 | 45 | 60 | 75 | 95 | 120 | 145 | 170 | 205 | 250 | 310 | 344 | 402 | 250 | |
| 0.9 | 15 | 50 | 5 | 15 | 25 | 30 | 40 | 50 | 70 | 80 | 100 | 110 | 130 | 150 | 170 | 200 | 150 | |
| 1.0 | 18 | 60 | | 10 | 15 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 150 | |
| 1.0 | 22 | 70 | | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 55 | 60 | 70 | 80 | 90 | 100 | 120 | |
| 1.1 | 25 | 80 | | 5 | 10 | 15 | 20 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80 | 90 | 110 | |
| 1.2 | 28 | 90 | | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80 | 100 | |
| 1.3 | 31 | 100 | | 5 | 10 | 12 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 90 | |
| 1.4 | 34 | 110 | | 5 | 10 | 12 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 90 | |
| 1.5 | 37 | 120 | | 5 | 7 | 10 | 15 | 20 | 22 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 80 | |
| 1.6 | 40 | 130 | | 5 | 10 | 13 | 15 | 20 | 22 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 80 | |

CHART 3 - REPETITIVE DIVE TIME

| PO ₂ | 0.8 | 0.9 | 1.0 | 1.0 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | Group Letter |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------------|
| msw | 12 | 15 | 18 | 22 | 25 | 28 | 31 | 34 | 37 | 40 | |
| fsw | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | |
| | 7 | 6 | 5 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | A |
| | 193 | 94 | 56 | 46 | 36 | 27 | 27 | 22 | 17 | 17 | B |
| | 17 | 13 | 11 | 9 | 8 | 7 | 7 | 7 | 6 | 6 | B |
| | 183 | 87 | 49 | 41 | 32 | 23 | 23 | 18 | 14 | 14 | B |
| | 25 | 21 | 17 | 15 | 13 | 11 | 11 | 10 | 10 | 10 | C |
| | 175 | 79 | 43 | 36 | 27 | 19 | 19 | 15 | 10 | 10 | C |
| | 37 | 25 | 24 | 20 | 18 | 16 | 16 | 14 | 13 | 13 | D |
| | 163 | 71 | 36 | 30 | 22 | 14 | 14 | 11 | 7 | 7 | D |
| | 49 | 38 | 30 | 26 | 23 | 20 | 20 | 18 | 16 | 16 | E |
| | 151 | 62 | 30 | 24 | 17 | 10 | 10 | 7 | 4 | 4 | E |
| | 61 | 47 | 36 | 31 | 28 | 24 | 24 | 21 | 20 | 20 | F |
| | 139 | 53 | 24 | 19 | 12 | 6 | 6 | 3 | 3 | 3 | F |
| | 73 | 56 | 44 | 37 | 31 | 29 | 29 | 26 | 24 | 24 | G |
| | 127 | 44 | 16 | 13 | 8 | 1 | 1 | 1 | 1 | 1 | G |
| | 87 | 66 | 52 | 43 | 38 | 33 | 33 | 30 | 27 | 27 | H |
| | 113 | 34 | 8 | 7 | 2 | | | | | | H |
| | 101 | 76 | 61 | 50 | 43 | 38 | 38 | 34 | 31 | 31 | I |
| | 99 | 24 | | | | | | | | | I |
| | 116 | 87 | 70 | 67 | 68 | 63 | 63 | 58 | 54 | 54 | J |
| | 84 | 13 | | | | | | | | | J |
| | 138 | 99 | 79 | 64 | 54 | 47 | 47 | 43 | 38 | 38 | K |
| | 62 | 1 | | | | | | | | | K |
| | 161 | 111 | 88 | 72 | 61 | 53 | 53 | 48 | 42 | 42 | L |
| | 39 | | | | | | | | | | L |
| | 187 | 124 | 97 | 80 | 68 | 58 | 58 | 51 | 47 | 47 | M |
| | 13 | | | | | | | | | | M |
| | 213 | 142 | 107 | 87 | 73 | 64 | 64 | 57 | 51 | 51 | N |
| | 241 | 160 | 117 | 96 | 80 | 70 | 70 | 61 | 55 | 55 | O |

CHART 3 - REPETITIVE DIVE TIME
RED NUMBERS (TOP) ARE RESIDUAL NITROGEN TIMES (RNT)
BLACK NUMBERS (BOTTOM) ARE ADJUSTED NO-STOP REPETITIVE DIVE TIMES. ACTUAL DIVE TIME SHOULD NOT EXCEED THIS NUMBER.

32

CHART 2 - SURFACE INTERVAL TIME
TIME RANGES IN HOURS:MINUTES
ENTER FROM THE TOP, MOVE DOWN TO FIND SURFACE INTERVAL TIME
MOVE TO LEFT TO FIND THE NEXT REPETITIVE GROUP LETTER

A.5 NOAA NITROX 36, No-Decompression Dive Table



NOAA NITROX 36 NO DECOMPRESSION TABLE - Abbreviated USE ONLY WITH 36% OXYGEN 64% NITROGEN MIXTURES

WARNING: EVEN STRICT COMPLIANCE WITH THESE CHARTS WILL NOT GUARANTEE AVOIDANCE OF DECOMPRESSION SICKNESS. CONSERVATIVE USAGE IS STRONGLY RECOMMENDED

RNT RESIDUAL NITROGEN TIME
+ABT ACTUAL BOTTOM TIME
ESDT EQUIVALENT SINGLE DIVE TIME

PO₂ has been rounded to the next highest value

CHART 1 - DIVE TIMES WITH END-OF-DIVE GROUP LETTER

| PO ₂ | START DEPTH | | DIVE TIME REQUIRING DECOMPRESSION | | | | | | | | | | | | | | | |
|-----------------|-----------------|-----------------|-----------------------------------|----|----|----|----|----|-----|-----|--|-----|-----|-----|-----|-----|-----|--|
| | m _{sw} | f _{sw} | NO-STOP TIME | | | | | | | | MINUTES REQUIRED AT 10 f _{sw} STOP (3 m _{sw}) | | | | | | | |
| 0.8 | 12 | 40 | 15 | 30 | 45 | 60 | 75 | 95 | 120 | 145 | 170 | 205 | 250 | 310 | 344 | 405 | | |
| 1.0 | 15 | 50 | 5 | 15 | 25 | 40 | 50 | 60 | 80 | 100 | 120 | 140 | 160 | 190 | 220 | 270 | 310 | |
| 1.1 | 18 | 60 | | 10 | 15 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 120 | 140 | 160 | |
| 1.2 | 22 | 70 | | 10 | 15 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 120 | 140 | 160 | |
| 1.25 | 25 | 80 | | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 55 | 60 | 70 | 80 | 90 | 100 | 110 | |
| 1.35 | 28 | 90 | | 5 | 10 | 15 | 20 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80 | 90 | 100 | |
| 1.5 | 31 | 100 | | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80 | 90 | |
| 1.6 | 34 | 110 | | 5 | 10 | 12 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80 | |

| PO ₂ | 0.8 | 1.0 | 1.1 | 1.2 | 1.25 | 1.35 | 1.5 | 1.6 | Group |
|-----------------|-----|-----|-----|-----|------|------|-----|-----|--------|
| m _{sw} | 12 | 15 | 18 | 22 | 25 | 28 | 31 | 34 | Letter |
| f _{sw} | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | Letter |
| | 7 | 6 | 6 | 5 | 4 | 4 | 3 | 3 | A |
| | 303 | 94 | 94 | 55 | 46 | 36 | 27 | 27 | A |
| | 17 | 13 | 13 | 11 | 9 | 8 | 7 | 7 | B |
| | 293 | 87 | 87 | 49 | 41 | 32 | 23 | 23 | B |
| | 25 | 21 | 21 | 17 | 15 | 13 | 11 | 11 | C |
| | 285 | 79 | 79 | 43 | 35 | 27 | 19 | 19 | C |
| | 37 | 29 | 29 | 24 | 20 | 18 | 16 | 16 | D |
| | 273 | 71 | 71 | 36 | 30 | 22 | 14 | 14 | D |
| | 49 | 38 | 38 | 30 | 26 | 23 | 20 | 20 | E |
| | 261 | 62 | 62 | 30 | 24 | 17 | 10 | 10 | E |
| | 61 | 47 | 47 | 36 | 31 | 28 | 24 | 24 | F |
| | 249 | 53 | 53 | 24 | 19 | 12 | 6 | 6 | F |
| | 73 | 66 | 66 | 44 | 37 | 32 | 29 | 29 | G |
| | 237 | 44 | 44 | 16 | 13 | 8 | 1 | 1 | G |
| | 87 | 66 | 66 | 52 | 43 | 38 | 33 | 33 | H |
| | 223 | 34 | 34 | 8 | 7 | 2 | | | H |
| | 101 | 70 | 70 | 61 | 50 | 43 | 38 | 38 | I |
| | 209 | 24 | 24 | | | | | | I |
| | 116 | 87 | 87 | 70 | 57 | 49 | 43 | 43 | J |
| | 194 | 13 | 13 | | | | | | J |
| | 138 | 99 | 99 | 79 | 64 | 54 | 47 | 47 | K |
| | 172 | 1 | 1 | | | | | | K |
| | 161 | 111 | 111 | 88 | 72 | 61 | 53 | 53 | L |
| | 149 | | | | | | | | L |
| | 187 | 124 | 124 | 97 | 80 | 68 | 58 | 58 | M |
| | 123 | | | | | | | | M |
| | 213 | 142 | 142 | 107 | 87 | 73 | 64 | 64 | N |
| | 97 | | | | | | | | N |
| | 241 | 160 | 160 | 117 | 96 | 80 | 70 | 70 | O |
| | 69 | | | | | | | | O |

CHART 3 - REPETITIVE DIVE TIME

00 RED NUMBER (TOP) ARE RESIDUAL NITROGEN TIMES (RNT)
00 BLACK NUMBERS (BOTTOM) ARE ADJUSTED NO-STOP REPETITIVE DIVE TIMES. ACTUAL DIVE TIME SHOULD NOT EXCEED THIS NUMBER.

36

CHART 2 - SURFACE INTERVAL TIME

TIME RANGES IN HOURS:MINUTES
ENTER FROM THE TOP, MOVE DOWN TO FIND SURFACE INTERVAL TIME
MOVE TO LEFT TO FIND THE NEXT REPETITIVE GROUP LETTER

A.6 U.S. Navy Equivalent Air Depth Table

Table 10-1. Equivalent Air Depth Table.

| Diver's Actual Depth (fsw) | EAD Feet | | | | | | | | | | | | | | | |
|----------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | 25% O ₂ | 26% O ₂ | 27% O ₂ | 28% O ₂ | 29% O ₂ | 30% O ₂ | 31% O ₂ | 32% O ₂ | 33% O ₂ | 34% O ₂ | 35% O ₂ | 36% O ₂ | 37% O ₂ | 38% O ₂ | 39% O ₂ | 40% O ₂ |
| 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 15 | 15 | 15 | 15 | 15 | 10 | 10 | 10 | 10 |
| 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 25 | 25 | 25 | 20 | 20 | 20 | 20 | 20 | 20 |
| 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 35 | 30 | 30 | 30 | 30 | 30 | 30 | 25 | 25 |
| 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 40 | 40 | 40 | 40 | 40 | 35 | 35 | 35 | 35 |
| 60 | 60 | 60 | 60 | 60 | 60 | 60 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 40 | 40 |
| 70 | 70 | 70 | 70 | 70 | 70 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 50 | 50 | 50 | 50 |
| 80 | 80 | 80 | 80 | 80 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 60 | 60 | 60 | 60 | 60 |
| 90 | 90 | 90 | 90 | 90 | 80 | 80 | 80 | 80 | 80 | 80 | 70 | 70 | 70 (:107) | 70 (:80) | 70 (:61) | 70 (:47) |
| 100 | 100 | 100 | 100 | 90 | 90 | 90 | 90 | 90 | 90 | 80 (:113) | 80 (:82) | 80 (:61) | 80 (:46) | 80 (:36) | 80 (:29) | 70 (:23) |
| 110 | 110 | 110 | 110 | 100 | 100 | 100 | 100 | 100 (:96) | 100 (:69) | 90 (:51) | 90 (:39) | 90 (:30) | | | | |
| 120 | 120 | 120 | 120 | 110 | 110 | 110 (:91) | 110 (:64) | 110 (:47) | 100 (:35) | 100 (:27) | | | | | | |
| 130 | 130 | 130 | 120 | 120 (:95) | 120 (:65) | 120 (:47) | 120 (:35) | 110 (:26) | | | | | | | | |
| 140 | 140 (:109) | 140 (:73) | 130 (:50) | 130 (:38) | | | | | | | | | | | | |
| 150 | 150 (:89) | 150 (:59) | 140 (:41) | | | | | | | | | | | | | |
| 160 | 160 (:50) | 160 (:35) | | | | | | | | | | | | | | |

EAD = Equivalent Air Depth - For Decompression Table Selection Only Rounded to Next Greater Depth

= 1.4 ata Normal working limit.

= Depth exceeds the normal working limit, requires the Commanding Officer's authorization and surface-supplied equipment. Repetitive dives are not authorized. Times listed in parentheses indicate maximum allowable exposure.

Note¹: Depths not listed are considered beyond the safe limits of NITROX diving.

Note²: The EAD, 1.4 ata Normal Working Limit Line and Maximum Allowable Exposure Time for dives deeper than the Normal Working Limit Line are calculated assuming the diver rounds the oxygen percentage in the gas mixture using the standard rounding rule discussed in paragraph 10-4.1. The calculations also take into account the allowable ± 0.5 percent error in gas analysis.

A.7 Ascent to Altitude After Diving

Table 9-6. Required Surface Interval Before Ascent to Altitude After Diving.

| Repetitive Group Designator | Increase in Altitude (feet) | | | | | | | | | |
|-----------------------------|-----------------------------|------|------|-------|-------|-------|-------|-------|-------|-------|
| | 1000 | 2000 | 3000 | 4000 | 5000 | 6000 | 7000 | 8000 | 9000 | 10000 |
| A | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 |
| B | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 | 1:42 |
| C | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 | 1:48 | 6:23 |
| D | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 | 1:45 | 5:24 | 9:59 |
| E | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 | 1:37 | 4:39 | 8:18 | 12:54 |
| F | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 | 1:32 | 4:04 | 7:06 | 10:45 | 15:20 |
| G | 0:00 | 0:00 | 0:00 | 0:00 | 1:19 | 3:38 | 6:10 | 9:13 | 12:52 | 17:27 |
| H | 0:00 | 0:00 | 0:00 | 1:06 | 3:10 | 5:29 | 8:02 | 11:04 | 14:43 | 19:18 |
| I | 0:00 | 0:00 | 0:56 | 2:45 | 4:50 | 7:09 | 9:41 | 12:44 | 16:22 | 20:58 |
| J | 0:00 | 0:41 | 2:25 | 4:15 | 6:19 | 8:39 | 11:11 | 14:13 | 17:52 | 22:27 |
| K | 0:30 | 2:03 | 3:47 | 5:37 | 7:41 | 10:00 | 12:33 | 15:35 | 19:14 | 23:49 |
| L | 1:45 | 3:18 | 5:02 | 6:52 | 8:56 | 11:15 | 13:48 | 16:50 | 20:29 | 25:04 |
| M | 2:54 | 4:28 | 6:12 | 8:01 | 10:06 | 12:25 | 14:57 | 18:00 | 21:38 | 26:14 |
| N | 3:59 | 5:32 | 7:16 | 9:06 | 11:10 | 13:29 | 16:02 | 19:04 | 22:43 | 27:18 |
| O | 4:59 | 6:33 | 8:17 | 10:06 | 12:11 | 14:30 | 17:02 | 20:05 | 23:43 | 28:19 |
| Z | 5:56 | 7:29 | 9:13 | 11:03 | 13:07 | 15:26 | 17:59 | 21:01 | 24:40 | 29:15 |
| Exceptional Exposure | Wait 48 hours before ascent | | | | | | | | | |

NOTE 1 When using Table 9-6, use the highest repetitive group designator obtained in the previous 24-hour period.

NOTE 2 Table 9-6 may only be used when the maximum altitude achieved is 10,000 feet or less. For ascents above 10,000 feet, consult NAVSEA 00C for guidance.

NOTE 3 The cabin pressure in commercial aircraft is maintained at a constant value regardless of the actual altitude of the flight. Though cabin pressure varies somewhat with aircraft type, the nominal value is 8,000 feet. For commercial flights, use a final altitude of 8,000 feet to compute the required surface interval before flying.

NOTE 4 No surface interval is required before taking a commercial flight if the dive site is at 8,000 feet or higher. In this case, flying results in an increase in atmospheric pressure rather than a decrease.

NOTE 5 For ascent to altitude following a non-saturation helium-oxygen dive, wait 12 hours if the dive was a no-decompression dive. Wait 24 hours if the dive was a decompression dive.

A.8 Sea Level Equivalent Depth Table

Table 9-4. Sea Level Equivalent Depth (fsw).

| Actual Depth (fsw) | Altitude (feet) | | | | | | | | | |
|--------------------------|-------------------------------------|------|------|------|------|------|------|------|------|-------|
| | 1000 | 2000 | 3000 | 4000 | 5000 | 6000 | 7000 | 8000 | 9000 | 10000 |
| 10 | 10 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 15 | 15 | 20 | 20 | 20 | 20 | 20 | 20 | 25 | 25 | 25 |
| 20 | 20 | 25 | 25 | 25 | 25 | 25 | 30 | 30 | 30 | 30 |
| 25 | 25 | 30 | 30 | 30 | 35 | 35 | 35 | 35 | 35 | 40 |
| 30 | 30 | 35 | 35 | 35 | 40 | 40 | 40 | 45 | 45 | 45 |
| 35 | 35 | 40 | 40 | 45 | 45 | 45 | 50 | 50 | 50 | 60 |
| 40 | 40 | 45 | 45 | 50 | 50 | 50 | 55 | 55 | 60 | 60 |
| 45 | 45 | 50 | 55 | 55 | 55 | 60 | 60 | 70 | 70 | 70 |
| 50 | 50 | 55 | 60 | 60 | 70 | 70 | 70 | 70 | 70 | 80 |
| 55 | 55 | 60 | 70 | 70 | 70 | 70 | 80 | 80 | 80 | 80 |
| 60 | 60 | 70 | 70 | 70 | 80 | 80 | 80 | 90 | 90 | 90 |
| 65 | 65 | 70 | 80 | 80 | 80 | 90 | 90 | 90 | 100 | 100 |
| 70 | 70 | 80 | 80 | 90 | 90 | 90 | 100 | 100 | 100 | 110 |
| 75 | 75 | 90 | 90 | 90 | 100 | 100 | 100 | 110 | 110 | 110 |
| 80 | 80 | 90 | 90 | 100 | 100 | 100 | 110 | 110 | 120 | 120 |
| 85 | 85 | 100 | 100 | 100 | 110 | 110 | 120 | 120 | 120 | 130 |
| 90 | 90 | 100 | 110 | 110 | 110 | 120 | 120 | 130 | 130 | 140 |
| 95 | 95 | 110 | 110 | 110 | 120 | 120 | 130 | 130 | 140 | 140 |
| 100 | 100 | 110 | 120 | 120 | 130 | 130 | 130 | 140 | 140 | 150 |
| 105 | 105 | 120 | 120 | 130 | 130 | 140 | 140 | 150 | 150 | 160 |
| 110 | 110 | 120 | 130 | 130 | 140 | 140 | 150 | 150 | 160 | 160 |
| 115 | 115 | 130 | 130 | 140 | 140 | 150 | 150 | 160 | 170 | 170 |
| 120 | 120 | 130 | 140 | 140 | 150 | 150 | 160 | 170 | 170 | 180 |
| 125 | 125 | 140 | 140 | 150 | 160 | 160 | 170 | 170 | 180 | 190 |
| 130 | 130 | 140 | 150 | 160 | 160 | 170 | 170 | 180 | 190 | 190 |
| 135 | 135 | 150 | 160 | 160 | 170 | 170 | 180 | 190 | 190 | 200 |
| 140 | 140 | 160 | 160 | 170 | 170 | 180 | 190 | 190 | 200 | 210 |
| 145 | 145 | 160 | 170 | 170 | 180 | 190 | 190 | 200 | 210 | |
| 150 | 160 | 170 | 170 | 180 | 190 | 190 | 200 | 210 | | |
| 155 | 170 | 170 | 180 | 180 | 190 | 200 | 210 | | | |
| 160 | 170 | 180 | 180 | 190 | 200 | 200 | | | | |
| 165 | 180 | 180 | 190 | 200 | 200 | | | | | |
| 170 | 180 | 190 | 190 | 200 | | | | | | |
| 175 | 190 | 190 | 200 | | | | | | | |
| 180 | 190 | 200 | 210 | | | | | | | |
| 185 | 200 | 200 | | | | | | | | |
| 190 | 200 | | | | | | | | | |
| Table Water Stops | Equivalent Stop Depths (fsw) | | | | | | | | | |
| 10 | 10 | 9 | 9 | 9 | 8 | 8 | 8 | 7 | 7 | 7 |
| 20 | 19 | 19 | 18 | 17 | 17 | 16 | 15 | 15 | 14 | 14 |
| 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 21 |
| 40 | 39 | 37 | 36 | 35 | 33 | 32 | 31 | 30 | 29 | 28 |
| 50 | 48 | 47 | 45 | 43 | 42 | 40 | 39 | 37 | 36 | 34 |
| 60 | 58 | 56 | 54 | 52 | 50 | 48 | 46 | 45 | 43 | 41 |

Note: = Exceptional Exposure Limit

A.9 Pressure Variations with Altitude Table

Table 9-5. *Repetitive Groups Associated with Initial Ascent to Altitude.*

| Altitude (feet) | Repetitive Group |
|-----------------|------------------|
| 1000 | A |
| 2000 | A |
| 3000 | B |
| 4000 | C |
| 5000 | D |
| 6000 | E |
| 7000 | F |
| 8000 | G |
| 9000 | H |
| 10000 | I |